Comparing CANeLearn Design Principles for K-12 Online Learning with Researched Models and Standards: Principles to Guide Quality Policy and Practice

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Abstract

In 2023, researchers explored the relationship between *Design Principles for K-12 Online Learning* (Crichton & Childs, 2022) and quality standards for K-12 online learning, publishing a report on the intersection between design principles and standards (LaBonte et al., 2023). 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, 2003). Unlike standards, the design principles focus on institutional support of technology, infrastructure, students, and faculty, as well as program effectiveness and assessment which are not described in most standards. The Community of Inquiry (COI), a research-based model describing the three interdependent elements of social, cognitive, and teaching presence (Garrison et al., 2000), was used to explore the intersection points between the COI, design principles, and published standards for K-12 online learning. The analysis was used to revise the design principles further and support the ongoing development of quality standards. It is hoped that basing design principles and standards in the context of a research-based model will further develop an understanding of quality in K-12 online learning and inform practice.

Keywords: design principles, policy, standards, quality

Introduction

Much of the governance surrounding K-12 online learning in Canada comes from policy and legislation, as well as handbooks and/or separate agreements: these documents specify certain activities or standards for online learning practices (Barbour & LaBonte, 2023). As such, quality online learning is often defined by policy-compliance statements or checklists. In Canada, ministries of education focus on accountability when describing quality in K-12 online learning with little connection to the effective design, delivery, and support of K-12 online learning. The Canadian eLearning Network (CANeLearn) conducted research focused on quality assurance measures resulting in eight design principles for K-12 online learning. *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) and have been used to describe K-12 online learning in Canada (Crichton & Childs, 2022). This practitioner-based focus draws attention to program factors that support and promote quality online instruction (Phipps & Merisotis, 2000), while *standards*, which have been the predominant model for defining quality in online learning, often describe contextual policy and practices specific to local jurisdictions.

Building from the design principles work, LaBonte et al. (2023) conducted a review of the alignment between design principles (Crichton & Childs, 2022), the National Standards for Quality Online Learning (NSQOL; 2019a, 2019b, & 2019c), and the Quality Matters (QM; 2016a, 2016b) standards. The authors found that most standards served as examples of components that could be found in an effective model or a course, much like a parts list, without a clear picture of what they comprise collectively. In addition, while design principles may align with educational policies, goals, and standards, they describe factors that support instruction, not just define it, as standards do. This work was extended to explore the design principles' relationship with other prevalent researched online learning models. The Community of Inquiry (COI) model (Garrison et al., 2000) was selected because it is a validated, accepted, and robust framework for online learning design and inquiry. The COI model's survey questions[1] were used to identify the intersection with the design principles. These survey questions outline specific instructional requirements and program design elements that address the three interdependent elements: teaching, cognitive, and social presences.

Development of the CANeLearn Design Principles

In February 2021, CANeLearn began engaging educators across Canada in facilitated conversations about teaching in online learning environments. The process started in BC (Crichton & Kinsel, 2021) with the development of eight design principles which were later shared with participants across Canada in both Anglophone and Francophone online programs. The revised, and validated, design principles were published by CANeLearn in February 2022 (Crichton & Childs, 2022).

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[1] See Arbaugh et al. (2024) for a copy of this instrument: https:// https://coi.athabascau.ca/coi-model/coi-survey/

Defining Design Principles

The concept of using design principles to describe the practice of K-12 online learning is relatively new. Whereas standards tend to be more granular and specific to local contexts, principles establish broader philosophical underpinnings (Asaqli, 2020). Current standards for online learning describe observable outcomes or actions contextual to specific jurisdictions and policies while design principles set a context or process. Furthermore, design principles serve as foundational concepts and guidelines for creating and implementing curricula, materials, and learning systems (Kukulska-Hulme & Traxler, 2013). As Crichton and Childs (2022) asserted, design principles were "a living entity that can inform practice, frameworks, guidelines, quality assurance documents, and many other things" (p. 7).

Initial Development: BC Phase 1 Study

The study's origins can be traced back to the BC Ministry of Education's 2018 appointment of a panel to review the funding model for public K-12 education, which called for a renewed focus on the quality of online programs (Barbour et al., 2021). CANeLearn was asked to conduct a study to inform the Ministry's work on developing a quality assurance framework for online learning in the province, the results of which also provided guidance for online educators and education leaders.

The non-institutionally reviewed study aimed to gather input from a representative sample of educators across different school types (public, independent, Indigenous) and grade levels (K–5, 6–9, 10–12) in both urban and rural/small settings. The participants were solicited from a variety of networks that included the Distributed Learning (DL) Network of online educators, a database of CANeLearn subscribers, past participants of DL symposiums, and leaders in independent and DL programs. The actual study was conducted in four phases:

1. Survey 1: Collected demographic information from 150 participants.

2. Survey 2: Adapted design conversation questions into a survey format due to the high response rate, with 81 participants.

3. Design Conversations: Conducted via web-conferencing with 22 participants who volunteered from Survey 2 respondents, reflecting the matrix of school types and grade levels.

4. Survey 3: A follow-up survey where 29 participants commented on and ranked the proposed design principles based on Survey 2 responses.

There was a total of 356 participants in the three different surveys, along with 42 participants involved in the design conversations.

The study's findings led to the initial validation and revision of the *Design Principles for K-12 Online Learning: British Columbia Study* (Crichton & Kinsel, 2021). These principles were shared with the BC Ministry of Education for inclusion in its quality assurance review during the 2020–21 school year.

National Refinement and Validation: Phase 2 Study

As a follow-up to Crichton and Kinsel (2021), CANeLearn aimed to revisit and validate the *Design Principles for K-12 Online Learning* that were initially developed by educators in BC during the COVID-19 pandemic. The study followed the same design thinking cycle and participatory research approach utilized during the BC phase of the study. Similar to Phase 1, this study aimed to gather input from a representative sample of educators across different school types (i.e., public, independent, Indigenous) and grade levels (i.e., K–5, 6–9, 10–12) in both urban and rural/small settings; however, there was no requirement to be teaching in an online school. The participants were solicited from the database of those who took part in the Phase 1 study, the networks of Phase 1 participants, the CANeLearn email database, and the researchers' social media networks.

The study was conducted over two phases.

1. Survey 1: Design Principles validation questions (i.e., English and French)

2. Survey 2: Revised Design Principles for comment

The study received 58 responses, primarily from experienced, mid-career educators in public schools, teaching at the high school level. The majority of participants considered themselves experienced in teaching online, although most had little or no formal training in this modality (relying heavily on professional development courses and self-teaching to acquire the necessary skills). The study found that the initial *Design Principles for K-12 Online Learning* were largely validated by an expanded educator audience, with some revisions and refinements based on the feedback received. The revisions to these design principles aimed to capture the words and understanding of practicing educators, their vision for effective online learning, and the need to prepare the K-12 learning environment for future disruptions (Crichton & Childs, 2022).

Most participants saw the value of design principles, primarily centering around the use of design principles to inform and improve practice. Several saw value in identifying and guiding professional learning opportunities and creating consistency and good design. Participants expressed a need for models and examples of different ways to use the online environment in teaching and learning. Participants also spoke of the need to support the lifelong learning of educators as they continue to improve and iterate their practice and the role that design principles play in guiding this learning. See Appendix A for the revised design principles.

The researchers emphasized that design principles are a living entity that should inform policy, practice, frameworks, and professional learning opportunities. The study also highlighted the importance of educational leaders reflecting on the lessons learned during the emergency remote learning period of the pandemic, drawing on the available research, and thoughtfully preparing for future educational disruptions and changes in the workforce.

Expanded BC Validation: Phase 3 Study

As a follow-up to Crichton and Kinsel (2021) and Crichton & Childs (2022), an ethics committee-approved research study was conducted with an expanded population of BC Educators to

examine the *Design Principles for K-12 Online Learning* initially developed by educators in BC during the COVID-19 pandemic to investigate their utility, impact, and implementation three years out. The study followed the same design thinking cycle and participatory research methodology utilized during the previous two phases. The sample of BC K-12 educators was invited to participate in the following two phases.

1. Survey 1: Design Principles validation questions (i.e., English only)

2. Design Conversations: Conducted via *Zoom* with 20 participants who volunteered from Survey 1 respondents, reflecting the matrix of school types and grade levels.

The study received 38 responses, primarily from experienced, mid-career educators in public schools, teaching at the high school level. Most participants considered themselves experienced in teaching online. However, half (i.e., 50%) had little or no formal training in this modality relying heavily on professional development courses and self-teaching to acquire the necessary skills—71% identified as self-taught. Design conversations were held with 20 participants and the study found that the initial *Design Principles for K-12 Online Learning* were validated and being used by the expanded BC educator audience. Many participants commented on the need and desire to connect, share, and learn together as they iterate, and in some cases, develop their online practice. Several commented on the new pedagogy that online learning affords and the need for research to guide their implementation approach as many teacher education programs offered little support in learning how to teach online. All participants commented on the increased complexity of the job of a K-12 educator. In particular, participants noted the increase in anxiety and mental health issues in schools and their communities which require support. They were pleased to see the support for mental health issues captured in the design principles. In addition, participants spoke to the need for access to appropriate technologies and increased support for developing digital literacy and digital fluency in the contemporary K-12 environment.

Design Principles Alignment with Existing K-12 Online Learning Standards

Building from the initial design principles work, the next stage in the continuing development of the CANeLearn design principles was to compare them to existing standards commonly used within the K-12 online learning environment (LaBonte et al., 2023). This study aimed to compare the CANeLearn design principles with the NSQOL (2019a, 2019b, & 2019c) and QM (2016a, 2016b) standards. The methodology involved three independent reviewers aligning the selected standards with the CANeLearn design principles. This approach utilized inter-rater reliability, a form of triangulation to assess accuracy through multiple inputs. Generally, an agreement level of 90% is considered acceptable, with 80% being acceptable in most situations.

The results showed high levels of agreement between the three reviewers across all standard sets examined. The overall agreement rate was over 90%, regardless of the calculation method used. Specifically, the agreement rates were 93% when comparing the total number of differences with the average number of aligned standards, and 97% when considering the total number of standards both reviewers agreed upon. In cases of disagreement, the reviewers discussed the issues and made collective decisions on intersection points. This process ensured a thorough and reliable comparison of the various online learning standards with the CANeLearn design principles, providing valuable insights for K-12 online education practitioners and researchers.

The study found varying degrees of alignment between the design principles and the other standards. For instance, Design Principle 1, focusing on asynchronous course content design, aligned well with NSQOL Online Course Standards and aspects of the QM standards. However, subsequent design principles had diminished alignment with NSQOL and QM standards, with some exceptions. For example, Design Principle 2 emphasizing ongoing professional learning had no alignment with NSQOL course standards due to their focus on content design rather than instruction delivery. Similarly, Design Principle 4 about fostering relationships in online environments found some examples in NSQOL program standards, but not direct associations. Further, Design Principle 5, prioritizing pedagogy in technology selection, aligned well with QM's "Course Technology" standards and some NSQOL course indicators. Additionally, Design Principle 6, which calls for formal teacher preparation and mentorship, is directly aligned with NSQOL's Faculty and Staff Support standard. However, the final two design principles, which focused on K-12 specific research and student-teacher wellness, found no intersection points with the other standards.

Our analysis concluded that the CANeLearn Design Principles set a context or process for online learning, while NSQOL and QM standards described observable outcomes and examples. The QM Online Instructor Skill Set aligned more closely with the design principles, as both aimed to describe a comprehensive picture of effective online instruction. In contrast, NSQOL standards were developed with a focus on accountability and influenced by state standards driving funding for online programs. Essentially, the NSQOL standards were found to provide detailed components of effective online teaching and learning, but without offering a cohesive overview of how these elements work together. They served more as a checklist of best practices rather than a comprehensive model. The QM K-12 Rubric showed limited direct alignment with the design principles, while the QM Online Instructor Skills Set came closer to describing a holistic picture of effective online teaching. Overall, this study highlighted the different approaches and priorities in various K-12 online learning frameworks, emphasizing the need for a more integrated understanding of effective online education practices.

Design Principles Alignment with the Community Of Inquiry

After analyzing the design principles—derived from Canadian online educators—with current K-12 online learning standards typically derived from jurisdictional context-specific policy, and finding limited intersection points (LaBonte et al., 2023), the slightly greater alignment with the research-based QM standards led to consider exploring comparison with other online learning research-based models. The study was extended to explore the alignment with the Community of Inquiry (COI) model (Garrison et al., 2000) as it is a validated, accepted, and research-based model for online learning design and practices. The design principles are based on research, not policy, and focus on institutional support of technology, infrastructure, students, and faculty, as well as program effectiveness and assessment. These are not the focus of most standards but are part of the COI model.

The COI has a 34-question survey (Arbaugh et al., 2024) that outlines specific instructional requirements and program design elements to address the three interdependent elements, described as teaching, cognitive, and social presences. The survey questions have been used to frame online standards in K-12, notably in BC where the design principles were developed (BC Ministry of Education, 2021), and to inform program design and instruction in the post-secondary sector (see Abbitt & Boone, 2021; Garrison, 2022; Ruth & Wertz, 2022 for

examples). The intended study will follow the same methodology as the design principles and standards review, using a grid with double-blind analysis comparing each of the 34 questions from the COI survey (Arbaugh et al., 2024) to the eight design principles.

Conclusions and Implications

While the researchers initially found limited intersection points between design principles and standards other than the first two design principles describing instructional practices and training, there was a better alignment with research-based models and standards. Much like the QM K-12 rubrics and instructor skill sets, greater alignment was found between the COI model and the design principles describing learner engagement, supportive relationships, and the use of technology, unlike with the NSQOL standards. The QM rubrics and instructor skill sets, along with the COI model, include a focus on the community context of the teacher and student and are not based on centralized policy or government program standards.

While legislation, policy, standards, handbooks, and agreements greatly influence the quality practices of online teachers and program leaders, the design principles are a foundation to support quality online practices. Their alignment with other research-based models, such as the Community of Inquiry, offers understandable and defensible frameworks to inform both practice and policy for online learning. The design principles provide a clear picture and context within which to view policy, goals, and standards. They describe factors that support online instruction, not just defining it as existing policy and standards do, setting a strong foundation and context to drive quality in practice.

Author's Contributions

RL managed the data analysis and review of the alignment of the design principles with the Community of Inquiry model and survey questions, following a similar methodology as the comparative study of standards and design principles. He oversaw the development of the proceedings paper.

EC was responsible for refining the original research idea, contributing to the literature search, co-conducting Phase 2 (national validation study) for CANeLearn, obtaining ethical approval for and co-conducting Phase 3 (expanded BC study), analyzing the data, contributing to the writing of the design principles section of the manuscript, and as a part of the author team for edits and revisions.

MB undertook data analysis and review of the alignment of the design principles with the NSQ and QM standards and the Community of Inquiry model and survey questions. He also contributed to the writing and editing of this manuscript.

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Ethics Statement

Based on the nature and purpose of the study being conducted at the time, ethical review was not applicable for Phase 1 and Phase 2 of the Design Principles research study. Ethical approval was granted for Phase 3 of the Design Principles research by the Royal Roads University Research Ethics Board September 2022, Childs 9/9/2022. Ethics approval was not required for the alignment portion of the study.

Conflict of Interest

The authors do not declare any conflict of interest.

Data Availability Statement

Data is stored on the Canadian eLearning Network and Royal Roads University servers and is available upon request.

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