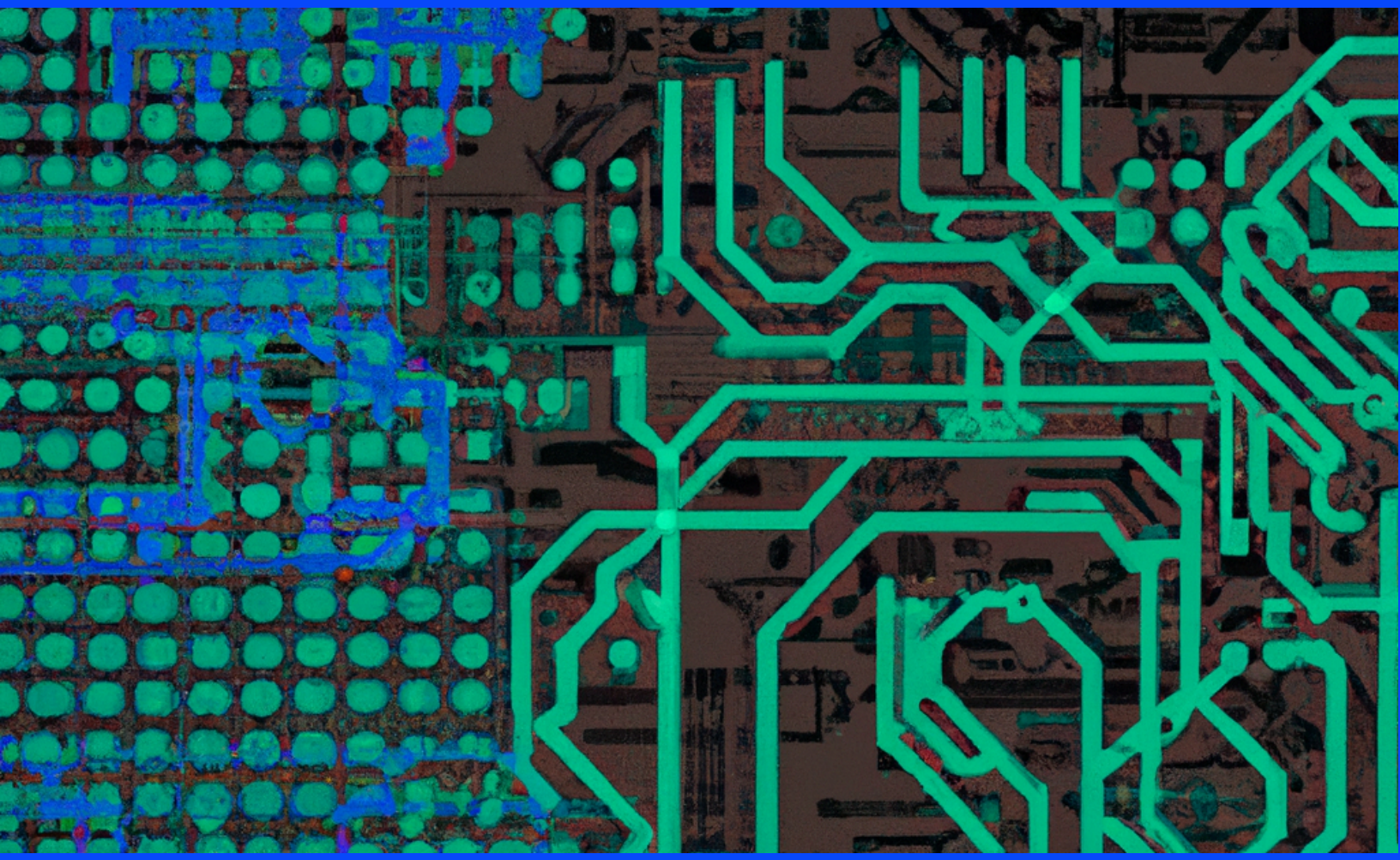

A Mismatch from the Start? A Comparison of CANeLearn Design Principles for Online Learning with NSQOL and QM Standards

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The image on the front cover was created with the assistance of DALL.E and is described as “mismatched pattern grey dot matrix under and large green circuit paths above” and is available at:

https://labs.openai.com/s/YEVUgI0YVa3Rz7plOjhhU1xn

Foreword

During my time as a leader in distance learning in British Columbia, my team and I focused on improving education for students in the public system. We did this by using various quality input methods, such as funding and legislation, to ensure high-quality programs. We also used audits and data reports to track quality outputs such as student achievement, satisfaction, and participation. Since online learning requires specific skills that were in short supply, we introduced additional measures to support the quality of the learning process. This included setting standards for program delivery and content development and implementing a review process involving external review sites. These measures were based on the government's need for accountability, research evidence, and the belief that educators want the best for their students but need support.

Looking back, I would have appreciated having a tool like the Design Principles for K-12 Online Learning – they reflect educators' desire to work in a system that will support them in obtaining better student outcomes. The provincial and national engagement processes that established the principles enables: informed decision-making for school boards and governments, increased acceptance and advocacy by educators for Principle-based policies and practices, and improved relevance based on educator experience. In other words, the principles should improve the balance between government's inevitable top-down policy creation and what educators need and experience. I can't say that every principle would have been addressed, but they would have been considered in developing and evolving the online learning model.

Why do I say this even though the Canadian eLearning Network positions the principles as a work-in-progress in this paper? Education systems constantly evolve, rendering even a perfect model today imperfect tomorrow due to changing expectations and requirements influenced by economic, technological, political, and other factors. However, within a continuous improvement environment, we can aspire to highly effective systems, and I view the Principles as a dynamic tool capable of evolving alongside these changes.

Tim Winkelmans

The authors wish to acknowledge the input from the Canadian eLearning Network committee that contributed their input to this report.

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Executive Summary

In February 2021 the Canadian eLearning Network (CANeLearn) began engaging educators across Canada in facilitated conversations about teaching in online learning environments. While the process began in British Columbia (BC) (Crichton & Kinsel, 2021), the confirmation of the derived "design principles" were shared with participants across Canada in both anglophone and francophone online programs. The resulting modified design principles from the national validation process were published by CANeLearn in February 2022 (Crichton & Childs, 2022). However, the concept of using design principles to describe the practice of K-12 online learning is relatively new so CANeLearn invited K-12 researchers to examine a variety of standards related to K-12 online learning in an effort to situate them within the CANeLearn design principles. After the analysis was completed it was found that, at best, the design principles set a context or process while the NSQOL and QM standards described an observable outcome or action. As such, it was suggested that standards could offer examples that could be used to support the Design Principles for K-12 Online Learning. Additional research needs to be done to explore that notion as well as the relationship of CANeLearn's Design Principles for K-12 Online Learning to other prevalent researched models of online learning. This report has been published with the intention to lay that foundation.

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Introduction

In February 2021 the Canadian eLearning Network (CANeLearn) began engaging educators across Canada in facilitated conversations about teaching in online learning environments. While the process began in British Columbia (BC) (Crichton & Kinsel, 2021), the confirmation of the derived "design principles" from those conversations were shared with participants across Canada in both anglophone and francophone online programs, serving as a framework for conversations about online learning design, needed support, and implementation strategies across the country. The resulting modified design principles from the national validation process were published by CANeLearn in February 2022 (Crichton & Childs, 2022).

Design principles refer to the fundamental concepts and guidelines that inform the creation and implementation of educational programs, materials, and systems (Kukulska-Hulme & Traxler, 2013), while standards tend to be more discrete, flexible, and responsive to local conditions (Bell, 2000). Further, the use of standards in K-12 distance and online learning is a well-established practice. However, the concept of using design principles to describe the practice of K-12 online learning is relatively new. As such, the purpose of this study was to examine a variety of standards related to K-12 online learning in an effort to situate them within the CANeLearn design principles. The goal of this report is to lay a foundation for further exploration of additional quality online learning models through the lens of the CANeLearn design principles.

Standards, Design Principles, and Policy

Much of the governance surrounding online learning in Canada comes from policy and legislation, as well as several Ministries of Education publish handbooks and/or separate agreements, all of which specify certain activities or standards for online learning practices

(Barbour & LaBonte, 2022). Standards refer to the expectations or benchmarks that are set for student performance and the quality of instruction (Asaqli, 2020), while practices refer to the actual methods and strategies used by educators in the classroom – in theory to achieve or exhibit a set of standards (Fullan, 2001). Standards and practices tend to be more flexible and responsive to local conditions (Bell, 2000). While practices can vary across jurisdictions, standards are descriptive consolidations of what educators deem to be 'effective practices;' often times referred to as best or promising practices. The formulation of standards in education was intended to raise professional oversight of the quality of teachers' work (Darling-Hammond, 1999), and as such were designed to ensure reforms in teachers' development and promotion could be tracked to help structure the complex work of teaching. Standards were intended to make clear the foundations of knowledge in teaching practice and, above all, help students achieve.

Design principles, however, refer to the fundamental concepts and guidelines that inform the creation and implementation of educational programs, materials, and systems (Kukulska-Hulme & Traxler, 2013). These principles can involve alignment with educational policy, goals and standards, evidence-based practices, along with the use of technology to enhance learning. Specific design principles can vary depending on the context and are considered as key elements in effective online learning design and are used to ensure that educational materials and instructional practices are aligned with learning goals and that instruction is evidence-based, student-centered, and supported by technology when appropriate.

Finally, education policies refer to the rules, regulations, and guidelines that are established by government authorities and are often more prescriptive and top-down. In some cases, these policies will use the language of standards or principles. However, in most cases

these policy-driven ‘standards’ or ‘principles’ focus more on compliance issues, and not on best or promising practices. An understanding of the influence policy and other government regulations have on education practitioner’s descriptions of effective practices for online learning and teaching or development of standards and design principles is important to bear in mind.

The Use of Standards in K-12 Online Learning

During the early stages of the development of K-12 online learning there were several standards initiatives (e.g., the Electronic Classroom of Tomorrow, the National Educational Association, the International Society for Technology and Education [ISTE], etc.), but each of these failed to gain traction within the field. The first set of standards within the K-12 online learning environment that did achieve widespread acceptance came from one of the first online programs in the United States – the Virtual High School (now referred to as the VHS Collaborative). Over a period of several years, a NetCourse Evaluation Board was established to produce, review, and revise standards for both online teaching and online course design (Espinoza et al., 1999; Yamashiro & Zucker, 1999; Zucker & Kozma, 2003). In his assessment of both the process that was undertaken and the final standards that were developed, Clark (2000) commented that the online “course quality standards and evaluation rubrics developed by Concord’s [Virtual High School] and SRI are outstanding. Both have embedded continuous internal needs assessment and evaluation procedures in their online courses and administrative processes” (pp. 24-25). In fact, it was only five years later when several national education associations representing educators, administrators, and boards proposed that the Virtual High School standards be used as the basis for an agreed upon set of national standards for online learning (Pape et al., 2005).

Interestingly, in 2006 the Southern Regional Education Board (SREB) would release online teaching and online course design standards (SREB 2006a, 2006b), which some believed were simply the VHS Collaborative standards with updated terminology. The SREB online teaching and online course design standards would later be adopted wholesale by the North American Council for Online Learning (NACOL) (later named the International Association of K-12 Online Learning [iNACOL]) in 2007 (NACOL, 2007a; 2007b), with some additions to accommodate initiatives that NACOL was involved in at the time (e.g., the Partnership for 21st Century Skills initiative [Berge & Clark, 2009]). Two years later iNACOL would release online program standards (iNACOL, 2009). After being rebranded by iNACOL, these online course standards were used as the basis for reviewing course content by the Texas Agency's Texas Virtual School Network and the California Learning Resource Network (Smith et al., 2013), while scholars also explored the possibility of research that might support the online teaching standards (Ferdig et al., 2009). These efforts, as well as a desire to create consistency with the newly released iNACOL online program standards, lead to a 2011 update to the online teaching and online course design standards (iNACOL 2011a; 2011b). Unfortunately, following a multi-year, systematic examination, Adelstein and Barbour (2016a, 2016b, 2017, 2018) reported that the iNACOL National Standards for Quality Online Courses failed to meet the threshold of reliability and validity, while Ferdig et al. (2009) were unable to identify specific K-12 distance and online learning literature to support the iNACOL National Standards for Quality Online Teaching.

At the same time that SREB-iNACOL were adopting and revising their own standards, the MarylandOnline Consortium began a grant-funded program to create a rubric for quality online course design in higher education (Legon & Runyon, 2007). This program would

eventually become Quality Matters (QM), and in 2010 would begin the process of revising and extending that rubric for use in the K-12 online environment (Barbour et al., 2014). The K-12 version of the QM standards was primarily developed in partnership with the Florida Virtual School (FLVS), which was the largest K-12 online learning program in the United States at the time (QM, 2016a). The process involved modifying the existing higher education standards to be applicable to a K-12 context through testing the reliability and validity of a revised rubric with FLVS courses, as well as examining the standards' relationship to K-12 research (Shattuck, 2015) and the existing iNACOL standards (QM, 2015).

More recently, as iNACOL began to shift its focus from K-12 online and blended learning to personalized learning and competency-based education (which included changing their name once again to the Aurora Institute), the Virtual Learning Leadership Alliance and QM assumed responsibility for the iNACOL standards and rebranded them as the National Standards for Quality in Online Learning (NSQOL) (NSQOL, 2019a; 2019b; 2019c). The Digital Learning Collaborative joined as a partner in the oversight of the NSQOL in 2021. As a part of this rebranding process, QM contracted researchers to identify relevant peer-reviewed literature and research-based publications that supported these standards (Kennedy et al., 2018; Shattuck & Birch, 2018a, 2018b); although a cursory analysis of one of these projects suggested that only about half of the literature was peer-reviewed or research-based and the extent of the support for the standards was generously applied (Barbour, 2018). The NSQOL project also relied upon teams of primarily practitioners from the field to review and suggested updates to the standards prior to their 2019 release.

While all of these efforts are described as research-supported, the only standards that were originally created using a generally accepted, reliable and valid process were those

standards produced by the VHS Collaborative and, to a lesser extent, QM. It is also important to note that all of these standards initiatives were focused on programs and organizations in the United States. In BC, where the CANeLearn design principles were first developed, standards for K-12 online learning[1] and content development had begun in 2006 (BC Ministry of Education, 2010a, 2010b). The BC standards had been developed from a review and consolidation of the iNACOL, QM, and ISTE standards, with an understanding of the Community of Inquiry framework incorporated (Winkelmans, 2010). As the province recently underwent a significant revision to its regulatory environment for K-12 online learning (Barbour et al., 2022), updated standards for K-12 online learning and online content were released (BC Ministry of Education, 2021a, 2021b), which continue to rely upon the Community of Inquiry model (Garrison et al., 2000).

Design Principles in K-12 Online Learning

In February 2018 the BC Ministry of Education appointed a panel to review and provide recommendations for changes to the funding model for public K-12 education that called for a new policy and program model for online schools with a renewed focus on the quality of the online programs (BC Ministry of Education, 2019; CANeLearn, 2019). During the implementation of those recommendations, in February 2021 CANeLearn began engaging educators in facilitated conversations about teaching in online learning environments (Crichton & Kinsel, 2021). The purpose of the CANeLearn study was to gain an understanding of the lived experiences of online educators and those who came to online education during the COVID-19 Pandemic. The study began in BC so that results could inform the work of the BC Ministry of Education's 2020-21 Quality Panel in its development of a quality assurance framework for

[1] known as 'distributed learning' at the time

online learning in the province (Hembling, 2022). While the primary audience of the initial study in BC was to inform online teacher's and education leader's practices, it also informed the published Accountability and Quality Assurance (AQA) framework (Online Learning BC, 2023). The principles derived from the initial consultation with BC teachers are listed below.

Principle 1: Access is needed to models of good learning and teaching with exemplars and a hub of curated resources and materials to support those models.

Principle 2: As COVID showed us, contexts change. Education works when it is flexible, responsive and open to change. Educators need timely supports, including professional development, wellness, community, technology, resources and materials to be flexible, responsive and open to change. Supports must reflect educators' career cycles, contexts, etc..

Principle 3: Educators and families need to develop a deep understanding the Importance of Engagement and how to foster and encourage it in Learning and Teaching.

Principle 4: Educators and families need to develop a deep understanding of ways to enhance Relationships that are academic and intellectual, including creative and social activities.

Principle 5: Recognition that technologies are the enablers of online learning and teaching. Technology support is essential for all within the system. Technologies including hardware, software, access, attention to future trends and directions. Technologies inform models of good learning and teaching not dictate them.

Principle 6: Intentional / professional preparation is needed for educators and administrators for the specific realities of online learning – post secondary

degrees, certificates, microcredentials, etc.. Mentorship is important and needs to be recognized and intentional.

Principle 7: Research is needed that is timely, strategic, focused, etc. and used to Inform policy and practice. This will help to honor the field as a field of study and add respectability.

Principle 8: System level focus on wellness/ergonomics/well being for students, teachers, families, extended families – everyone. (Crichton & Kinsel, 2021)

In November 2021 the BC study was expanded to include educators from across Canada.

The expanded study, building on the initial findings, used many of the same processes and approaches to assess the efficacy of the initial Design Principles for K-12 Online Learning but within the broader Canadian context (Crichton & Childs, 2022). The following definitions were used for the national study.

Standards: Statements defining and establishing uniform specifications and characteristics for products and/or services

Practices: The way something is regularly done

Policies: A deliberate system of guidelines to guide decisions and achieve rational outcomes

The confirmation of the principles from participants across Canada in both anglophone and francophone online programs was an important step in ensuring the principles could serve as a framework for conversations about online learning design, needed support, and implementation strategies across all provinces and territories. The following principles were derived from the national input.

Principle 1: Educators require access to models of effective online teaching and learning and a repository of open, curated resources to support their practice.

Principle 2: Educators require ongoing, timely and relevant professional learning opportunities and supports that (1) model effective online teaching and learning design principles and (2) are fostered and honed through the development of supportive and flexible learning communities that reflect educators' career cycles and contexts.

Principle 3: Educators, families, and the school community require a deep understanding of the importance of various forms of engagement, including how to foster it in learning, teaching, and educational resources.

Principle 4: Educators and families require a deep understanding of ways to enhance relationships and foster connection and relatedness with students in academic, intellectual, creative, and social activities.

Principle 5: Educators require support in understanding that (1) technologies are the enablers of online teaching and learning and (2) the technologies support, not dictate, effective teaching and learning.

Principle 6: Educators require intentional professional preparation specific to online teaching and learning in post-secondary degree, certificate, and micro-credential programs that is supported by formal, intentional mentorship programs throughout the educator career cycle.

Principle 7: Educators require ongoing strategic research specific to teaching and learning online to inform both practice and policy and contribute to the field of study.

Principle 8: Educators and the entire school community require a system-level focus on health, wellness, and well-being specific to teaching and learning online.

These CANeLearn Design Principles for K-12 Online Learning are one of the only sets – possible the only set - of design principles specifically focused on the K-12 online learning context.

Methodology

The purpose of this study was to examine a variety of standards related to K-12 online learning in an effort to situate them within the CANeLearn design principles. The process of comparing standards and competencies is a common practice. As was mentioned above, Ferdig et al. (2009) compared the NACOL online teaching standards with 12 different sets of online learning standards, while QM (2015) compared their online course design standards to the ones released by iNACOL – even British Columbia reviewed their own standards through the lens of the iNACOL, QM, and ISTE standards (Winkelmans, 2010). Similarly, Pulman and Graham (2018) compared 10 different sets of online learning standards and eight different sets of blended learning standards. More recently, the NSQOL project created a crosswalk between their own online teaching standards and the Danielson Framework for Teaching (Digital Learning Collaborative et al., 2023). In the case of this study, the researchers chose the NSQOL Program Standards, Teaching Standards, and Course Standards (NSQOL, 2019a; 2019b; 2019c) as the most commonly adopted K-12 online learning standards, along with the QM K-12 Rubric for Course Design, Fifth Edition, and Online Instructor Skills Set, primarily used and developed for the higher education sector (QM, 2016b; 2020) as the most commonly used research-supported K-12 online learning standards, to compare with the CANeLearn Design Principles for K-12 Online Learning.

A common strategy to use when engaged in the development, alignment, or comparison of any type of standards is to have reviewers independently undertake the task, and then compare the inter-rater reliability between the reviewers (Brennan & Hays, 2007; Taggart et al., 1998). Inter-rater reliability is a form of triangulation (Denzin, 1978), which is a method used to assess the accuracy of a specific point using different inputs. Basically, inter-rater reliability is having two or more individuals undertake a task, and then compare the level of consistency in their responses. As noted by Neuendorf (2002), an agreement level of 90% is always acceptable, and even an agreement level of 80% is acceptable in most situations.

In this instance, two reviewers were tasked with independently reviewing the NSQOL Program Standards, Teaching Standards, and Course Standards (NSQOL, 2019a; 2019b; 2019c), along with the QM K-12 Rubric for Course Design and Online Instructor Skills Set (QM, 2016b; 2020), to determine which – if any – of the CANeLearn design principles it aligned to. The level of agreement between the two reviewers is shown in Table 1.

Table 1.

Inter-rater reliability by type of standards

Standard Set	Reviewer 1: # aligned	Reviewer 2: # aligned	# of disagreements
NSQOL Program	60	62	3
NSQOL Teaching	132	119	13
NSQOL Course	44	46	4
QM K-12 Course	51	51	0
QM Instructor Skills	41	40	1
Total codes	328	318	21

Regardless if you compare the total number of differences with the average number of standards that each reviewer felt aligned or the total number of standards that both reviewers indicated aligned, the level of agreement is over 90% in both instances (i.e., 93% or 97% respectively). In instances where there was disagreement, the reviewers came together to discuss the nature of the disagreement and collectively decided on whether to align the standard or not.

Results

The following sub-sections explore the alignment of these standards to each of the CANeLearn design principles – first by examining the alignment to the three NSQOL standards and then the two QM standards.

Design Principle 1

The original wording for the first design principle published in *Design Principles for Online Learning: British Columbia Study* read:

> Principle 1 – Access is needed to Models of Good Learning and Teaching with Exemplars and a Hub of Curated Resources and Materials to Support those Models.

In the National Study, this principle's wording was simplified but even in this original version, the first design principle was focused specifically on the need for exemplars and resources drawn from others' experiences and/or the research on K-12 online learning. The principle underscored the need for educators to share models and resources for others to have access in order to teach effectively in the online environment. The first principle also spoke directly to the need for investments in developing research-driven models of effective online pedagogy, combined with quality online learning courses and resources. Additionally, the principle focused on the notion that for educators to learn how to teach online effectively, they should be exposed to models of online instruction. Coupled with pre-made course materials and resources developed specifically

for online delivery, such investments would ensure that educators have the tools and knowledge to offer students quality online learning.

When viewed in this context of effective online learning, both the NSQOL and QM K-12 Rubric Standards for Course Design and Online Instructor Skills Set help us to understand in more detail what these models and resources might look like. Table 2 provides a summary of the alignment of the NSQOL standards to this principle.

Table 2.

Alignment of Design Principle 1 with various NSQOL standards

1. Educators require access to models of effective online teaching and learning and a repository of open, curated resources to support their practice.		
NSQOL Program Indicators	NSQOL Teaching Indicators	NSQOL Course Indicators
B1, B2 C1, C2, C3 D2 F1, F2 G1, G2 H2 I1, I2, I3, I4, I5, I6, I7, I8, I9, I10 J1, J2, J3, J4, J5 K1, K2, K3, K4	B1, B2, B3, B4, B5 C1, C2, C3, C4, C5 D1, D2, D3, D4, D5, D6, D7 E1, E2, E3, E4 F1, F2, F3, F4, F5, F6, F7 G1, G2, G3, G4, G5, G6, G7, G8 H1, H2, H3, H4, H5, H6	A1, A2, A3, A4, A5, A6, A7, A8 B1, B2, B3, B4, B5, B6, B7, B8, B9, B10 C1, C2, C3, C4, C5, C6, C7, C8, C9 D1, D2, D3, D4, D5 E1, E2, E3, E4, E5 F1, F2, F3, F4, F5 G1, G2, G3

M1, M2, M3, M4, M5, M6, M7 N1, N2, N3, N4		

There are a number of indicators from the NSQOL Online Program Standards that aligned to models for effective online teaching and learning. For example, the indicators related to Standard I (i.e., "a quality online program will adopt and implement instructional design methods that enable effective online instruction for both institutionally developed courses as well as licensed content from other sources") or Standard J (i.e., "a quality online learning program takes a comprehensive and integrated approach to ensuring excellent teaching for its students") are focused on ensuring there are effective online teaching and learning models. Similarly, most of the quality online teaching standards provide descriptions of exemplars that would comprise a quality online teaching and learning model. Quality program indicators (such as Standard M, which describes program support for learners and Standard N, which describes program evaluation) have an even less direct relationship, focusing on supporting and measuring the effectiveness of an effective online teaching and learning model. Most of the NSQOL standards do not focus on the description of a particular model or design of effective online teaching and learning, however, it is only Quality Online Programs Standard I: Curriculum & Course Design, which reads "a quality online program will adopt and implement instructional design methods that enable effective online instruction for both institutionally developed courses as well as licensed content from other sources" that could be directly aligned to this design principle.

Regarding the second part of this design principle (i.e., resources that are available to educators), it was not surprising that most of the individual indicators from the NSQOL Online Teaching Standards and NSQOL Online Course Standards align with this portion of Design

Principle 1. However, it is important to understand the nature of the alignment between the design principle and the NSQOL Online Teaching Standards and NSQOL Online Course Standards. For example, listed below are a sample of the standards that represent examples of effective online teaching and learning.

- Online Teaching Standard B – The online teacher supports learning and facilitates presence (teacher, social, and learner) with digital pedagogy.
- Online Teaching Standard C – The online teacher facilitates interactions and collaboration to build a supportive online community that fosters active learning.
- Online Teaching Standard D – The online teacher promotes learner success through interactions with learners and other stakeholders and by facilitating meaningful learner engagement in learning activities.
- Online Course Standard C – The online course incorporates instructional materials, activities, resources, and assessments that are aligned to standards, engage all learners, and support the achievement of academic goals.

However, these standards are not focused on the description of specific models of online teaching and learning or what specific types of resources can support online teaching and learning. Instead, they are examples of components that could be found in an effective model or course, much like a list of component parts without a clear picture of what they comprise collectively.

In much the same way that the NSQOL Online Course Standards could be aligned to Design Principle 1 because of their focus on the design of asynchronous online course content. Design Principle 1 also aligned with the QM K-12 Rubric and the QM Online Instructor Skills Set, which was generally focused on the instructor being knowledgeable about or understanding

various aspects of effective online teaching and learning (see Table 3). While the alignment of Design Principle 1 was indirect, the QM skills set did offer a description of specific models of online teaching and learning, or at the least examples of resources that could be used to support online teaching and learning.

Table 3.

Alignment of Design Principle 1 with various QM standards

1. Educators require access to models of effective online teaching and learning and a repository of open, curated resources to support their practice	
QM K-12 Rubric Specific Review Standards	QM Online Instructor Skills
1.1 T, 1.2 C, 1.3 T, 1.4 T, 1.5 T, 1.6 T, 1.7 C, 1.8 C 2.1 C, 2.2 C, 2.3 C, 2.4 C 3.1C, 3.2 C, 3.3 C, 3.4 C, 3.5 C 4.1 C, 4.2 C, 4.3 C, 4.4 C, 4.5 C, 4.6 C, 4.7 C 5.1 C, 5.2 C, 5.3 C, 5.4 C, 5.5 C 6.1 C, 6.2 T, 6.3 T, 6.4 T 7.1T, 7.2 T, 7.3 T, 7.4 T 8.1 T, 8.2 C, 8.3 C, 8.4 C, 8.5 T, 8.6 T	II. Technologies III. Instructional Design IV. Pedagogy V. Assessment VI. Social Presence

In summary, instructional design, assessment, learning support, course standards, and overall program evaluation could be mapped to models of effective online teaching as those standards were designed to describe quality online learning programs. Design Principle 1 focuses on the need for exemplars of effective online practice, as well as the design of online learning resources, courses, and programs that quality teaching and course standards describe. Further, the additional QM K-12 Rubric's Specific Review Standards could be mapped to this principle for

the same reasons. The QM Online Instructor Skills Set also aligned well given they described instructor competencies for the use of technologies, instructional design, and pedagogy online, as well as the maintenance of effective assessment and social presence for instructing online, all part of effective online teaching and learning.

Design Principle 2

In its original version produced from the study of British Columbia online educators, the second design principle read:

> Principle 2 – As COVID showed us, contexts change. Education works when it is flexible, responsive and open to change. Educators need timely supports, including PD, wellness, community, technology, resources and materials to be flexible, responsive and open to change. Supports must reflect educators' career cycles, contexts, etc.

While the national study participants did not suggest changes to this design principle, the researchers edited it to its current form, removing the reference to COVID along with slight modifications that were informed by what was heard in design conversations in the initial BC study and their collective expertise in the field. This editing was done for consistency in wording with the other principles. Essentially, the main thrust of this design principle, in its original and edited version, is that in order to deliver effective online teaching and learning, educators need to be provided with professional learning and require the development of individual professional learning communities.

The table below maps the relationship of the second design principle to the NSQOL standards.

Table 4.

Alignment of Design Principle 2 with various NSQOL standards

2. Educators require ongoing, timely and relevant professional learning opportunities and supports that (1) model effective online teaching and learning design principles and (2) are fostered and honed through the development of supportive and flexible learning communities that reflect educators' career cycles and contexts.		
NSQOL Program Indicators	NSQOL Teaching Indicators	NSQOL Course Indicators
B4 C1, C2, C3 G2 I6, I9, I10 J1, J2, J3, J4, J5 K1, K2, K3, K4 L1, L2, L3, L4, L5 N5, N7, N8, N9	A1, A2, A3, A5, A6, A7 B1, B2, B3, B4, B5 C1, C2, C3, C4, C5 D1, D2, D3, D4, D5, D6, D7 E1, E2, E3, E4 F1, F2, F3, F4, F5, F6, F7 G1, G2, G3, G4, G5, G6, G7, G8 H1, H2, H3, H4, H5, H6	

There are a number of indicators from the NSQOL Online Program Standards that could be tangentially aligned to this design principle. For example, an argument could be made that indicators related to Standard J (i.e., "a quality online program takes a comprehensive and integrated approach to ensuring excellent teaching for its students") or Standard K (i.e., "a quality online learning program values positive learner outcomes and takes a comprehensive, integrated approach to measuring and monitoring progress toward defined learning objectives") are focused on effective online teaching and learning and therefore would be included in any

professional learning an educator might receive. Similarly, the indicators from Standard N on program evaluation focused on the effectiveness of course delivery and the online teacher, in general, were somewhat related to effective online teaching and learning. However, none of these indicators or NSQOL standards truly focused on the provision of professional learning opportunities or the development of a learning community. In fact, it was only the five indicators related to Standard L, which read "a quality online program supports faculty and staff by providing mentoring, technical assistance, and timely professional development" that were well aligned to this design principle.

In a similar fashion, it was not surprising that most of the individual indicators from the NSQOL Online Teaching Standards were somewhat aligned to this design principle. The design principle is focused specifically on the provision of professional learning for educators on how to teach effectively in the online environment. But it is also important to once again understand the nature of the alignment between Design Principle 2 and the NSQOL Online Teaching Standards. For example, standards such as the ones listed below were a sample of the standards that represent examples of effective online teaching and learning – but these standards were not focused on the provision of professional learning opportunities.

- Standard B – The online teacher supports learning and facilitates presence (teacher, social, and learner) with digital pedagogy.
- Standard C – The online teacher facilitates interactions and collaboration to build a supportive online community that fosters active learning.
- Standard D – The online teacher promotes learner success through interactions with learners and other stakeholders and by facilitating meaningful learner engagement in learning activities.

By the same token, the only standard in the NSQOL Online Teaching Standards that was squarely aligned to Design Principle 2 was "the online teacher demonstrates professional responsibilities in keeping with the best practices of online instruction" because it was the only one that is focused on professional learning. It is worth noting that even with this apparent alignment, this standard places the onus for professional learning on the online teacher – as opposed to those responsible for providing the online learning as implied by the design principle.

Further, as this design principle is focused on the act of teaching and learning, it was also not surprising that there was no alignment with any of the indicators from the NSQOL Online Course Standards. These NSQOL standards are focused solely on the design of asynchronous online course content, and not on the delivery of asynchronous or synchronous online instruction. In much the same way that the NSQOL Online Course Standards did not align to Design Principle 2 because of their focus on the design of asynchronous online course content, Design Principle 2 also did not align with any of the QM K-12 Rubric (see Table 5).

Table 5.

Alignment of Design Principle 2 with various QM standards

2. Educators require ongoing, timely and relevant professional learning opportunities and supports that (1) model effective online teaching and learning design principles and (2) are fostered and honed through the development of supportive and flexible learning communities that reflect educators' career cycles and contexts.	
QM K-12 Rubric Specific Review Standards	QM Online Instructor Skills
	II. Technologies III. Instructional Design IV. Pedagogy

	V. Assessment VI. Social Presence

Similarly, while the QM Online Instructor Skills Set are generally focused on the instructor being knowledgeable about or understanding various aspects of effective online teaching and learning, as such the alignment with Design Principle 2 was tangential at best.

Design Principle 3

The first version of the third design principle published in the first study of British Columbia online educators read:

Principle 3 – Educators and families need to develop a deep understanding the Importance of Engagement and how to foster and encourage it in Learning and Teaching

The national study broadened and specified the role that the school community played as well and that engagement also included content that is part of the educational resources used. The editing was also done for consistency in wording and alignment with the other principles. Essentially, the main focus of this design principle, in its original and edited version, is that for effective engagement to occur in online teaching and learning, educators need to review and restructure instructional practices and their own instructional design and, at the same time, resource design must also include active engagement for the learner. Table 6 links the relationship of this principle to the NSQOL standards of which only the two teaching standards and one course standard have a direct relationship with the design principle as they speak to learner engagement, but not the need to understand the importance this engagement.

Table 6.

Alignment of Design Principle 3 with various NSQOL standards

3. Educators, families, and the school community require a deep understanding of the importance of various forms of engagement, including how to foster it in learning, teaching, and educational resources.		
NSQOL Program Indicators	NSQOL Teaching Indicators	NSQOL Course Indicators
A3, A4, A5 C3 D4 G2 H1 M1, M2, M3, M4, M7 N10	D4, D7	C8

Design Principle 3 describes the need for all parties in the educational process, students, parents, teachers, resource creators, and the entire school community, to understand that intentional design, oversight, and direct action specific to the online environment is critical to learner engagement. While NSQOL course indicator C8 in Standard C – Instructional Design states that course design "provides opportunities for learner-instructor interaction", there is only an implied need for teachers to understand online interactions before they can plan and participate in them which this standard describes. In essence, the design principle sets a context whereas the standards describe observable outcomes of this planning to create that interaction but not the need for this understanding. Similarly, teaching indicators D4 and D7 reinforce the importance of deliberate actions taken by the teacher to build relationships to foster student engagement, but

do not directly address the need for teachers, students, and parents to understand why. Again, it is merely an observable example of this need being acted on and there may well be other such examples that may not be included in these standards.

The importance of parents, school community, and others with a direct interest in the student's success to understand the need for a broad level of engagement is arguably indirectly linked with several NSQOL program standards that specify organizational responsibilities and strategies for the school community to support student engagement and success and only loosely linked to this principle. For example, program indicators A3, A4, and A5 speak to the importance of a mission statement to communicate with the public and are only generally associated with this design principle and program indicator G2 may highlight the importance of communication with student and families but it is to "personalize programs", not to understand the need for learner engagement Table 7 provides alignment of the third design principle with the QM K-12 Rubric.

Table 7.

Alignment of Design Principle 3 with various QM standards

3. Educators, families, and the school community require a deep understanding of the importance of various forms of engagement, including how to foster it in learning, teaching, and educational resources.	
QM K-12 Rubric Specific Review Standards	QM Online Instructor Skills
5.4 C, 5.5 C	I. Institutional Context II. Technologies III. Instructional Design IV. Pedagogy

	V. Assessment VI. Social Presence VII. Faculty Hiring

As with other design principles, any alignment of Design Principle 3 to the QM K-12 Rubric's Course Standards and Instructors Skills Set was indirect at best. QM Course Specific Review Standards 5.4 C and 5.5 C could be associated with this principle with a call for "instructor responsiveness and availability," as well as "requirements for learner interaction are clearly stated" indicating to students their responsibility to be active participants in the course, but like with the NSQOL standards and QM skills set are observable outcomes of creating "a deep understanding of the importance of various forms of engagement."

Design Principle 4

> The original version of Design Principle 4 read:
>
> Principle 4 – Educators and families need to develop a deep understanding of ways to enhance Relationships that are academic and intellectual, including creative and social activities.

The national study simplified the wording for consistency and alignment with the other principles without altering the principle all that much. Like the previous design principle, the focus is on deepening understanding; whereas the NSQOL and QM standards, at best, offer examples of establishing relationships and connections through course activities and social interactions, often overlooked in online instruction.

Table 8 offers the general categorization of NSQOL standards that provide some examples of general activities that could address the goal of deepening both cognitive and social connections that support creative activity in online teaching and learning but like the third

principle not directly addressing the importance of all educators and families in understanding the importance.

Table 8.

Alignment of Design Principle 4 with various NSQOL standards

4. Educators and families require a deep understanding of ways to enhance relationships and foster connection and relatedness with students in academic, intellectual, creative, and social activities.		
NSQOL Program Indicators	NSQOL Teaching Indicators	NSQOL Course Indicators
C3 G2 H1 M1, M2, M3, M4, M7 N10	A4 D4, D7	

While the research did not find any connection to the NSQOL course standards, NSQOL Teaching Standard D – Learner Engagement indicated the general responsibility of the teacher to communicate with parents and the educational community (i.e. "the online teacher promotes learner success through interactions with learners and other stakeholders and by facilitating meaningful learner engagement in learning activities"). The NSQOL program standards did not specifically address the need or reason for fostering understanding of how relationships were created in an online learning environment, rather provided a few examples of planning to support that opportunity such as providing "a productive collaborative environment" (C3), "faculty and staff work with students and families to personalize programs" (G2), and offer an orientation to the learning tools, services, and processes (M1, M2, M3, and M4). Program indicator M7 states

there are guidance and advising services to support success, which are methods of achieving the intent of Design Principle 4 but not directly associated with its purpose.

Table 9 offers similar limitation with the Quality Matters standards.

Table 9.

Alignment of Design Principle 4 with various QM standards

4. Educators and families require a deep understanding of ways to enhance relationships and foster connection and relatedness with students in academic, intellectual, creative, and social activities.	
QM K-12 Rubric Specific Review Standards	QM Online Instructor Skills
	I. Institutional Context II. Technologies III. Instructional Design IV. Pedagogy V. Assessment VI. Social Presence VII. Faculty Hiring

As with previous design principles, the table reflects the limited connections with the QM Instructor Skills Set and the lack of any direct connection with the Course Standards. At best the QM indicators offer only limited examples of how this principle could be met.

Design Principle 5

The fifth design principle centred on the technologies used in online learning and the importance for educators of understanding their influence on pedagogy. The original version of Design Principle 5 read:

> Principle 5 – Recognition that technologies are the enablers of online learning and teaching. Tech Support is essential for all within the system. Technologies including hardware, software, access, attention to future trends and directions. Technologies inform Models of Good Learning and Teaching not dictate them.

The national study revised this principle to emphasize that, while technologies may be enablers of online learning, they should support, not dictate, how that learning occurred. Table 10 maps the revised principle to all three of the NSQOL standards that focus on the role and use of technology tools for instruction and learning, some specific to the implied 'pedagogy first, technology second' message for this design principle, others with an indirect or implied connection.

Table 10.

Alignment of Design Principle 5 with various NSQOL standards

5. Educators require support in understanding that (1) technologies are the enablers of online teaching and learning and (2) the technologies support, not dictate, effective teaching and learning.		
NSQOL Program Indicators	NSQOL Teaching Indicators	NSQOL Course Indicators
I4 L5	A5 B1, B2, B3, B4, B5 D1 F5 G1	A5 F2, F3

The NSQOL program standards only have a very limited and loose connection to purposeful selection of technology that supports quality teaching and learning. Program indicator I4

suggests that technologies should "enhance the learning experience" and L5 that technical support should be provided, but neither imply that instructional planning should precede and drive the selection of the technology. The teaching indicators describe the role of technology as central to online learning, yet, only one, A5, comes close to 'pedagogy first' merely states that teachers have an understanding of online learning but not its interconnectedness to technology use and selection. Finally, Course Standard F – Technology directly addresses the role of technology (i.e. "the technologies enabling the various course components facilitate active learning and do not impede the learning process") yet, while focused on technology use and students, are only tangentially related to a 'pedagogy first, technology second' principle. For example, indicators F2 and F3 merely specify that teachers ensure "course tools support the learning objectives" and "adapt learning activities to accommodate learners' needs and preferences."

In the case of the QM course standards there was a tighter alignment, but with only one set of the standards (see Table 11).

Table 11.

Alignment of Design Principle 5 with various QM standards

5. Educators require support in understanding that (1) technologies are the enablers of online teaching and learning and (2) the technologies support, not dictate, effective teaching and learning.	
QM K-12 Rubric Specific Review Standards	QM Online Instructor Skills
1.3 T, 1.4 T 6.1 C, 6.2T, 6.3 T, 6.4 T 8.5 T	I. Institutional Context II. Technologies III. Instructional Design

	IV. Pedagogy V. Assessment VII. Faculty Hiring

The QM Specific Review Standards 1.3 T, 1.4 T, and 8.5 T had only a marginal association to the use of technologies and did not address the relationship between pedagogy and technology selection. However, Standard 6 – Course Technology in the QM K-12 Rubric speaks directly to the relationship between technology and instruction with "tools support the learning objectives" (6.1 C), "facilitate student engagement…[and] active learning" (6.2 T), and address student confidentiality and are current (6.3 T and 6.4 T). As for the QM instructional skills set, there was also only a tangential connection to Design Principle 5 because they failed to address the critical importance of technology selection and support being done for purposefully designed instruction in the online learning environment.

Design Principle 6

The sixth design principle, in its original wording and intent, argued for the need for online teachers to have training specific to the online learning environment combined with ongoing support and mentorship.

> Principle 6 – Intentional/professional preparation is needed for educators and administrators for the specific realities of online learning – post secondary degrees, certificates, micro-credentials, etc. Mentorship is important and needs to be recognized and intentional.

The national study only saw a slight modification of the original principle's wording without changing the intent of the need for preparation and ongoing support for teachers. Table 12 indicates that several NSQOL program and teaching standards aligned with this need. However,

not surprisingly, there was nothing found in the course standards that addressed professional learning and support.

Table 12.

Alignment of Design Principle 6 with various NSQOL standards

6. Educators require intentional professional preparation specific to online teaching and learning in post-secondary degree, certificate, and micro-credential programs that is supported by formal, intentional mentorship programs throughout the educator career cycle.		
NSQOL Program Indicators	NSQOL Teaching Indicators	NSQOL Course Indicators
B2 D2 I3, I4, I5, I6, I7, I8, I9, I10 J1, J2, J3, J4, J5 K1, K2, K3, K4 L1, L2, L3, L4, L5	A1, A2, A3, A5, A6, A7 B1, B2, B3, B4, B5 C1, C2, C3, C4, C5 D1, D2, D3, D4, D5, D6, D7 E1, E2, E3, E4 F1, F2, F3, F4, F5, F6, F7 G1, G2, G3, G4, G5, G6, G7, G8 H1, H2, H3, H4, H5, H6	

As you can see from the above table, many of the NSQOL program standards were matched to this design principle. Program indicators B2 and D2 spoke to program governance with specific planning for teacher professional learning while Standards I (Curriculum and Course Design), J (Instruction), and K (Assessment and Learner Performance) described specific requirements for online teachers, arguably defining a focus for both ‘induction’, or online pre-service training, and mentoring. Program Standard I described online course design requirements, J instructional

accountabilities, and K learner assessment and performance expectations. However, however, only one was clearly focused on professional learning, Standard L – Faculty and Staff Support (i.e. "a quality online program supports faculty and staff by providing mentoring, technical assistance, and timely professional development"). Both the design principle and the standard specifically mention online teaching preparation and ongoing mentoring. Standard L uses directive language such as "program provides and encourages" (L1) while Design Principle 6 uses "intentional" and "formal" indicating responsibilities that are outside of the individual teacher's regular practice.

Design Principle 6 was also mapped to many of the NSQOL teaching standards which focused on teacher skills and responsibilities that included understanding online pedagogy, learner engagement, assessment, and digital citizenship in combination with instructional design skills and the ability to personalize learning within this environment. Not unlike the QM Instructor Skills Set in Table 13, the relationship to these standards were incidental and not direct, but did provide examples that could have a specific role and purpose related to the need for continuing professional learning induction and mentorship as they described specific skills required to teach online.

Table 13.

Alignment of Design Principle 6 with various QM standards

6. Educators require intentional professional preparation specific to online teaching and learning in post-secondary degree, certificate, and micro-credential programs that is supported by formal, intentional mentorship programs throughout the educator career cycle.	
QM K-12 Rubric Specific Review Standards	QM Online Instructor Skills
	I. Institutional Context

	II. Technologies III. Instructional Design IV. Pedagogy V. Assessment VI. Social Presence VII. Faculty Hiring

While most of the QM Online Instructor Skills Set did not have a direct relationship to Design Principle 6, Skill Set VII Faculty Hiring does outline the need for faculty/instructors to meet the "academic and/or professional standards in their chosen field of teaching." Like the NSQOL teaching standards, the remaining items describe instructor competencies regarding the use of technologies, understanding instructional design, and pedagogy online, as well as the need for maintenance of effective assessment and social presence when instructing online. While these are all part of effective online teaching and learning, they do provide a clear outline of the competencies required for any professional learning specific to teaching online. As such, the QM skills provide a research-based insight and validation of the required core competencies and topics for online teacher training which this principle calls for.

Design Principle 7

In the original BC-based research, the seventh design principle for online learning introduced the need for specific research for K-12 online teaching and learning:

> Principle 7 – Research is needed that is timely, strategic, focused, etc. and used to Inform policy and practice. This will help to honor the field as a field of study and add respectability.

The rewording of the principle based on the national input created a more precisely worded principle specific to the need for strategic research on both practice and policy relevant to educators in the field of online learning. However, when cast against the NSQOL standards that describe program, teaching, and course design expectations, a specific call for research related to these "quality" practices was not found other than a, at best, weak link to program planning and instruction that was guided by "evidence-based practices" (see Table 14).

Table 14.

Alignment of Design Principle 7 with various NSQOL standards

7. Educators require ongoing strategic research specific to teaching and learning online to inform both practice and policy and contribute to the field of study.		
NSQOL Program Indicators	NSQOL Teaching Indicators	NSQOL Course Indicators
D2 J2		

As indicated in the above table, the design principles go beyond a specific focus related to online teaching practice and address more of the educational context within which these practices occur. The design principles speak less to individual teachers and more to online program leaders often, as demonstrated above by only a short reference to "evidence-based", beyond just an operational practices view which the standards reflect.

Finally, as before, while the QM instructor skills set a framework for research into effective, quality practice, they do not specifically call for additional research into quality online learning (see Table 15).

Table 15.

Alignment of Design Principle 7 with various QM standards

7. Educators require ongoing strategic research specific to teaching and learning online to inform both practice and policy and contribute to the field of study.	
QM K-12 Rubric Specific Review Standards	QM Online Instructor Skills
	I. Institutional Context II. Technologies III. Instructional Design IV. Pedagogy V. Assessment VI. Social Presence VII. Faculty Hiring

This was likely a result of the fact that, unlike the NSQOL standards, the QM K-12 Rubric standards and Online Instructor Skills (were derived directly from research specific to online learning (unlike the NSQOL standards that were largely developed by practitioners). Accordingly, the QM instructor skills description provides a framework for the research this design principle calls for much in the same way the instructor skills set a professional learning agenda for Design Principle 6.

Design Principle 8

The eighth and final design principle for online learning came out of the focus during the pandemic era for the need of those isolated at home to develop clear systems for regular physical activity and social well-being (i.e., "wellness") to offset the drastic reduction of regular movement and social interactions in other physical spaces that were part the regular human

routines. This emphasized the need for online teachers and students, often sedentary with significant daily screen time, to formally consider life/work/school health and balance:

> Principle 8 – System level focus on Wellness/Ergonomics/Well Being for students, teachers, families, extended families – everyone

The rewording of the principle based on the national input clarified its intent using clearer wording to describe it. While at first it appeared there was no connection between the NSQOL and QM standards, a slim connection was made to program standards (see Table 16) and institutional context in the QM instructor skills set (see Table 17 below).

Table 16.

Alignment of Design Principle 8 with various NSQOL standards

8. Educators and the entire school community require a system-level focus on health, wellness, and well-being specific to teaching and learning online.		
NSQOL Program Indicators	NSQOL Teaching Indicators	NSQOL Course Indicators
C3 D2		

The NSQOL program indicators C3 and D2 provided an overall reference to creation of a collaborative or supportive environment for teachers and the provision of resources to support students and teachers. However, neither specifically addressed wellness specific to teaching and learning in an online environment.

Table 17.

Alignment of Design Principle 8 with various QM standards

8. Educators and the entire school community require a system-level focus on health, wellness, and well-being specific to teaching and learning online.	
QM K-12 Rubric Specific Review Standards	QM Online Instructor Skills
	I. Institutional Context

As well, like the NSQOL standards, beyond a reference to the context in which the teaching occurs, there is little connection to individual health and wellness in the quality standards described in both the NSQOL and QM documents and indicators.

Unmapped Standards

It is interesting to note that there were some NSQOL standards (see Table 18) that were not aligned to any of the CANeLearn Design Principles for K-12 Online Learning.

Table 18.

NSQOL standards not aligned to CANeLearn design principles

NSQOL Program Indicators	NSQOL Teaching Indicators	NSQOL Course Indicators
A1, A2 B3, B5 C4, C5 D1, D3 E1, E2, E3, E4, E5 G3 N6	A8, A9	

There were a few factors that can explain why these particular indicators within the NSQOL Program and Teaching standard sets were not aligned. NSQOL teaching standards indicator A8 more aptly fits the definition of a "standard," in that it serves to "define and establish uniform specifications and characteristics." As noted earlier, the creation of standards in education was intended to raise professional oversight of the quality of teachers' work (Darling-Hammond, 1999), and designed to ensure reforms in teachers' development and promotion tracks. Standards attempt to rationalize the complex work of teaching in an attempt to make the foundations of knowledge creation clear for learners in order to help them learn. As such, it would not serve the purpose of a design principle, defined as the fundamental concepts and guidelines that inform the creation and implementation of educational programs, materials, and systems that may involve alignment with educational policy, goals and standards. Similarly, indicator A9 from the same set serves to underscore the importance of the online teacher's capacity to meet the needs of diverse learners as defined by specific laws and mandates. Again, this is realizing a standard's focus on serving to define and establish uniform specifications and characteristics.

While only two indicators from the NSQOL teaching standards were not aligned, there are a great many more identified in the NSQOL program standards. While design principles, as explained earlier, refer to the fundamental concepts and guidelines that inform the creation and implementation of educational programs, materials, and systems (Kukulska-Hulme & Traxler, 2013), all the NSQOL indicators fall under the definition of a standard as they tend to be more discrete, flexible, and responsive to local conditions (Bell, 2003). Additionally, the identified NSQOL program standards indicators were all intended to establish more distinct oversight guidelines for an online program. This included specifically defining the audience and purpose, distinct staffing and leadership roles, and clarifying whether the program is public or private,

non-profit or for-profit. In the United States, this transparency helps stakeholders to make informed decisions regarding their learning path. Standard indicators such as E1 and E2 relate to adequate staffing, which is in accordance with US state and federal laws. While the Design Principles for K-12 Online Learning focus on the educator, the NSQOL program standards focus on the discrete indicators contributing to the overarching support services and governance of a program.

More interestingly, there were very few from either set of the QM standards that did not align with at least one of the CANeLearn Design Principles for K-12 Online Learning (see Table 19).

Table 19.

QM standards not directly aligned to CANeLearn design principles

QM K-12 Specific Review Standards	QM Online Instructor Skills
1.8 C 2.2 C, 2.4 C 5.5 C 6.2 T, 6.4 T 7.4 T	

While some QM K-12 Specific Review Standards are not directly aligned to the design principles, they are indirectly aligned to Principle 1, as noted in Table 3 above. QM Specific Review Standard 1.8 C, for example, supports the need for clearly stated required competencies and/or prerequisite knowledge in the discipline. Indeed, this is granular to the course and its design, but as noted above, design is mapped to models of effective online teaching. The same can be said for specific QM Specific Review Standards 2.2 C, which puts emphasis on the need for a course to have module/unit-level objectives or competencies that describe outcomes that are measurable and consistent with the course-level objectives, and also 2.4 C, which ensures they

are designed and written for the target student audience. Standards around learning support can also be mapped to models of effective teaching, and QM Specific Review Standard 7.4 T focuses on the need for a course to link to an institution's local accessibility policies and services. This particular standard harkens back to the definition of a standard as they tend to be more discrete, flexible, and responsive to local conditions (Bell, 2003).

Broader Trends from the Alignment Analysis

The NSQOL (2019a, 2019b, & 2019c) standards were not focused on descriptions of models of online teaching and learning or educator support resources required for quality online teaching and learning as the Design Principles for K-12 Online Learning were intended (Crichton & Childs, 2022). Instead, this study of the alignment of the NSQOL standards guiding K-12 online teaching and learning practices with the design principles found that most standards served as examples of components that could be found in an effective model or course or witnessed during the delivery of effective online teaching, much like a list of component parts without a clear picture of what they comprise collectively. Similarly, the review of the QM (2020) K-12 Rubric found only limited direct alignment with most standards, while the Online Instructor Skills Set (QM, 2016), which described six general areas of online instructional competencies further divided into associated skills and competencies, came closer to describing this "picture" of effective online teaching, the focus of the design principles. For example, while the NSQOL Online Course Standards could be aligned to Design Principle 1 because of their focus on the design of asynchronous online course content, the QM K-12 Rubric and the QM Online Instructor Skills Set also aligned as they generally focused on the instructor being knowledgeable about or understanding various aspects of effective online teaching and learning.

However, the divergence between the Design Principles for K-12 Online learning and NSQOL program, teaching, and course standards as well as most QM K-12 Rubric standards became more apparent in the review of subsequent design principles with only a few exceptions. For example, the second design principle called for educators to be provided "ongoing, timely, and relevant professional learning opportunities" through "supportive and flexible learning communities" which is focused on the act of teaching and learning in the online environment. It is not surprising that there was no alignment with any of the indicators from the NSQOL course standards as they are centred solely on the design of asynchronous online course content, and not on the delivery of asynchronous or synchronous online instruction.

As well, Design Principle 4 regarding the need to for educators and families to have a deep understanding of how relationships that foster connections are created in an online learning environment, arguably had some examples of how this is done in the NSQOL program standards that described fostering "a productive collaborative environment" (C3), as "faculty and staff work with students and families to personalize programs" (G2), and an orientation to the learning tools, services, and processes is provided (M1, M2, M3, M4), all are methods of achieving the intent of this principle but not directly associated with its purpose. In contrast, Design Principle 5, which places an emphasis on the selection of technologies specific to instructional intent of "pedagogy first", is directly aligned with the standards for "Course Technology" in the QM K-12 Rubric which speak directly to the relationship between technology and instruction where "tools support the learning objectives" (6.1), and the purpose of tool selection is to "facilitate student engagement…[and] active learning" (6.2). This addresses the critical importance of technology selection and support being done for purposefully designed instruction for the online learning environment.

Despite this, a direct alignment to the intent of Design Principle 5 could be found for the NSQOL Course Indicators F2 and F3 which state that "course tools support the learning objectives" and enable teachers to "adapt learning activities to accommodate learners' needs and preferences". Similarly, Design Principle 6 that calls for formal and intentional teacher professional preparation combined with ongoing mentorship aligned directly with the NSQOL Program Standard L -Faculty and Staff Support, which states: "A quality online program supports faculty and staff by providing mentoring, technical assistance, and timely professional development" directly matching the design principle's call for intentional professional preparation. As well, both the design principle and the standard specifically mention pre-online teaching preparation (post-secondary in the case of Design Principle 6 and "induction" as well as mentoring programs aligned with the National Standards for Quality Online Teaching in the case of NSQOL's teaching standards). NSQOL Standard L uses directive language such as "program provides and encourages" while Design Principle 6 uses "intentional" and "formal" indicating responsibilities that are outside of the individual teacher's regular practice.

The remaining NSQOL and QM standards did not match the focus of the design principles, particularly the final two which called for research specific to K-12 online teaching and learning and a system focus on student and teacher wellness. After the analysis was completed it was found that, at best, the design principles set a context or process while the NSQOL and QM standards described an observable outcome and offered examples that could be used to support the Design Principles for K-12 Online Learning. The QM Online Instructor Skill Set largely aligned as it described teacher competencies, originally identified by Jurgen Hilke and others in 2012 (Deihl, 2018), and later refined for K-12 online learning standards or benchmarks of performance. Like the design principles, the skill set was intended to describe a

picture of the collective knowledge, abilities, and experience needed to be an effective online instructor. In contrast, the NSQOL standards were developed by practitioners with the intention of identifying effective teaching practices for accountability needs. In fact, it could be argued that state standards in the US had a larger influence in the development and description as the NSQOL as the state standards drove funding which directly influenced the descriptions and accounting for program effectiveness in the online programs.

The researchers took away from this study a deeper understanding of the interconnectedness, or lack thereof, of three very different approaches to understanding and describing online learning practices in K-12 settings. Additional research needs to be done to explore the relationship of CANeLearn's Design Principles for K-12 Online Learning with other prevalent researched models of online learning. Some of these models could include the current iteration of the Community of Inquiry and its 34-question survey[2] that outlines specific instructional requirements and program design elements that address the three interdependent elements of social, cognitive, and teaching presence (Garrison et al., 2000), as well as the Academic Communities of Engagement, a framework developed specifically from the K-12 online learning environment (Borup et al., 2020). This analysis could lead to further review and revision of the CANeLearn Design Principles for K-12 Online Learning to support ongoing development of quality standards and professional development in K-12 online learning programs in Canada and abroad.

[2] See https://coi.athabascau.ca/coi-model/coi-survey/ for a copy of this instrument.

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