Design Principles for K-12 Online Learning:
National Validation Study

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A special report of the Canadian eLearning Network

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Foreword

In February 2021 the Canadian eLearning Network (CANeLearn) began engaging educators across Canada in facilitated conversations about teaching in online learning environments. The work began in British Columbia. The purpose of that study was to gain an understanding of the lived experiences of online educators and of those who came to online education during the COVID-19 Pandemic. In March 2021 CANeLearn published the report *Design Principles for Online Learning: BC Study* (Crichton & Kinsel, 2021) which shared findings from the British Columbia study.

In November 2021 the study was expanded to include educators from across Canada. This study builds on the BC findings, using many of the same processes and approaches to assess the efficacy of the initial *Design Principles for K-12 Online Learning* in the broader Canadian context. The confirmation of the principles from participants across Canada in both anglophone and francophone online programs is an important step in ensuring the principles can serve as a framework for conversations about online learning design, needed support, and implementation strategies.

CANeLearn's next step in the iteration of the design principle work is to engage a wider audience including classroom educators, researchers, and education leaders from government and teacher education programs in shaping the principles to improve online learning practices. It is CANeLearn's intention and hope that the design principles continue to serve as a guide for educator practice as well as a foundation for the development of professional learning experiences offered through school jurisdictions, postsecondary teacher education programs, and other organizations.

We encourage others to build on this work and share it with their education communities.

Randy LaBonte
CEO, Canadian eLearning Network

Acknowledgments

This report follows the approach and structure of *Design Principles for K-12 Online Learning* (Crichton & Kinsel, 2021). As such, and given the short time span between the two studies, it draws on much of the same literature. Additional relevant literature that has been published since March 2021 informs the literature in this report.

We are grateful to the participants who responded to the invitation to engage in this study, Ellen Kinsel who managed logistics and the surveys, and the CANeLearn network for their ongoing support.

Design Principles

> Design Principles "… represent the accumulated wisdom of researchers and practitioners" (https://www.interaction-design.org/literature/topics/design-principles).
>
> Michael Pollan's *Simple Rules for Eating* can be seen as design principles for healthy living – 'Eat food. Not too much. Mostly plants.' Design Principles in education are used to help improve practice and help educators design better ways of doing things. They are flexible and open to interpretation by educational professionals. They are not rigid rules or fixed templates. Design Principles require knowledge, insight, and discretion, and they thrive in a supportive and collaborative environment where they can be discussed, challenged, explored and illustrated with exemplars of good practice (Crichton & Kinsel, 2021, p. 4).

Design Principles are typically derived as part of a Design Thinking process which engages participants who are doing the work that is being studied to respond to a design challenge. Design Thinking enables an iterative participatory design approach that trusts the process of design thinking as well as the collected wisdom and skill of those educators who have agreed to participate in the process. In the case of the *Design Principles for K-12 Online Learning* – the participants included Canadian educators and school administrators.

Given the maturity of the field of study in online learning (Bozkurt et. al., 2020) and school jurisdictions' evolving response to COVID-19, practicing educators are the ones directly living the experience of school closures and sudden shifts to remote learning (Barbour et. al., 2020; Barbour, Nagel & LaBonte, 2020; Bates, 2021a). Therefore, the educators engaged in the studies were well-suited to respond to the design challenge – *What are the Design Principles that could inform K-12 Online Learning*?

As described by Interaction Design (n.d.), design thinking is enabled by a five-step process. While typically presented in what appears to be a linear process, design thinking is anything but linear. Each step in the process is meant to be reviewed, revisited, and reconsidered until the process has deemed to have been adequately completed. The five steps of the process are illustrated in Figure 1 - Illustration of iterative nature of Design Thinking Process and described below.

- The Empathy stage allows researchers to gain an understanding of the lived experiences of those experiencing the online learning and the shift to emergency remote learning.

- The Definition stage builds from what was learned during the Empathy Stage and collects information that allows the researchers to further define the problems that participants are experiencing during the phenomenon being studied – online learning and emergency remote learning.

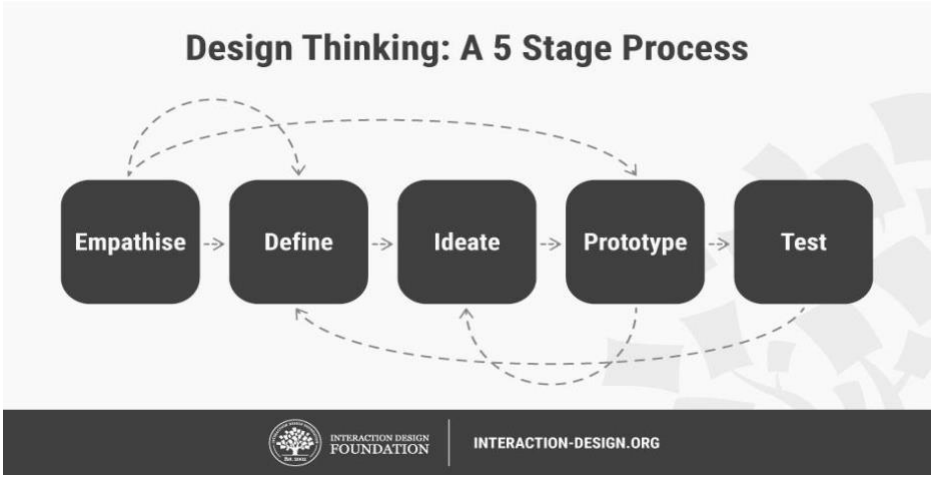
- The Ideation stage allows researchers to begin to generate ideas or potential solutions to address the phenomenon being studied. In the case of this study, the Ideation stage generated an initial draft of design principles.

- The Prototype stage formalized the initial design principles, anchoring them in the literature.

- The Testing stage allowed the researchers to share the design principles with participants. The researchers then incorporated the participants' feedback into the eight *Design Principles of K-12 Online Learning* that are shared in this report.

Figure 1

Illustration of iterative nature of Design Thinking Process (Interaction Design, n.d.)



It is hoped that the process used in this study continues and other researchers and groups test and validate these principles by participating in a national conversation about the importance of online learning within the K-12 learning environment.

Purpose of Design Principles

Design principles are a living entity that can inform practice, frameworks, guidelines, quality assurance documents, and many other things. It is expected that they will continually be reviewed and revised. They provide a foundation of shared understanding to guide and inform whatever comes next.

In the case of the *Design Principles for K-12 Online Learning: British Columbia Study* (Crichton & Kinsel, 2021), they have now been validated and revised based on the findings of the National Validation Study that is shared in this report. They are offered as a base to reflect on and inform our understanding of what good online learning is, has been, and might become.

The initial set of *Design Principles For K-12 Online Learning* (Crichton & Kinsel, 2021) was distilled from an analysis of British Columbia educators' survey responses. These initial design principles were then revised through a series of design conversations with the survey participants. All British Columbia survey participants were able to comment on the final draft of

the design principles. The final version of those design principles was published and shared in conference presentations as well as submitted to the BC Ministry of Education for inclusion in its quality assurance review conducted during the 2020-21 school year.

Presented below is the revised version of the *Design Principles for K-12 Online Learning* that have been amended and reworded following the analysis of the 2022 National Validation Survey results. The principles are *not* presented in terms of importance; study participants stated they were unable to rank the individual principles, noting that all the principles were important, and each educational context would probably rank them directly based on their own, individual contexts, experiences, and needs.

Eight Design Principles for K-12 Online Learning

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.

National Validation Study Design

Process

The process for the National Validation Study followed a design thinking cycle and participatory research approach (Crichton & Kinsel, 2021). Tables 1 and 2 illustrate the process, intended outcomes, and participants for the study.

Design Thinking and Participatory Design approaches were chosen for this study as they invite engagement, feedback and open-ended responses from participants who are experiencing the phenomenon that is being studied. Both approaches allow for and encourage the participants to challenge, test, and contribute to the revision of findings. In the case of the eight *Design Principles for K-12 Online Learning* shared in this report, iteration, revision, rewording, and validation were deemed essential. The design principles were derived from the participants' responses and validated by the literature.

Table 1

CANeLearn Design Thinking Process

Design Thinking Process – Revised Process				
Empathize	**Define**	**Ideate**	**Prototype**	**Test**
Design Conversations – Participatory Approach				
● Survey 1 to CANeLearn board members and their "plus 1s" – in English and French	● Analysis of survey responses	● Revision of initial Design Principles based on the analysis of Survey 1 data	● Survey 2 - Circulate revised Design Principles to Survey 1 participants for their feedback ● Revise Design Principles based on Survey 2 participants' feedback	● Share revised Design Principles through the CANeLearn network via the annual conference for comment and discussion ● Continue to share / publish Design Principles and seek feedback

Table 2

CANeLearn Phases, Activities and Participant Numbers

Study	**Study Phases and Their Activities**	**Participants**
Initial Design Principles Study February 2021	Survey 1 – Demographic information	150
	Survey 2 – Design Conversation questions adapted for survey participation due to high respondence rate	81
	Design Conversations via ZOOM – participant volunteers from Survey 2 participants / reflecting Matrix groupings	22

	Survey 3 – Follow up commenting on and ranking the Design Principles offered to Survey 2 participants	29
Design Principles National Validation Study November 2021 – February 2022	Survey 1 – Design Principles validation questions (English and French)	58
	Survey 2 – Revised Design Principles for comment NOTE: CANeLearn to circulate report once it has been received and address comments as it sees fit.	

During the various waves of the COVID 19 Pandemic from early March 2020 to February 2022, as this report is being written, emergency remote learning has been employed in a variety of ways by Canadian educators across the K – 12 system (Barbour, et al., 2020). While the pandemic impacted educators globally, the National Validation Study sought participation only from a representative sample of Canadian educators.

Participant Recruitment

A selective sample of K-12 educators across Canada were invited to participate. CANeLearn board members were asked to participate in the study and to share the opportunity to participate with a "plus 1" colleague working in the K-12 educational context. Participants were made aware that this study was not conducted under Tri Council research ethics and, therefore, were not asked to give formal informed consent for the use of their responses. Consequently, findings are reported anonymously and not attributed to specific educators, groups, or regions.

In addition, the study invitation was promoted in the CANeLearn network via their newsletter and through the database of CANeLearn subscribers, many of whom were past participants of CANeLearn professional learning conferences and symposiums. Invitations included a link to the online survey. The English version of the survey was live Nov 1 – Nov 30, 2021, with an email reminder sent after day 10, and a reminder to participate included in the CANeLearn newsletter. The French language version was live January 18 – 28, 2022.

While the researchers acknowledge the sample size (n = 58) is small for a national study, they recognized the constraints on educators' time, decided to honour the contributions made, and share the findings. There are plans to continue this work and invite additional Canadian educators to participate in a subsequent survey and national conversation in the hopes of increasing the participation.

Data Analysis

Survey data was analyzed using descriptive statistics and thematic analysis. An inductive coding procedure was used (Glaser & Strauss, 1967; Corbin & Strauss, 2008). Analysis was done by the two researchers who individually coded the data. They then met to discuss themes and created summary statements which generalized the themes based on frequency. The recurrent themes

and data were identified using the following headings: (1) Needs; (2) Barriers, and (3) Interesting Comments. Findings are discussed in the sections that follow.

Study Responses

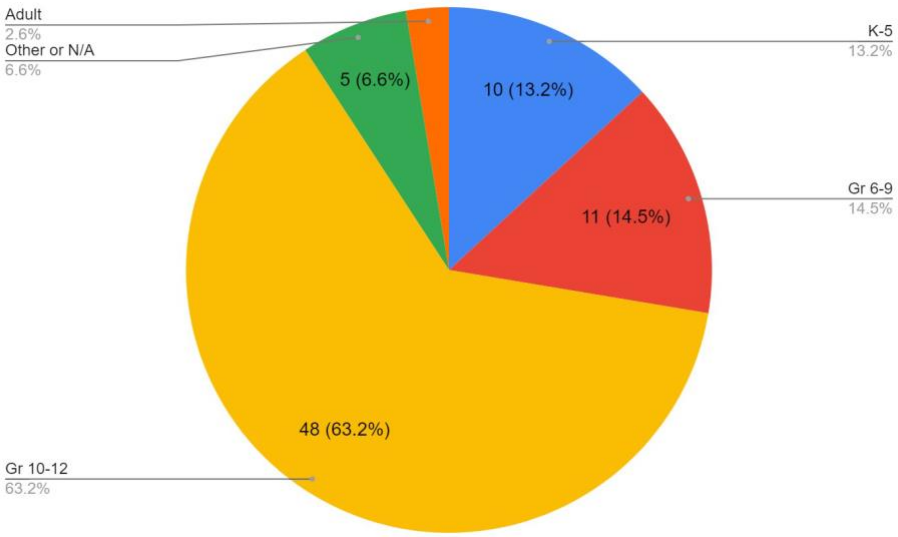
Demographics

Educators from Quebec (n=2), Ontario (n=11), Nova Scotia (n=3), Alberta (n=36), and British Columbia (n=6) participated in the national study[1]. The majority of participants (86.2%) teach in a public-school setting and predominantly work in online or distance learning schools (87.9%).

Grade level teaching responsibilities are presented in Figure 2, and it is necessary to note that multiple responses were possible on this question as many of the educators work in a variety of ways with various groups.

Figure 2

Grade Level Teaching Responsibilities of Participants

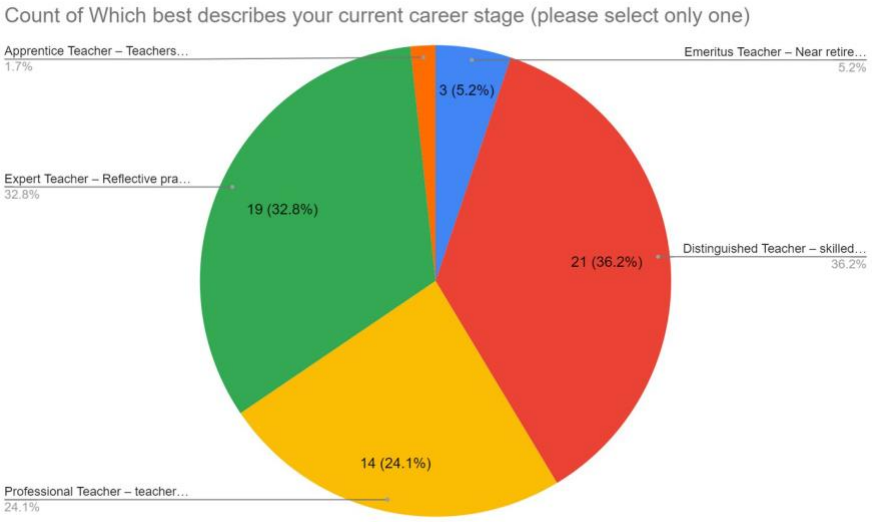


In addition, participants were asked to identify their career stage as per Steffy, Wolfe, Pasch and Enz (2002) stages in an educator's career cycle: novice, apprentice, professional, expert, distinguished, and emeritus. Please see Table 3 – Career Cycle Descriptors to BC and National Study for a description of each career stage. Figure 3 illustrates the range of career stages reflected in the study participants with the majority being in the distinguished or expert stage of their career.

[1] It could be assumed that British Columbia educators did not participate as fully in the national study as they had recently been invited to participate in *Design Principles for K-12 Online Learning: British Columbia Study* (Crichton & Kinsel, 2021).

Figure 3

Career stage of participants



Similarly, participants were asked to identify their online teaching experience (Figure 4) as well as their formal training (Figure 5) and informal training (Figure 6) for the work. Combined, these questions indicate that while the majority of participants (81%) considered themselves experienced in teaching online, 62.1% of participants had no formal training to teach online. The participants identified attending professional development courses (37%) and being self-taught (31 %) as the predominant ways they learned how to teach online.

Figure 4

Online Teaching Experience

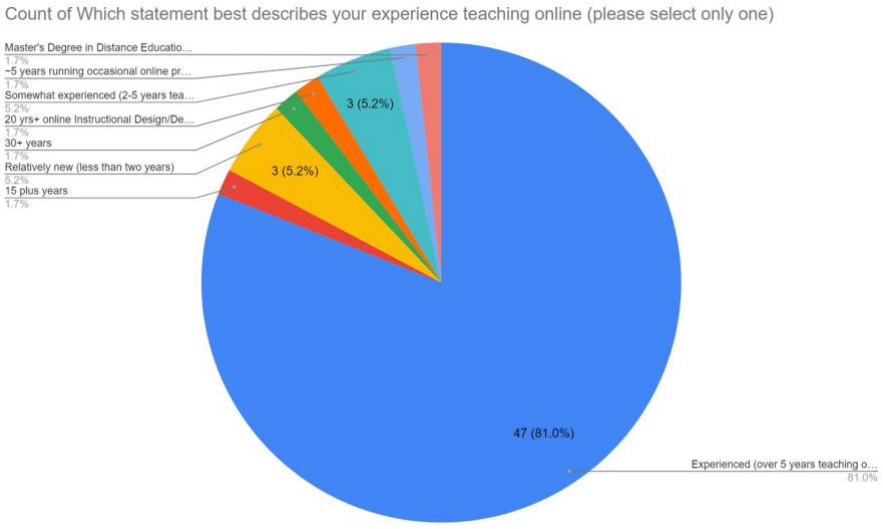


Figure 5

Formal training to teach online

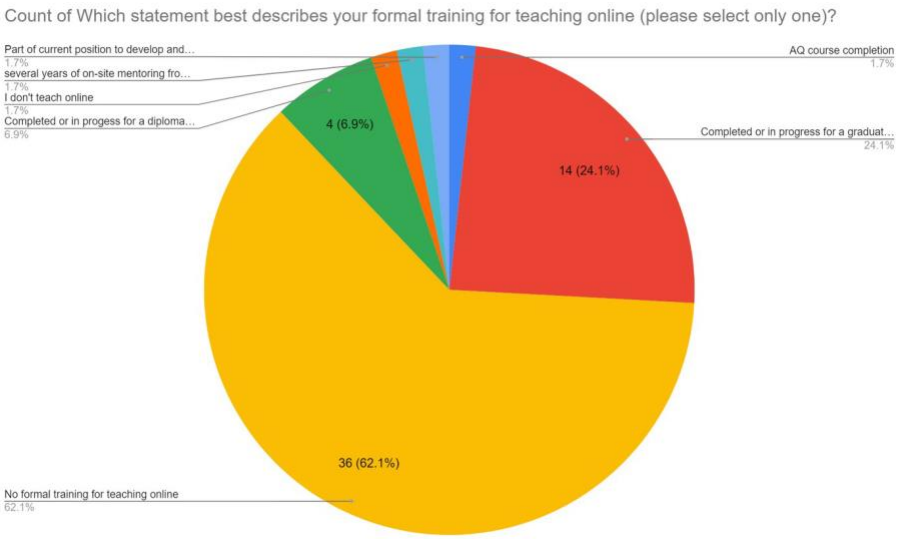
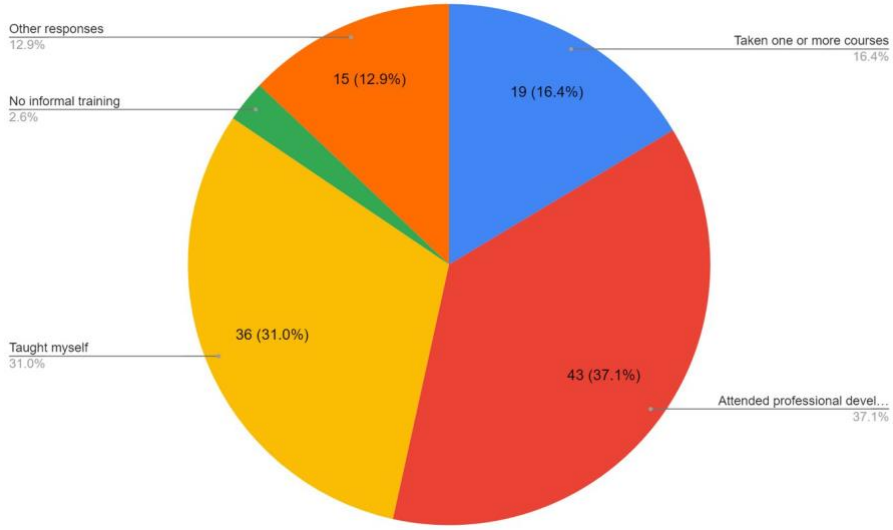


Figure 6

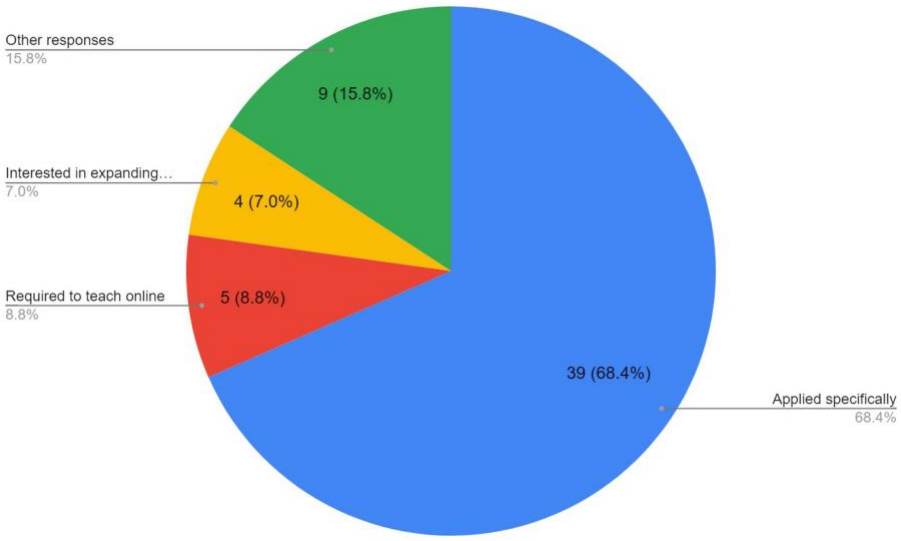
Informal training to teach online



When participants were asked why they began to teach online, 68.4% identified that they applied specifically to teach in this modality.

Figure 7

Reason given for teaching in online



In summary, as Figures 2 - 7 indicate, the majority of participants in the National Validation Study were mid-career, high school educators that identified as expert or distinguished teachers who specifically applied to teach online, with little or no formal preparation or supports for online teaching.

Open Ended Questions and Responses

Understanding and Use of Design Principles:

Participants were asked if they were aware of and understood the general notion or use of design principles in education. The majority of participants (82.8%) responded yes. They ranked their degree of understanding of the use of design principles as somewhat familiar (56.9%) to very familiar (29.3%). The majority (82.8%) stated they had used principles to design online courses and to guide course revisions, assessment, and resource development. Specifically, one respondent noted they had continually used design statements to guide their work and that they had "… adapted them over the years". Participants also identified using design principles to create templates and online learning guides and standards and to guide professional development, inquiry, and student engagement. Participants noted that design principles were best used at the course level. "They clearly demonstrate that online teachers must demonstrate discernment and flexibility in the delivery of their online courses to their target clientele".

No barriers to understanding or use of design principles were identified by participants; however, many participants expressed a need to have standards or a checklist to guide the determination of quality. Interestingly, in some responses it appeared that using design principles, in general, might have been confused or linked with the principles of universal design for learning and/or a more general sense of human centred design. In addition, several participants appeared to conflate proficiency with technology with mastery of online pedagogy.

Value of Design Principles for Practice

The majority (96 %) of participants saw value of design principles, primarily centering around the use of design principles to inform best practice and to improve practice. Several (40%) saw the value of design principles 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 spoke of the need to support lifelong learning of educators as they continue to improve and iterate their practice and the role that design principles play in guiding this learning. When asked if they were interested in seeing the survey results and commenting on them, 69% said yes. Those who responded expressed the need for a community and ways to learn from others and see what design principles could look like in practice. “I am curious about what others have to say and would love the opportunity to engage in dialogue on this.” Many expressed a passion for online learning and a desire to learn more. However, several participants expressed distain for formal research, suggesting it had little value for actual practice. The following comment is an example, “The principles outlined are obvious to any seasoned teacher designing a course. It is my opinion that a lot of time is spent on research to come up with obvious answers”.

Time was reported by participants as being a barrier to seeing the value of the design principles taken up in practice. As one participant stated, “the impact could be significant in theory, but in practice, it’s a lot of added foci beyond the curricular outcomes – just getting through the day seems like enough most days.”

It was interesting to note that there were some general thoughts expressed about the possibilities and potential for forming relationships online and a growing recognition that the online environment for learning could be more attractive and appealing for students and educators.

Role of Design Principles in Informing Teaching and Learning

The majority (84.4%) of participants agreed there was a role for design principles in informing teaching and learning. As one participant highlights, “They are the root…online is nothing like bricks and mortar so online design principles are essential.”

Participants commented on the need for a variety of supports to create effective and attractive environments for teaching and learning online as well as the need for mechanisms and understanding to support accessibility, flexibility, and inclusion. Help with course design and a way to improve practice and structure professional learning were also highlighted as needing to be attended to in order to incorporate design principles in their work.

Burn out and fatigue were identified as the two barriers many educators face when attempting to use design principles in their work. As shared by one participant, “if you are a good teacher, you use all principles regardless of context, and I’m just too burnt out to write more on this.” Another commented that “after working in both environments (f2f and online) for many, many years, the wellness of DL teachers is not seen as important as that of classroom teachers. We are expected

to carry a much heavier load simply because we aren't working in a classroom. This is causing burn out in our school population".

There is an interesting tension expressed by participants between wanting to develop and contribute to a professional community, and the lack of personal capacity to contribute to this community in a meaningful way.

Design Principles Reflect Online Learning in District

Almost half (40%) of the participants identified that design principles are understood, and they are actively being worked on or used in their district. Several participants (32%) commented they are striving to incorporate the design principles in their context.

There was a need expressed by several participants for continuous professional learning. Participants also identified the need for a way to formalize the design principles and examples that could be put into practice.

Barriers to adopting design principles at the district level included funding, lack of professional development, and the ongoing ripple effect and impact of burn out. There was a consistent and overwhelming call for informal mentorship opportunities as well as the need to find ways to support educator wellness in the context of the evolving nature of an educators' work.

Design Principles Improve Online Learning in District

Many participants (59%) stated that the design principles could improve learning in their district. Several (30%) spoke directly to how design principles could be the vehicle to facilitate continuous improvement and to improve quality.

The needs that were expressed by participants included having a clear and executable strategy for implementation system wide. Challenges of funding, resourcing and implementation strategy taken were raised as barriers to the ability of design principles to improve learning.

Interestingly, the role of design principles in directing professional development efforts was raised by several participants. A few participants spoke of how the design principles could become a national benchmark and be used to directly improve teacher education programs and the way in which they prepare educators for online teaching and learning.

Summary of Findings from Open-Ended Responses

In reviewing the responses to the survey, the following issues / concerns arose:

- Educators in K-12 online teaching and learning want and need a community. There is a strong desire to connect with other educators doing this work and to see what is working, share strategies, and discuss how to improve practice.
- Educators who have been doing the work of online teaching and learning for a long time are engaged and passionate about the field. They would welcome a chance to speak about

the field and to share their lessons learned with others beyond the usual venues of conferences and typical professional development offerings.
- Educators need ongoing, sustained, and supported professional learning opportunities that model good, research informed practice and are examples of the design principles in action.
- Educators need opportunities to understand how research can inform practice, and professional learning opportunities that make a connection between theory and practice in a meaningful way.
- Educators need to be supported in their health and wellbeing as the nature of their work is changing and is increasingly challenging as they support student learning.

Quantitative Feedback on Initial Design Principles from the British Columbia Study

The initial design principles below were a result of the 2021 British Columbia study (Crichton & Kinsel, 2021). Participants in the National Validation Study were asked to comment on those principles. The eight design principles shared in this report build on the BC Design Principles and have been modified to reflect the feedback gained from the national study.

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

- 98.3 % of participants understood the important of this design principle
- 67.2 % found it clear and strongly agreed with it
- 98.3% commented that it would help their practice
- Over 87% agreed or strongly agreed that their district/context had elements of this design principle
- No edits or adjustments were raised.

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.*

- 100% of participants understood the importance of this design principles
- 74.1% found it clear and strongly agreed with it
- 98% commented that it would help their practice
- Over 80% agreed or strongly agreed that their district/context had elements of this design principle
- No edits or adjustments were raised.

Principle 3 - *Educators and families need to develop a deep understanding the importance of engagement and how to foster and encourage it in teaching and learning*

- 100% of participants understood the importance of this design principles
- 72.4% found it clear and strongly agreed with it

- 100% commented that it would help their practice
- Over 85% agreed or strongly agreed that their district/context had elements of this design principle
- No edits or adjustments were raised.

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.*

- 96.6% of participants understood the importance of this design principles
- 53.5% found it clear and strongly agreed
- 94.8% commented that it would help their practice
- Over 75% agreed or strongly agreed that their district/context had elements of this design principle
- The following edit was suggested:

  I think some revision to include the emotional aspect of relationships is important. Perhaps particularly in our program, but I think in all contexts, the relationship between the student and the teacher has a great deal of impact on the student's level of success in their studies. In studying Engagement and Motivation for my thesis, the importance of 'Emotional Engagement' for engagement and 'Relatedness' for motivation was very clear.

Principle 5 - *Recognition that technologies are the enablers of online teaching and learning. 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 teaching and learning not dictate them.*

- 100% of participants understood the importance of this design principles
- 84.5 % found it clear
- 100% commented that it would help their practice
- Over 90% agreed or strongly agreed that their district/context had elements of this design principle
- No edits or adjustments were raised.

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.*

- 96.6% of participants understood the importance of this design principles
- 77.6% found it clear
- 87.9% commented that it would help their practice
- Over 70% agreed or strongly agreed that their district/context had elements of this design principle
- No edits or adjustments were raised.

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.*

- 96.6% of participants understood the importance of this design principles
- 77.6% found it clear
- 98.3% commented that it would help their practice
- 48% agreed or strongly agreed that their district/context had elements of this design principle
- No edits or adjustments were raised.

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

- 96.6% of participants understood the importance of this design principles
- 74.1% found it clear
- 94.8% commented that it would help their practice
- Over 60% agreed or strongly agreed that their district/context had elements of this design principle
- No edits or adjustments were raised.

Review of Literature in Support of the Revised Design Principles

Findings from the National Validation Study, and the BC Study that preceded it, call for more relevant and timely K-12 research and literature to support good online K-12 practices. This call is supported by the literature (Gedak, 2021; Bozkurt et. al., 2020). Participants noted the majority of the existing literature is typically situated in the post-secondary environment, requiring K-12 educators to make link between that context and the teaching and learning contexts with children. The literature summarized here is organized to help support and clarify the eight *Design Principles for K-12 Online Learning* that surfaced from survey data and conversations with Canadian K - 12 educators.

It is important to situate this study in the context in which it occurred. The initial BC Study was conducted in February – March 2021 which was approximately one year after the emergence of shifting K-12 education from the classroom to remote learning. The National Validation Survey was conducted in November 2021 – January 2022. This date is important as it was near the end of the first half of the second year of the pandemic. While the impact of the pandemic on K-12 education had diminished considerably due to the increasing percentage of the population who were vaccinated against COVID-19 starting in June 2021, including children aged 12 and up, in Canada, and ages 5 - 11 in December 2021, the Omicron variant surfaced and began to impact the K-12 system differently across Canada.

As Bates (2021a) notes

> Something truly remarkable happened in March, 2020. Because of the dangers of a rampant epidemic, most schools, colleges and universities across the world were forced to close to protect students and staff from infection (OECD, 2021). But education did not

> stop. Certainly, in North America, all post-secondary instructors, and many K-12 teachers, pivoted within two weeks to emergency remote learning, using mainly Internet-based video-conferencing technology such as Zoom, Microsoft Teams or Google Meet. This enabled teaching to continue and students to complete their courses and programs.
>
> The results were not always pretty. Most instructors and teachers had no prior experience of teaching online. Many students did less well than they would have done in class (Cellini, 2021). Above all students missed the social aspects of school and college: being with friends; non-academic activities such as sport and drama; the routine of getting up and going to school every day (Usher & Sullivan, 2021).

Bates' words are an important reminder that the move to remote learning happened quickly and with little or no apparent planning. It appears that educators did not have time to consider the best practices of online learning nor review the depth of research that had taken place for decades concerning online and distance education. Teachers, with little or no experience in online learning, were expected to move their practice online almost overnight. Therefore, CANeLearn felt it was important to study this period of time, recognizing that it was essential for Canadian educators to share lessons learned and consider ways in which they can be better prepared for other unplanned changes to their work in the future.

It is safe to say that Canada, and the world for that matter, was unprepared for emergency remote learning. Issues of equity of access to technology and Internet surfaced (Bates, 2021a). Parents were unclear as to their changing roles in support of their children's education as learning took place in homes rather than schools (Baker, 2020; Hamilton et al., 2020; Schwartz, 2020). Teachers were left to find their way online and support their learners as best they could (Crichton & Kinsel, 2021). Truly, it was an intense and unprecedented time in Canadian education, and it is important to remember that prior to COVID 19, fewer than 5% of Canadian K-12 students took courses online (Barbour & LaBonte, 2018).

However, teaching and learning did occur, albeit in different ways. Bates (2021a) suggests

> Although the pandemic itself was devastating, some of the educational changes resulting from emergency remote learning were positive. Students, instructors, teachers and parents all underwent significant change as a result of emergency remote learning. This resulted in most cases in a greater appreciation of the strengths and limitations of online learning. Instructors and teachers gained a better understanding of online learning, in particular the advantages and limitations of synchronous and asynchronous learning.

Globally, research is emerging about the impact the pandemic had on school systems, teachers, and educational leaders. Alhmidi (2020) notes that after being required to pivot to new ways of teaching early in the pandemic, approximately March 2020 onwards, many teachers expressed burnout and frustration with system level supports and responses. The pandemic exposed weaknesses in the education system, in teacher education, certification requirements, and opportunities for continuous professional learning.

The eight *Design Principles for K-12 Online Learning* shared in this report are offered to help frame what will hopefully become a national conversation concerning preparedness for what inevitably will be the next disruptions to education. They are also offered as a way of considering how we can best learn from the past months of emergency remote learning and inform current teaching and learning in positive and sustainable way. Each design principle is presented with supportive literature to clarify and elaborate key points, connecting lessons learned from emergency remote learning to the rich literature of online, distance and blended learning.

Design Principles 1 and 2

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

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.

Steffy et. al., (2002) suggested the attrition rate among "teachers is escalating due to retirements and new-teachers dropouts … and supply cannot meet demands" (p. vii). This fact was commonly known well before the current impacts of the COVID-19 global pandemic and the pressures it placed on across the K-12 system. As well, impacts on the labour market, specifically in the education sector, which have been speculated for many years, are now being predicted as the last of the baby boomers leave the workforce (Canadian Press, 2022, para. 1).

Steffy et. al., (2002) identified the need for personalized professional learning and support across teachers' career cycle. They suggest an educator's career is on a continuum of practice and the supports educators need changes over time. Probably the most significant aspect of their work is the recognition that professional learning and support must reflect the stage of a teachers' career – one size fits all professional learning is not only inappropriate but often is a waste of effort as it misses the mark in terms of needs and interest (Pegler et. al., 2010).

The assumptions that underpin Steffy et. al.'s work include:

- Teacher development is directional and impelled by the need to improve.
- The level of development in the life cycle of teaching is a function of personal characteristic, school contexts, support systems, and solid preparation.
- A community of inquiry about teaching encourages learning among teachers and students.
- Teaching excellence is influenced by one's ability to learn, do scholarly work, and commit to growth.
- Situation or context is a powerful force for growth and / or withdrawal.
- Excellence in teaching depends upon the centrality of caring – for students, self, ideas, and the profession (2002, p. 3).

They identified six stages in an educator's career cycle: novice, apprentice, professional, expert, distinguished, and emeritus. Participants in the BC Study and the National Validation Survey were asked to identify themselves within one of the stages. Table 3 illustrates the range of career stages reflected by study participants supporting the argument that professional learning and supports need to relevant, timely and situated within educators' career cycles.

Table 3

Career Cycle Descriptors Linked to BC and National Study

Career Stage	Description (from Steffy et. al., 2002)	BC Study Demographics	National Study Demographics
Novice	Begins when preservice students first encounter practicum experiences as part of their teacher education program.	0	0
Apprentice	Begins for most teacher when they receive responsibility for planning and delivering instruction on their own. Typically, up to the 3rd year of teaching.	9	1
Professional	Emerges as teachers grow in their self-confidence as educators and begin to view themselves as student advocates and begin to help their colleagues.	55	14
Expert	Begins for teachers as they anticipate student responses, modifying and adjusting instruction to promote growth. They begin to reflect on practice, facilitating growth and change.	45	19
Distinguished	Reserved for teachers who are truly gifted in their field. They exceed expectations and are recognized as making their schools better places in which to teach and learn.	36	21
Emeritus	Marks a lifetime of achievement in education. Often this is marked with a career change – teacher education or administration or district level work or retirement.	5	3

Design Principles 1 and 2 speak directly to the need for timely supports, models and professional learning opportunities across the K-12 system that reflect the needs of Canadian educators as well as novice educators who are in teacher education programs. Given the demographics of participants in this study, it appears that the K-12 education system will be required to consider ways in which it can prepare novice and early career educators to step into the potential void created by retiring baby boomers.

Design Principles 3 and 4

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.

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.

Design Principles 3 and 4 align well with the Canadian Education Association (CEA, 2009, p.2) study entitled, "*What Did You Do At School Today?"* This multi-year research study "was designed to capture, assess and inspire new ideas about enhancing the learning experiences of adolescents in classrooms and schools." The study identified three types of engagement and the importance of relationships to foster each type. The table below illustrates the characteristics and outcomes of each type.

Table 4

CEA Types of Engagement

	Social Engagement	**Academic Engagement**	**Intellectual Engagement**
Definition	Meaningful participation in the life of the school	Active participation in the requirements for school success	Serious emotional and cognitive investment in learning

Factors Influencing Engagement	• School teams, clubs, student government, and school-wide campaigns such as environment week
	• Positive relationships with peers and adults
	• High expectations for success.
		• Defined curriculum outcomes
		• Assignments, tests, and marks
		• Individual student effort
		• High expectations for success
		• Positive classroom disciplinary climate
		• Intellectually challenging lessons
		• Teacher and parental encouragement
		• Direct and indirect consequences.
			• Instructional challenge, characterized by:
			  • Curriculum as discipline
			  • Exploration, understanding of concepts
			  • Development of ideas through the disciplines and through work on authentic problems
			• Individual and collective knowledge building
			• Effective learning time
			• Positive classroom disciplinary climate
			• High expectations for success
			• Positive relationships with teachers

Developmental Outcomes	Friendships, social networks, sense of belonging, self-confidence, and often enjoyment of school.	Academic success, credit accumulation, and high school graduation. Post-secondary destinations. Orientation to good work and personal responsibility.	Confidence as knowledge-builders, problem-solvers, conceptual thinkers, self-motivated learners. Orientation to original work and often collaboration.

Critical to each type of engagement was the involvement of student, family, educational support systems and teachers / school administrators. Adoption of the CEA framework for engagement could be invaluable in mitigating some of the concerns expressed by educators and parents about students' sense of social isolation, lack of interest in learning, and overall concerns about learning losses during remote learning.

An interesting finding from the National Validation Study was a specific focus on relationships and relatedness in academic, intellectual, creative, and social activities. Ryan and Deci (2000) describe relatedness as the need to "belong and feel connected to others" (p. 13), suggesting a sense of belongingness "is a fundamental human motivation" and it has a significant impact "on cognition, emotion, behaviour, health, and well-being" (p. 14). Design Principle 4 signals the importance of intentionally fostering belongingness as part of engagement strategies when supporting learners online.

Research is now surfacing on the social, personal, and mental health impacts of the pandemic on K – 12 students, their families, and educators. Aligning those findings to the findings of this study and the CEA engagement framework could yield important considerations for educational leaders as they reflect on current events and prepare for future disruptions.

Design Principle 5

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

This principle speaks to the need to view a range of technologies as enablers of teaching and learning. Technologies must be responsive tools that help us complete the tasks we need to do, and they must be viewed in the plural, technologies, realizing that it is the task of informed educators to select the most appropriate suite of tools to address specific pedagogical needs.

Januszewski and Molenda (2008) reflect the work of the Association for Education Communications and Technology (AECT) when they describe technologies as enablers of human capabilities. Often when a specific technology is selected for non-pedagogical conditions (i.e., cost, server location, technical support, etc.), teachers are trained in that technology and then required to adapt their practices to the tool's affordances. AECT reminds us that teaching practices and student learning needs should inform the select of the most appropriate technologies (Schumacher, 1973). Schumacher's philosophy is one of *enoughness*, suggesting appropriate technologies are the simplest tools that can achieve the intended purposes.

During the COVID-19 pandemic, teachers experienced the degree to which the digital divide exists cross Canada. They reported often students did not have adequate bandwidth or access to computers or tablets to download, engage or even participate in online learning (Gautreaux & Hales, 2020). Many reported that even in homes with a tablet device and computer, an entire family had to balance working from home (the adults) with studying from home (the students) with linked bandwidth (entertainment, Internet, school, and work demands). Access to technological devices and equitable amounts of bandwidth varied by location, demographics,

economic levels, and other constraints, and many school jurisdictions were not able to provide devices or mobile Internet access points.

The digital divide is not a new concern. It has been reported on since the early 1990s. What was significant during the recent move to emergency remote learning is (1) the degree to which it impacted emergency remote learning across Canada, and (2) the degree to which teachers felt that they were not fully prepared to embrace existing and emerging technologies as enablers for teaching and learning. Further, Design Principle 5 suggests there is a role for teacher education and continuous professional learning to help educators across their career cycles (Steffy et. al., 2002) embrace appropriate technologies to inform and enhance their practice. As previously mentioned, several participants in this study appeared to conflate proficiency with technology with mastery of online pedagogy which suggests a lack of understanding of the nuances of good online pedagogy versus manipulation of learning management systems and other software.

Studying issues of equity of access to and fluency with a range of technologies was beyond the scope of this study, but findings suggest that these are importance issues for future consideration.

Design Principle 6

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

Design Principle 6 is tied directly to Principles 1, 2 and 5. The field of online learning is a discipline to be studied and prepared for in intentional and purposeful ways. Crichton and Childs (2004) reported on a study of online educators in Alberta, asking what is the knowledge based for online educators and how might we prepare them for practice? Their findings suggest the "skills required for online educators can be broadly categorized as follows: (1) technology and support, (2) online pedagogy, and (3) opportunity to practice" (p. 27). The study details each category and recommends these skills be developed in teacher education as well formalized professional development, micro-credentials, and graduate certificates and degrees.

The National Validation Study, completed almost 20 years after the Alberta study, found 62% of participants had received no formal training for teaching online while approximately 14% were in progress or had completed a graduate degree specific to educational technology or teaching online. Fewer than 7% reported either having completed or in progress for a diploma specific to educational technology or teaching online.

Design Principle 6 highlights the gap in preparation for teachers entering the system and suggests there is a role to be played by teacher education, graduate education and continued formal professional development in certification or micro-credentials for practicing professionals.

Design Principle 7

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

K-12 educators were eloquent in their call for specific research into good / promising practices for K-12 educators. Too often educators are required to extrapolate research conducted in the post-secondary sector to K-12 learning. In 2009, iNACOL (International Associate for K-12 Online Learning) reported "Few rigorous research studies of the effectiveness of online learning or K-12 students have been published" (Patrick & Powell, 2009, p. 4). A scan of the reference list from a 2020 John Hopkins study into key K-12 practices for online teaching cited 52 articles with only eight published within the previous five years. Further, it was hard to determine how many of the references were specifically K-12 contexts. McKay (2020) at the University of Waterloo identified at least **"**50+ differences between the average, normal Canadian high school experience and what you will experience at university" (para. 1) further supporting the need for specific research to inform K-12 teaching and learning. Bates (2021b) calls for additional study in good practices, asking the question, "online learning and (k-12) schools: do we need a different curriculum for online learning?" (para. 1).

In October 2020, Rachel Collishaw, president of the Ontario History and Social Science Teachers' Association, stated "teachers are putting their students' well-being above their own mental health … [they] are feeling stressed about becoming sick, but also [about] being unable to adapt to the new hybrid teaching system" (Alhmidi, 2020, para 6). This concern illustrates a general lack of preparedness and responsiveness to the implications of the pivot to emergency remote learning. For many researchers in the field of online learning, in the early days of the pandemic, it felt as though educational leaders and administrators simply threw their hands into the air and 'pivoted' to emergency remote learning rather than drawing on proven practices of distance delivery and blended learning. As Bates (2021a) and Barbour, Nagle, and LaBonte (2020) report, teaching and learning did occur. Teachers did their best, often with little or no time to plan. Many teachers report they simply made plans, adjustments, and modification as they worked with students and their families.

Design Principle 7 states the K-12 system must do better for educators, students, and families. Good teaching and learning are intentional, and research informed. A finding from this study suggests the divide still exists between theory and practice. Several educators in this study noted that they did not see value in formal research as a way of strengthening their practices.

While it was outside the scope of this study to probe this notion further, it would suggest that those without formal training in the field do not necessarily turn to the theory informing the field to improve their own practice. This is a concern that higher education may choose to address through both teacher education and graduate degrees.

Design 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.

This principle reflects the stress and anxiety which surfaced during COVID-19. Teachers were placed in complex situations, both personally and professionally. They are the front-line support for many students, and as teaching moved online and into homes, educators were required to

provide emotional support, tech support, and education not only to the students but the families as well. Issues of access to emotional supports, counselling, meals, and the myriad of other forms of assistance that schools provide were clearly exposed for all to see during the COVID-19 pandemic (Bozkurt et. al., 2020). The Secretary General of the United Nations, António Guterres reminds us "When education is interrupted, it affects everyone and all of us pay the price…education is the foundation for expanding opportunities, transforming economies, fighting intolerance, protecting our planet and achieving the Sustainable Development Goals (SDGs)" (UN News, 2021, para. 1).

When we consider wellness and well-being online, we must consider issues of digital citizenship, digital literacy and fluency, and social emotional concerns. Baum and McPherson (2019) remind us "students with weak academic backgrounds and other risk factors struggle most in fully online courses, creating larger socioeconomic gaps in outcomes than those in traditional classroom environments" (Abstract).

Of additional concern are the issues of screen time and ergonomic workstations. "Many people don't realize that a poorly designed computer workstation and/or bad work habits can result in serious health problems. Common symptoms associated with poor design or habits include discomfort in the back, neck and shoulders, hands and wrists, as well as headaches and eyestrain" (UNC, 2022, para 1). Universally, the recommendation to address these issues is to improve workspaces and chairs and to limit screen time. Additional recommendations include developing a cycle of healthy exercises, stretches, and breaks.

A question that arises from this study is the degree to which teachers and their students have access to ergonomic workstations and understand the importance of establishing healthy work habits. Further, it is important to note "the Canadian 24 Hour Movement Guidelines for Children and Youth recommend just two hours of screen time per day (school work doesn't count toward this total), plus at least 60 minutes of exercise for kids and teens ages 5 to 17" (Hulick, 2020, para. 4). These findings could have significant impact for K-12 online learning environments and will require system wide attention. Additional research is needed to address this concern – both within the school and home settings for educators, students, and families.

Recommendations

The rushed 'pivot' or shift to emergency remote learning has left many people with the impression that online learning is "less than" face-to-face brick and mortar learning. However, it is interesting and important to remember that the online environment has been an attractive and appealing learning space for students and educators, and it has a long and well researched history of excellence in Canada, dating back to early correspondence schools delivered through the mail (Crichton et. al., 2013).

The COVID-19 pandemic that began in March 2020 exposed systemic weaknesses in the Canadian education system as captured by this quote "In my school board, online learning is still considered a plan B. The pandemic may have accelerated the shift to online learning, but it is still not on the same footing / equality than face-to-face learning. So not all guiding principles or similar ideas are put forward". Based on the findings from the surveys and a review of the

literature, the first recommendation this reports makes is to encourage educators and school leaders to use the *Design Principles for K-12 Online Learning* as a provocation for a national conversation on teaching and learning amongst educational leaders.

Specific recommendations include:

1. Using the eight design principles as a framework to review and inform K-12 jurisdictions as well as post-secondary teacher and graduate education programs.
2. Creating a curated, national shared collection that showcases Canadian models and examples of a variety of ways to use the online environment in teaching and learning.
3. Creating an online community of practice for K-12 online educators that recognizes time constraints and needs, allowing for the creation of a safe and timely way to learn from one another and see what design principles could look like in practice.
4. Offering professional learning opportunities that are timely and reflect the career cycles, experiences, specific needs, and the projected shortfall of K -12 educators in the near-term.
5. Creating a mentorship model that supports K-12 online educators and addresses the concerns of wellness, burn out, ergonomics, and stress.
6. Considering ways of promoting quality online learning and celebrating the role it plays in many learners' education by engaging with education leaders to guide the determination of quality teaching and learning to help shape teacher preparation and professional development.
7. Leveraging the national conversation of K-12 online learning to affect change in the design and delivery of undergraduate education, diploma, and micro-credential programs to recognize the changing work environment of a K-12 educator.
8. Engaging those with leadership and certification responsibilities in Canadian education to adopt these principles as a way preparing K-12 teachers to be responsive to changes and to be a position to respond rather than react to emerging pressures which as natural disasters, health concerns, etc.

Suggested Framework for a National Conversation amongst Educational Leaders on Design Principles

Building from this report, it is suggested that CANeLearn share the National Validation Study report and findings with educators and invite educational leaders to a national conversation. CANeLearn may choose to leverage its existing network, specifically including anyone who has participated in the BC or national study. CANeLearn may also wish to share the report as broadly as possible across the system and ensuring educators in rural, remote, northern, Indigenous, separate, and other underrepresented jurisdictions have had their voices and experiences included in future work.

As pre-work for the national conversation CANeLearn might consider taking the temperature of educators nationally concerning the role of online learning across the K-12 system. A way of doing this would include a survey of K-12 educators that would ask the following:

1. Degree to which the design principles resonate for you (Likert scale expressed as a temperature gauge),

2. Degree to which you saw the design principles in action in your school district (Likert scale expressed as a temperature gauge),
    - Provide 3 examples of those design principles in your school (Open-ended response up to 50 words), and
3. Degree to which you embrace/embody the design principles in your practice (Likert scale expressed as a temperature gauge),
    - Provide 3 examples from your practice that you are willing to share with colleagues (using the template provided).

The template for sharing one's practice would need to be created in advance for educators and would serve as an initial structure for open content to be included in a national K-12 repository of curated resources. CANeLearn could curate the collection and use the templated examples as a way of continuing to contribute to professional learning in Canada. This collection would be a curated gift from the field to the field, and it could model the ways in which research, good practice and collaboration would foster professional learning.

Suggestions for the template include:

- Contributor's name;
- Specialization/grade level;
- Language; and
- 100-word description and attachment or link.

Following the online temperature check, CANeLearn could continue the national conversation with a conference, offering a variety of sessions, panels and other activities including:

- Arranging a session that provides a good foregrounding on what design principles are and what they facilitate;
- Sharing of the temperature check results and hosting a discussion of the findings (thermometer readings);
- Continuing the conversation and identifying actionable next steps and where support is needed; and
- Facilitating the templated gift exchange (give a gift, receive a gift) which involves the showcasing the curated collection of good practices and highlighting exemplary contributions.

CANeLearn could continue the conversation post-conference, framing it around the following eight questions arising from this study and which need further research and exploration.

1. Degree to which educators equate technology competence with online pedagogical experience and expertise?
2. Degree to which educators fully understand the notion of design principles as an iterative way of making system wide changes in terms of informing policy, practice, funding, technology acquisition / choices, professional learning, teacher education, etc.?
3. Degree to which practicing educators value research as a way of informing classroom practice? Have we inadvertently created silos around theory and practice and practice informed theory?

4. Degree to which we have a deep understanding of where change is made, adopted, and adapted within the K-12 ecosystem of learning? Are we asking the right questions of the wrong people or the wrong questions of the right people?
5. Degree to which the K-12 ecosystem of learning is prepared to embrace blended learning as a way of preparing to future disruptions / changes within the K-12 ecosystem of learning?
6. Degree to which the K-12 ecosystem of learning has embraced the potential and promise of educational technologies to enhance learning and use it to prepare the system for the next disruptions – climate emergencies, future pandemics, natural disasters, etc.?
7. Degree to which the K-12 ecosystem recognizes that the fundamental nature of the work has changed and will change more in the near future?
8. Degree to which post-secondary education, specifically teacher education and graduate education, has recognized the history, role and importance of online and blended learning in Canadian contexts and in preparing for future disruptions to the K- 12 system?

Summary

The purpose of the National Validation Study was to revisit the initial design principles developed by educators in early 2021 and test their efficacy and relevance with a national audience. Having done that, the next steps include continuing the conversation which is in keeping with the needs and desires of the educators involved and their hope to share their learning and move their practice forward. To continue to be effective, the *Design Principles for K-12 Online Learning* need to be renewed and revised.

In both the initial study conducted in British Columbia and the subsequent National Validation Study, participants expressed their desire to have the principles shared widely and used to move practice forward in innovative and research informed ways. They believed the principles would help enhance the reputation of online learning, and the principles should be used to continue discussions about online learning practice amongst their colleagues and the system at large. It was the intention of the researchers and participants that the resulting revised design principles be discussed, used, and iterated by educators as they use them in their work.

Design principles are a living entity that can inform policy, practice, frameworks, guidelines, quality assurance documents, and professional learning opportunities. They are valuable as they provide a foundation of shared understanding. The principles both reflect actual practice and the current literature that could inform that practice. In the case of the design principles developed during this study, they captured (1) the words of practicing educators, (2) their understanding of what good online learning is, has been, and could become, and (3) the hope that they can provoke leaders to consider the importance of preparing the K-12 learning and teaching environment for the inevitable changes it will face in the years ahead from climate change, natural disasters, health emergencies, and other global pressures.

Education has never been a static endeavour. It must be responsive to the needs of its constituents - students, educators, family, and society. This report highlights that while educators did not have time to consider the best practices of online learning nor review the depth of research that had taken place at the beginning of the pandemic, educational leaders now would

be remiss to not reflect on what happened during emergency remote learning, draw on the literature in the field, and prepare thoughtfully for future educational disruptions and a changing workforce.

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