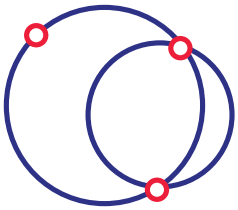

OTESSA

Open/Technology in Education,
Society, and Scholarship Association

Association pour l'Ouverture/Technologies en Éducation,
dans les milieux Scolaires et dans la Société.

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Editorial: Promoting Innovation in Research and Practice

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Keywords: educational technology, online learning, open education, digital learning, digital scholarship, open scholarship, editorial

Welcome to OTESSA!

We are excited to publish the first issue of the Open/Technology in Education, Society, and Scholarship Association (OTESSA) Journal. OTESSA was formed in 2019 with the goal to provide an inviting community to drive innovation, research, and practice in areas where either technology or openness intersect with education, research, and, more broadly, within society.

Naming Our Association

Open displays prominently in our name. However, our association of scholars and practitioners is dedicated to more than open education. Addressing the pressing and complex problems facing education and society requires that research and practice addresses the intersections and the relationships between technology, openness, education, society, research, and practice. Instead of instrumentalizing openness, we recognize that openness is intertwined with various issues such as power and privilege. To that end, we strive to be an inclusive organisation that promotes, supports and publishes work in the areas and intersections of educational technology, instructional design, the learning sciences, digital, online, and open education as these fields span scholarship, design, teaching, and learning. We welcome work at the intersection of technology and society as it affects all facets of how we connect and learn. We seek to bring together those working in teaching and learning with those working in scholarship, given that librarians, designers, and educators have much in common. Similarly, we seek to support all areas of education, including K12, higher education, workplace learning, and informal and lifelong learning as these share both struggles and successes in navigating the integration of technology for learning or the adoption of openness in their systems and cultures. While OTESSA is a Canadian non-profit corporation with the goal of connecting researchers, practitioners, and other stakeholders from across Canada, our scope is very much international. International executive advisors are on our board and we aim to contribute to and expand international discourse, collaboration, and advocacy.

Our Mission

OTESSA supports networking between and among researchers, practitioners, graduate and undergraduate students, librarians, designers, educators, administrators, policy-makers, and other stakeholders both nationally and internationally, from K12, post-secondary, workplace, or informal learning settings. Our association builds relationships, supports professional partnerships, enhances communications, shares resources, and encourages innovation. OTESSA supports the development of new research and practice, promotes research opportunities, and disseminates and applies research results. We strive to inform policy and practice regionally, provincially, nationally, and internationally.

Our mission is intertwined with our dedication to issues of equity, diversity, inclusion, and decolonization, which are the lenses we use to inform all of the association's work. For example, among the many steps we have taken so far, we include the following

- OTESSA's board of directors includes an equity officer, as well as Francophone and Indigenous representation. Our goal is to broaden the board's diversity, aiming for gender-balanced representation from various provinces and territories, while drawing upon expertise from across the globe.

- OTESSA's conference registration rates vary according to various factors that differentiate abilities to pay conference fees

- Our journal is open and welcoming to scholarship broadly defined, regardless of whether it is empirical or theoretical, transdisciplinary, critical or situated within the canons of a particular discipline.

- In developing the OTESSA Conference program, we are intentional about inviting, welcoming and showcasing diverse and underrepresented voices and perspectives and disrupting hegemony and homogeneity.

We invite opportunities, suggestions, and collaborations that will help us to do more to promote equity, diversity, inclusion, and decolonization through our association.

Our Beginnings

OTESSA was formed right before the COVID-19 pandemic impacted all of our lives. We are very thankful to our board, volunteers, members, and sponsors for sharing our vision and supporting the growth of this new association. Many have persisted to build a movement and a community that advocates for a world in which technology improves learning and teaching, research and scholarship, and has a positive impact on society, while critically assessing and opposing the negative influences that can exist in an analog society and can be channeled, and sometimes amplified, through technology. In order to advance our work, the Association commits to being a collective and connecting with diverse voices from researchers, practitioners, and all stakeholders. We commit to an inclusive approach in promoting innovation; thus, we created both a research and practice stream in our journal and our conference sessions/proceedings. We recognize that no single knowledge mobilization effort can adequately support the diverse needs and pressures that different stakeholders face in sharing their ideas. We have therefore sought to provide multiple pathways for engagement, including simple abstracts for conference session submissions, to layering on options to publish either short papers in peer-reviewed conference proceedings or full papers in our peer-reviewed journal.

We have opted to become an association member of the Federation of the Humanities and Social Sciences and we have the option to host an annual conference within Congress, with reciprocity attendance agreements with several of its other association conferences, including CSSE, CSSHE, and CASAE, with the potential to expand to more collaborations in the future. At our 2021 conference, we presented three $500 graduate awards to talented new researchers and practitioners, indicating early our desire to engage and support graduate students in taking leadership in expanding OTESSA.

We aim to expand the scope of recognition, showcasing, and celebration of innovative scholarship and practice in the future. We expect to host conferences, online events, and other community-building options both within and independent of Congress as we build and grow our association. These opportunities to connect and collaborate can be situated globally, co-located, or fully online and we look forward to building partnerships with organizations in the pursuit of common goals. We hope that you will engage with us and help shape a better future for learning, teaching, and sustaining our world. You can connect with our work as follows:

The OTESSA Website, which includes our blog, annual conference websites, membership and sponsorship information and sign-up, also links to our journal and conference proceedings:

- OTESSA Journal
- OTESSA Conference System with Published Proceedings

We are excited to welcome you as a reader to the inaugural issue of the OTESSA Journal. At present, our journal is double-blind peer-reviewed, although we are exploring options for self-selection of alternative review models, so that individuals can select pathways that support their individual circumstances, needs, and goals.

For our first issue, we are publishing 3 research articles and 3 practice articles. We gratefully acknowledge the peer reviewers and copy editors, who have made this issue possible, and thank them for contributing support in bringing you the following research and practice articles.

Research Section Overview

Support to Rural, Remote and Northern Counsellors: The Unique Features Inherent to Video-Conferencing Technology by **Micheala Slipp**

> Slipp examined the use of video conferencing technology in clinical supervision settings, specifically in supporting nine counsellors in Canadian rural, remote, and Northern contexts. Findings from this qualitative study highlight the contextual factors that impact practice, as well as a number of opportunities and barriers counsellors report in using video conferencing technology.

The Design and Evaluation of Online Faculty Development for Effective Graduate Supervision by **Michele Jacobsen, Hawazen Alharbi, Lisa Taylor, Les Bairstow**, and **Verena Roberts**

> Jacobsen et al. utilized a design-based research approach to explore ways to improve the quality of graduate supervision using a massive open online course. Surveys, interviews, and system data were collected to assess the design, learner experiences, and the impact of the course on graduate supervision practices. The findings from this study show impact on graduate supervisor learning, goal setting, and their practice. Recommendations for design and practice, including insights about graduate supervisor development in interdisciplinary online learning environments, are provided.

Open Pedagogy and Transdisciplinary Thinking: Making Connections Through a Visual Artefact Self-Study by **Constance Blomgren**

> In this article, Blomgren explores an innovative approach via self-study as she develops a Science, Technology, Engineering, Art, and Mathematics (STEAM) OER project. Two questions are examined: How do Open Pedagogy attributes contribute to a transdisciplinary STEAM OER pedagogical stance? and How can one apply visual artefact self-study as intentional critical friends to examine professional value and to enhance pedagogical self-understanding? In closing, assertions are provided for open educators and researchers interested in the practices of transdisciplinary, open curricular and pedagogical processes.

Practice Section Overview

OTESSA Submission for Government of Canada 2021 Pre-Budget Consultations in Advance of the Federal Budget by **the Open/Technology in Education, Society, and Scholarship Association**

> This practice article contains OTESSA's submission to the Government of Canada federal pre-budget submission, which is a consultation process whereby organizations and the public can submit briefs outlining arguments in favour of initiatives or funding requests to be considered prior to the release of the official government budget. Our submission contains seven recommendations and was developed after an open process that solicited both member and public input. This submission has been identified as an exemplar of how associations can take proactive leadership steps toward government advocacy as it pertains to education. We encourage stakeholders around the world to consider using this submission as a model and advocate for government support at organizational, provincial/state, and/or national levels.

Building Bridges and Breaking Barriers: OER and Active Learning in Mathematics by **Ann Gagne**, **Xinli Wang**, and **Timothy Yusun**

> In their article, Gagne et al. discuss how open educational resources and instructional technology are used in case examples in mathematics courses to support learner academic success, develop faculty learning in pedagogy, and reduce barriers to access at a research-intensive university. The role of the educational developer is highlighted as a support for both the pedagogical and technological needs of faculty, within a frame of inclusive pedagogy.

Planning, Implementing, and Assessing an OER Faculty Learning Community: Facilitator's Lens by **Mary Jo Orzech**

> Orzech documents a librarian-led faculty learning community focused on open educational resources (OER) and summarizes practical steps to sustain campus-based OER adoption programs during and after startup. Top 10 takeaways are summarized based on one year with a faculty learning community with additional suggestions for next steps.

Our Appreciation

The launch of OTESSA as an association, the launch of a conference during a pandemic, and the launch of a journal in just two years has taken significant dedication, love, support, and teamwork. We thank our early presenters and authors for their patience as we experienced unexpected demands and diversions from this work. The pandemic has been difficult on members of our field due to unprecedented demands arising from the pivot across educational institutions; however, we also want to acknowledge the personal impacts being experienced by many members of our community. We recognize we still have a journey ahead as the pandemic continues, but our next goal is to develop strategies to support and connect our growing community, so that we not only can share our knowledge, but we can share our support as a collective on openness and technology in education, society, and scholarship.

We thank our early sponsors: BCcampus, eCampusOntario, LearnQuebec, and the University of Victoria (President's Office, Faculty of Education Dean's Office, and University Libraries). We must also pay special tribute to all of our supporters, including board members, editors, conference chairs, authors, reviewers, graduate students, library support, copyeditors, committee members, volunteers, and all the presenters and participants at the inaugural 2021 OTESSA Conference and those who chose to publish their manuscripts with us. Lastly, thank you, the reader, for supporting our journal.

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REVUE OTESSA

Éditorial: Promouvoir l'Innovation dans la Recherche et dans la Pratique

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Mots clés : technologie éducative, apprentissage en ligne, éducation ouverte, apprentissage numérique, développement des savoirs numérique, développement des savoirs ouvert, éditorial

Bienvenue à OTESSA!

Nous sommes ravis de la publication de ce premier numéro de la revue de l'association pour l'Ouverture/les Technologies en Éducation, dans les milieux Scolaires et dans la Société (OTESSA). L'association OTESSA a été créée en 2019 afin d'offrir une communauté invitante et rassembleuse pour stimuler l'innovation, la recherche et la pratique dans les domaines où les technologies ou l'ouverture sont liées à l'éducation, à la recherche et, plus largement, à la société.

Nommer une association

L'ouverture figure en bonne place dans notre nom. Cependant, notre association de chercheurs et de praticiens ne se consacre pas uniquement à l'éducation ouverte. Pour résoudre les problèmes urgents et complexes auxquels l'éducation et la société sont confrontés, la recherche et la pratique doivent tenir compte des intersections et des relations entre les technologies, l'ouverture, l'éducation, la société, la recherche et la pratique. Au lieu d'instrumentaliser l'ouverture, nous reconnaissons que celle-ci est intimement liée à diverses questions incluant des pouvoirs et des privilèges. À cette fin, nous nous efforçons d'être une organisation inclusive qui promeut, soutient et publie des travaux dans les domaines à l'intersection des technologies éducatives, de la conception pédagogique, des sciences de l'apprentissage, de l'éducation avec le numérique, en ligne et ouverte, étant donné que ces domaines couvrent la recherche, la conception, l'enseignement et l'apprentissage. Nous accueillons aussi les travaux qui lient technologies et société puisque cela affecte les façons dont nous nous connectons et apprenons. Nous cherchons à réunir les personnes œuvrant en enseignement en apprentissage avec celles œuvrant au développement des savoirs, les bibliothécaires, concepteurs pédagogiques, personnes enseignantes et chercheurs ayant beaucoup en commun. De même, nous cherchons à soutenir tous les ordres et milieux d'enseignement et d'apprentissage, du préscolaire et primaire à l'enseignement postsecondaire, l'apprentissage en milieu de travail, informel et tout au long de la vie, car ces milieux partagent à la fois des difficultés et des succès dans l'intégration des technologies pour l'apprentissage ou l'adoption de l'ouverture dans leurs systèmes et leurs cultures. Bien que l'association OTESSA soit une société canadienne sans but lucratif dont l'objectif est de mettre en relation des chercheurs, des praticiens et d'autres intervenants de partout au Canada, notre portée est très internationale. Des conseillers exécutifs internationaux font partie de notre conseil d'administration et nous visons à contribuer et à élargir les discussions, la collaboration et la défense de nos intérêts au niveau international.

Notre Mission

L'association OTESSA soutient le réseautage entre et parmi les chercheurs, praticiens, étudiants, bibliothécaires, concepteurs, enseignants, administrateurs, décideurs et d'autres parties prenantes, tant au niveau national qu'international, du préscolaire à l'enseignement postsecondaire, en milieu de travail ou en apprentissage informel. Notre association établit des relations, soutient les partenariats professionnels, améliore les communications, partage les ressources et encourage l'innovation. L'association OTESSA soutient le développement de nouvelles recherches et pratiques, favorise les possibilités de recherche, applique et diffuse les résultats de recherche. Nous nous efforçons d'éclairer les politiques et les pratiques aux niveaux régional, provincial, national et international.

Notre mission est étroitement liée à notre implication en matière d'équité, de diversité, d'inclusion, qui informe tous les travaux de l'association. Par exemple, parmi les nombreuses actions réalisées jusqu'à présent, citons les suivantes :

- Le conseil d'administration de l'association OTESSA inclut un membre dévoué à l'équité, ainsi que des représentants francophone et autochtone. Notre objectif est d'augmenter la diversité du conseil d'administration, en visant une représentation équilibrée entre les genres, personnes représentant diverses provinces et territoires, tout en faisant appel aux expertises de partout dans le monde.

- Les tarifs d'inscription aux conférences de l'association OTESSA sont modulés selon divers facteurs qui différencient les capacités de chacun à payer les frais de conférence.

- Notre revue accueille des études diversifiées, qu'elles soient empiriques ou théoriques, transdisciplinaires, critiques, interdisciplinaires ou au sein d'une discipline particulière.

- En développant le programme de la conférence OTESSA, nous avons l'intention d'accueillir, d'inviter et de présenter des voix et des perspectives diverses, sous-représentées, incluant celles qui perturbent l'hégémonie et l'homogénéité.

Nous accueillons aussi toutes les suggestions, opportunités et collaborations qui nous aideront à en faire plus pour promouvoir l'équité, la diversité et l'inclusion à travers notre association.

Nos débuts

L'association OTESSA a été créée juste avant que la pandémie de COVID-19 vienne affecter les vies de tous et chacun. Nous sommes très reconnaissants envers notre conseil d'administration, nos bénévoles, nos membres et nos partenaires d'avoir partagé notre vision et soutenu la croissance de cette nouvelle association. Nombreux sont ceux qui ont persévéré pour construire un mouvement et une communauté qui défendent un monde dans lequel les technologies améliorent l'apprentissage et l'enseignement, la recherche et les études, et a un impact positif sur la société, tout en évaluant de manière critique et en s'opposant aux influences négatives qui peuvent exister dans une société analogique et qui peuvent être canalisées, et parfois amplifiées, par les technologies. Afin de faire avancer notre travail, l'association s'engage à être un collectif et à se connecter avec diverses voix de chercheurs, de praticiens et d'autres parties prenantes. Nous nous engageons à adopter une approche inclusive dans la promotion de l'innovation ; c'est pourquoi nous avons créé un volet recherche et un volet pratique dans notre revue et dans les communications et actes de nos conférences. Nous reconnaissons qu'aucun effort de mobilisation des connaissances ne peut à lui seul répondre de manière adéquate aux divers besoins et pressions auxquels les différentes parties prenantes sont confrontées lorsqu'elles partagent leurs idées. Nous avons donc cherché à offrir de multiples voies d'engagement, allant de simples résumés pour les soumissions de communications aux conférences à des options de publication d'articles courts dans des actes de conférence ou d'articles complets dans notre revue, l'ensemble de ceux-ci étant évalués par des pairs.

Nous avons choisi de devenir une association membre de la Fédération des Sciences Humaines et nous avons la possibilité d'organiser une conférence annuelle au sein du Congrès, avec des ententes de réciprocité de participation avec plusieurs autres conférences d'association du Congrès, notamment la CSSE, la CSSHE et la CASAE, avec la possibilité d'étendre à d'autres collaborations à l'avenir. Lors de notre conférence de 2021, nous avons

remis trois prix de 500 $ à de nouveaux chercheurs et praticiens talentueux, témoignant ainsi de notre volonté à inciter et à aider les étudiants aux cycles supérieurs à participer et à mener l'expansion de l'association OTESSA.

Nous souhaitons élargir la portée des reconnaissances, mises en valeur et célébration des études et des pratiques innovantes à l'avenir. Nous prévoyons organiser des conférences, des événements en ligne et d'autres opportunités de renforcement de la communauté, à la fois au sein et en dehors du Congrès, à mesure que nous construisons et développons notre association. Ces occasions de se connecter et de collaborer peuvent se situer à l'échelle mondiale, dans un même lieu ou entièrement en ligne, et nous sommes impatients d'établir des partenariats avec des organisations dans la poursuite d'objectifs communs. Nous espérons que vous vous engagerez avec nous et que vous contribuerez à façonner un avenir meilleur pour l'apprentissage, l'enseignement et le développement de notre monde. Vous pouvez vous renseigner sur nos travaux et vous joindre à nous des façons suivantes :

Le site Web de l'association OTESSA, qui comprend notre blog, des informations sur l'adhésion et le parrainage, un lien vers les sites web de notre revue, de la conférence annuelle et des actes, etc.

- La Revue de l'association OTESSA.
- Le système de conférence de l'association OTESSA avec les actes publiés

Nous sommes heureux de vous accueillir, en tant que lecteur, pour ce premier numéro de la revue OTESSA. À l'heure actuelle, notre journal est évalué par des pairs en double aveugle, bien que nous explorions d'autres options d'auto-sélection de modèles d'évaluation alternatifs, afin que chacun puisse choisir la voie qui convient le mieux à leurs besoins, circonstances et objectifs individuels.

Pour notre premier numéro, nous publions 3 articles de recherche et 3 articles de pratique. Nous tenons à remercier les évaluateurs et correcteurs d'épreuves qui ont contribué à la publication de ce numéro, et nous les remercions d'avoir apporté leur expertise et leur soutien pour vous présenter les articles de recherche et de pratique qui suivent.

Aperçu de la section de recherche

Soutien aux conseillers des régions rurales, éloignées et nordiques : les caractéristiques uniques inhérentes à la technologie de la vidéoconférence, par **Micheala Slipp**

> Slipp a examiné l'utilisation de la technologie de vidéoconférence dans des contextes de supervision clinique, en particulier pour soutenir neuf conseillers dans des contextes ruraux, éloignés et nordiques canadiens. Les résultats de cette étude qualitative soulignent les facteurs contextuels qui ont un impact sur la pratique, ainsi qu'un certain nombre d'opportunités et d'obstacles que les conseillers signalent dans l'utilisation de la technologie de vidéoconférence.

Conception et évaluation d'un cours de formation en ligne pour une supervision efficace des étudiants aux cycles supérieurs, par **Michele Jacobsen, Hawazen Alharbi, Lisa Taylor, Les Bairstow** et **Verena Roberts**.

Jacobsen et al. ont utilisé une approche de type *design-based research* pour explorer les façons d'améliorer la qualité de la supervision des étudiants aux cycles supérieurs en utilisant un cours en ligne ouvert et massif. Des enquêtes, des entretiens et des données analytiques ont été collectés pour évaluer la conception, les expériences des apprenants et l'impact du cours sur les pratiques de supervision des étudiants. Les résultats de cette étude montrent un impact sur l'apprentissage, la fixation d'objectifs et la pratique des superviseurs. Des recommandations pour la conception et la pratique sont fournies, incluant des suggestions sur le développement professionnel des superviseurs dans des environnements d'apprentissage en ligne interdisciplinaires.

Pédagogie ouverte et pensée transdisciplinaire : établir des liens par le biais d'une *self-study* d'un artefact visuel, par **Constance Blomgren**

Dans cet article, Blomgren explore une approche innovante par le biais d'une étude de type *self-study* alors qu'elle développe un projet de REL en sciences, technologie, ingénierie, art et mathématiques (STEAM). Deux questions sont examinées : Comment les attributs de la pédagogie ouverte contribuent-ils à une position pédagogique transdisciplinaire pour les REL dans le domaine des sciences, de la technologie, de l'ingénierie, de l'art et des mathématiques (STEAM) ? et Comment peut-on réaliser une *self-study* d'artefacts visuels en tant qu'amis critiques pour en examiner la valeur professionnelle et améliorer son auto-compréhension pédagogique ? En conclusion, des suggestions sont fournies aux formateurs en apprentissage ouvert et aux chercheurs intéressés par les pratiques de processus pédagogiques transdisciplinaires et à curriculum ouvert.

Aperçu de la section de pratique

Mémoire OTESSA dans le cadre des consultations prébudgétaires du gouvernement du Canada 2021, en prévision du budget fédéral, par **l'Association pour l'Ouverture/Technologies en Éducation, dans les milieux Scolaires et dans la Société**

Il s'agit d'un processus de consultation dans le cadre duquel les organisations et le public peuvent soumettre des mémoires présentant des arguments en faveur d'initiatives ou de demandes de financement qui seront examinées avant la publication du budget officiel du gouvernement. Notre soumission contient sept recommandations et a été élaborée à la suite d'un processus ouvert qui a sollicité la participation des membres et du public. Cette proposition a été identifiée comme un exemple de la manière dont les associations peuvent prendre des mesures proactives pour défendre les intérêts du gouvernement en matière d'éducation. Nous encourageons les parties prenantes du monde entier à considérer cette proposition comme un modèle et à plaider en faveur d'un soutien gouvernemental aux niveaux organisationnel, provincial/étatique et/ou national.

Construire des ponts et briser des barrières : REL et apprentissage actif en mathématiques, par **Ann Gagne, Xinli Wang** et **Timothy Yusun**

Gagne et al. expliquent comment les ressources éducatives libres et les technologies éducatives sont utilisées dans des études de cas dans des cours de mathématiques pour favoriser la réussite scolaire des apprenants, développer l'apprentissage de la pédagogie par les enseignants et réduire les obstacles à l'accès dans une université orientée vers la recherche. Le rôle du conseiller pédagogique est mis de l'avant en tant que soutien aux

besoins pédagogiques et technologiques du corps enseignant, dans le cadre d'une pédagogie inclusive.

Planification, mise en œuvre et évaluation d'une communauté d'apprentissage sur les REL dans une faculté : la perspective d'une personne facilitatrice, par **Mary Jo Orzech**

Orzech documente une communauté d'apprentissage dans une faculté, dirigée par une personne bibliothécaire et axée sur les ressources éducatives libres (REL). Elle résume les étapes pratiques pour soutenir les programmes d'adoption des REL sur le campus pendant et après leur démarrage. Les 10 principaux points à retenir sont résumés sur la base d'une année de communauté d'apprentissage de la faculté, avec des suggestions additionnelles pour les prochaines étapes.

Notre appréciation

Le lancement de l'association OTESSA ainsi que ceux d'une première conférence pendant une pandémie et d'une revue, en seulement deux ans, ont nécessité beaucoup de dévouement, d'amour, de soutien et de travail d'équipe. Nous remercions nos premiers présentateurs et auteurs pour leur patience alors que nous avons rencontré des demandes imprévues et des diversions au fil de ce travail. La pandémie a été difficile pour les membres de notre domaine en raison des demandes sans précédent découlant de leur situation pivot dans les établissements d'enseignement ; nous reconnaissons par ailleurs les impacts personnels vécus par de nombreux membres de notre communauté. Alors que nous avons encore du chemin à parcourir dans la pandémie, notre prochain objectif est de développer des stratégies pour soutenir et connecter notre communauté grandissante afin que nous puissions non seulement partager nos connaissances, mais aussi notre soutien en tant que collectif sur l'ouverture, les technologies, l'éducation, la société et le développement des savoirs.

Nous remercions nos premiers sponsors : BCcampus, eCampusOntario, LearnQuebec, et l'Université de Victoria (Bureau du président, Bureau du doyen de la Faculté d'éducation et Bibliothèques universitaires). Nous devons également rendre un hommage particulier à tous ceux qui nous soutiennent, notamment les membres du conseil d'administration, les rédacteurs, les présidents de conférence, les auteurs, les évaluateurs, les étudiants aux cycles supérieurs, le personnel de soutien des bibliothèques, les évaluateurs, les membres des comités, les bénévoles, ainsi que tous les présentateurs et les participants à la conférence inaugurale de l'association OTESSA 2021 et ceux qui ont choisi de publier leurs manuscrits avec nous. Enfin, merci à vous, lectrices et lecteurs, de soutenir notre revue.

Research Article

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Support to Rural, Remote, and Northern Counsellors: The Unique Features Inherent to Video-Conferencing Technology

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Abstract
This paper presents the qualitative findings from a mixed methods quantitative-qualitative explanatory sequential research project. It investigates unique features of video conferencing technology and how these can be helpful in supporting counsellors in rural, remote, and Northern contexts to mitigate compassion fatigue through video conferencing clinical supervision. Semi structured interviews with nine respondents were conducted and analyzed with thematic content analysis supported by *NVivo 10.* The results revealed eight higher order themes. Of note are the thematic results which described technology as a solution, the unique opportunities inherent in the medium of video conferencing, and some of its inherent challenges. These results are relevant to a variety of consultative contexts across healthcare and education because they assist in understanding how the technology impacts interpersonal connection and efficacy in supervision work.

Keywords: remote, rural, northern, clinical supervision, counsellors, video conferencing, e-supervision.

Introduction

This paper presents the qualitative results of a mixed methods research which looked at the role of video conferencing technology when integrated into clinical supervision to support counsellors working in rural, remote, and Northern communities. The quantitative results of this research are published elsewhere (Slipp, 2020).

Literature

Challenges of Rural, Remote, and Northern Work

Geographic Isolation

The literature suggests that those working as counsellors in Northern, rural, and remote communities are working in some of the most extreme and complex clinical environments (Malone, 2010, 2011, 2012; Malone & Dyck, 2011; O'Neill et al., 2016). By their nature these communities are geographically remote and difficult to access which likely contributes to the felt sense of isolation (O'Neill, 2010) experienced in these professional contexts. DuPlessis et al. (2001) defined *rural* as communities outside the commuting zone to a center of 10,000 or more, while the Ontario Ministry of Health and Long-term Care (2011) suggested that remote communities are those without year-round road access or those that rely on a third party (e.g., train, airplane, ferry) for transportation to access larger centers. Given the social and cultural complexity (Kassam, 2001) involved in identifying a singular definition of "Northern," respondents in this research were encouraged to self-identify if they thought that their context was accurately captured by this word.

Sociocultural Factors

Geographic isolation is compounded by complex sociocultural conditions related to poverty (Malone, 2012), lack of resources, perpetual staff turnover (O'Neill et al., 2016), and difficulty accessing primary, secondary, and tertiary health and mental health services given the extreme weather and large geographic distances that often span these sparsely populated and vast land masses (O'Neill et al., 2013). It should be noted that over half of the 1.4 million Indigenous peoples in Canada live in rural, remote, and Northern communities; overall, Indigenous communities in Canada show marked decrease in life expectancy which can differ by as much as 16 years when compared to non-Indigenous communities (Ministerial Advisory Council on Rural Health, 2002). These poor health outcomes and the disparity of available medical services undermines the values of a universal healthcare system that purports to offer essential healthcare services to all Canadians (Pong & Pitblado, 2005). This inequity of distribution supports the Truth and Reconciliation Commission of Canada's (2015) Call for proper tracking and reporting of these health indicators, along with the provision and availability of appropriate healthcare services.

Ethical Tensions

The unique tensions present in rural and rural Northern mental health which include deep ethical complexities inclusive of dual relationships, community pressure, (Halverson & Brownlee, 2010; Schank, 1992), and the "fish bowl" phenomenon that accompanies being a highly visible professional in a small community (O'Neill, et al., 2016, p. 134). Practitioners in rural settings often describe the need to have a generalist scope of practice which necessitates the stressful and ethically challenging reality that practitioners are often working "at the edge of competency" with professional codes of practice better suited for the realities of urban mental health work (O'Neill et al., 2016, p. 130).

Compassion Fatigue

The aforementioned ethical tensions put counsellors working in these contexts at risk for the development of secondary stress syndromes, which include burn out, compassion fatigue, and vicarious trauma. These syndromes are now recognized as occupational hazards emerging from cumulative exposure to their clients' suffering (Ben-Porat & Itzhaky, 2009; Cohen & Collens, 2013; Finklestein et al., 2015; Lerias & Byrne, 2003; Mailloux, 2014; Mathieu, 2014; Pearlman & Saakvitnee, 1995; Ringel & Brandell, 2011). Coined by Charles Figley, *compassion fatigue* is defined by Mathieu (2012) as

> a concept that refers to the emotional and physical exhaustion that can affect helping professionals and caregivers over time. It has been associated with a gradual desensitization to patient stories, a decrease in quality care for patients and clients (sometimes described as "poor bedside manners"), an increase in clinical errors, higher rates of depression and anxiety disorders among helpers, and rising rates of stress leave and degradation in workplace climate. Helping professionals have also found that their empathy and ability to connect with their loved ones and friends is impacted by compassion fatigue. In turn, this can lead to increased rates of stress in the household, divorce, and social isolation. The most insidious aspect of compassion fatigue is that it attacks the very core of what brings helpers into this work: their empathy and compassion for others. (p.136)

Paradoxically, it is understood that, while capacity for empathetic engagement with the client is essential to ensuring therapeutic effectiveness, it is precisely this factor that seems to put clinicians at risk for developing secondary stress reactions (Pearlman & Saakvitnee, 1995; Rassmussen, 2019). Miller and Sprang (2017) suggested that although reports of incidence vary across the literature, it is estimated that compassion fatigue may occur in 8%–16% of social workers. Molnar et al. (2017) saw compassion fatigue as a systemic public health issue. The literature suggests that compassion fatigue affects workplace productivity and increases both absenteeism and premature departure from the field (Figley, 1995a, 1995b; Harris, 1995; Middleton & Potter, 2015; Sommer; 2008). Perhaps mostly disturbingly, compassion fatigue creates the sheer loss of hope that often ensues in counselling professionals who are suffering in this way (Edey & Jevne, 2003; O'Hara, 2013).

Clinical Supervision

Inspired by clinical supervision's potential to facilitate post-traumatic growth (Abel et al., 2014; Cohen & Collens, 2013; Neswald-Potter & Tripanny-Simmons, 2016) and compassion satisfaction (Figley & Stamm 1996), this research explored the ways in which video conferencing clinical supervision can help to facilitate health and wellness, while supporting counsellors in rural, remote, and Northern contexts to mitigate compassion fatigue risk. Merriman (2015) suggested that clinical supervision is the best place to sensitize students to the risks of compassion fatigue, while several other authors (Abassary & Goodrich, 2014; Lester, 2010; Miller & Sprang, 2017; Molnar et al., 2017; Wheeler & Richards, 2007) see clinical supervision of both students and professionals as providing an ideal opportunity to prevent and mitigate the risk.

Clinical supervision is a signature pedagogy (Munchel, 2014) in the fields of counselling, psychotherapy, and psychology. This practice has traditionally been conducted with the supervisor and counsellor in person. A classic definition offered by Bernard and Goodyear (2014) describes *clinical supervision* as

> an intervention that is provided by a more senior member of a profession to a more junior colleague or colleagues who typically (but not always) are members of that same profession. This relationship is evaluative and hierarchical, extends over time, and has the simultaneous purposes of enhancing the professional functioning of the more junior person(s); monitoring the quality of professional services offered to the clients she, he, or they see and serving as a gatekeeper for the particular profession the supervisee seeks to enter. (p. 9)

Because this research focused exclusively on post-graduate professional, registered counsellors rather than student counsellors in training, the following definition is relevant:

> a distinct professional practice employing a collaborative relationship that has both facilitative and evaluative components, that extends over time, which has the goals of enhancing the professional competence and science-informed practice of the supervisee, monitoring the quality of services provided, protecting the public, and providing a gatekeeping function for entry into the profession. (Falender & Shafranske, 2004, p. 5)

Clinical supervision has consultative, educative, and counselling functions (Bernard, 1997). It offers a professional mentor-like relationship in which practitioners can access emotional support and find solutions to some of the ethical tensions noted above. It is an arena is which they may develop competencies and learn new skills that assist them in managing these challenging contexts. It is recommended by Canadian social worker and psychologist codes of ethics and practice that therapists continue to engage in clinical supervision throughout the lifetime of their career (Canadian Association of Social Workers [CASW], 2005; CCPA, 2007; Canadian Psychological Association [CPA], 2017).

Integrating Technological Innovation

Given logistics and geographic isolation, counsellors working in rural, remote, and Northern contexts are typically reliant on distance clinical supervision services, often mediated by technology (Mitchell & McDougall, 2016; Murphy & Mitchell, 2016; Rousmaniere, 2014; Rousmaniere et al, 2016). This differs from traditional models in which supervision is typically offered in person. Weather, mountainous roads, ice roads, and expense of travel all contribute to the sheer impossibility in accessing face-to-face clinical supervision from within geographically remote communities (Austen & McGrath, 2006; Perle & Nierenberg, 2013; Wood et al., 2005).

The rapid growth of e-health and tele-mental health technologies has created opportunity to harness the power of connectivity offered by video conferencing to reach professionals working in isolated communities. In a broad survey of e-mental health initiatives across the country, the Mental Health Commission of Canada (MHCC, 2014) identified the imperative to meet this challenge: “the demand for mental health care exceeds available Canadian mental health services and resources, and this gap is likely to increase…demand for services continues to outpace supply…” (p. 2). Additionally, the MHCC suggested that

> cost pressures require that more be done with less and providers therefore must find innovative ways to deliver services. Connected health innovations—i.e., e-mental health interventions—have the potential to offer flexible, more patient-centered services to meet the burgeoning needs. (p. 2)

As indicated, the opportunities afforded by technological development have the potential to transform healthcare for both the patient and the practitioner and between the practitioner and the supervisor. Rousmaniere (2014) identified the sharp growth in the demand for video conferencing supervision and acknowledged its many benefits, including its ability to support clinicians in remote areas.

Video-Conferencing Technology

An interesting feature noted in the video conferencing literature is the difficulty inherent in making true eye contact, given that a parallax typically results from the difference in angles between the space where the users' cameras are positioned and where the image of the partner is displayed on the screen (Bohannon et al., 2013; Jaklicet al., 2017). For the video conferencing systems typically used on most personal laptops or computers, the camera that captures the user's image is located at the top of the screen, whereas the image of the conversational partner tends to rest in the middle of the user's computer screen. In order for the camera to capture the direct eye gaze, both users would need to both be looking directly at the camera; yet, this would seem unnatural, because neither individual would be seeing the image of the other person while speaking to them. There is some research suggesting that this lack of direct eye contact can diminish trust between video conferencing conversational partners (Bailenson et al., 2001; Bohannon et al., 2013; Jaklic et al., 2017). However, research trials show that generally users continue to perceive eye contact with about a 15-degree range of variation. Given this leeway, Bohannon et al. (2013) suggested that if the software generated image of the user is placed just below the computer's camera, the resulting parallax will decrease to about five degrees, which is still within the range of what most users will perceive as eye contact. This is one proposed solution that resolves the concerns that arise from diminished eye gaze in video-conferencing formats.

Research Method

This project was a case study (Yin, 2006, 2012, 2018) that encompassed an explanatory sequential mixed methods Quan-Qual research design (Creswell & Creswell, 2013). This paper focuses on the qualitative results of the study, particularly those most relevant to the video conferencing technology itself.

Sampling

Certified members of the Canadian Counselling and Psychotherapy Association (CCPA) were chosen as the population from which to draw the sample. This organization was chosen because it is a national organization which serves and supports counsellors and psychotherapists across the country. By its very nature, it is a heterogeneous organization with representation from all provincial jurisdictions and territories, with many clinical specializations and a range of educational levels represented.

Once ethics approval was obtained by Athabasca University's Research Ethics Board, purposeful sampling was used to identify participants best suited to provide insight regarding the research questions (Gerber et al., 2017). From February to August of 2019 respondents were contacted by email though the CCPA professional newsletter and invited to participate in an online survey. The survey isolated a specific sub-sample of counsellors who indicated having worked in rural and/or remote and/or Northern communities in Canada; these respondents indicated that they had accessed clinical supervision; additionally, they identified as having experienced compassion fatigue. Semi-structured interviews were conducted with an encrypted video counselling portal designed for tele-health service delivery. Given the sensitive nature of the information provided in the interviews, participants were given the option to review the transcript prior to analysis to check for accuracy and to review the information provided.

Data Collection

Nine respondents provided consent to participant in semi-structed interviewing which was supported by a list of guiding questions as outlined in Appendix 1. The questions were designed to give insight into how video conferencing-based clinical supervision sustained rural, remote, and Northern counsellors to mitigate compassion. The research sought to answer the following question: how can video conferencing-based clinical supervision support rural professional counsellors to enhance wellness and mitigate compassion fatigue?

Data Analysis

All interviews were recorded, then transcribed, and then all identifying information was removed. The transcript was sent to respondents for review prior to analysis. *NVivo 11 for Mac* was used to analyze the data through thematic content analysis (Braun & Clarke, 2006; Vaismoradi et al., 2011). I followed Braun and Clark's six coding steps, which included familiarizing oneself with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final report. As recommended by King (2004) and Saldaña (2013), I departed slightly from this method by beginning with a small series of provisional codes to work with the initial interview transcript. As I began coding the second transcript, new codes emerged from the data and were added to the coding framework; a process of sub-coding occurred and the development of child nodes emerged (Saldana, 2016). Green and Thorogood (2018) suggested that when little is known about a given phenomenon, explanatory projects should code the data with a focus on content and should include significant description in order to remain close to the participant's experience. As suggested by these authors, I moved between deductive and inductive modes of analysis. While the use of a set of provisional codes provided some deductive delineation, new codes were added inductively as the analysis progressed. The second and third passes through the transcripts allowed for all the data to be coded against the final code book which included clear, operationalized definitions of each code's inclusion criteria. I included exemplars in the code book to support the definitions. As noted above, analytic memos were written throughout the process to enhance research reflexivity. In addition to reviewing transcripts respondents were invited to review the completed codebook. Seven out of nine participants indicated that their experience was accurately reflected in this codebook.

Results and Limitations

The results generated eight higher order themes and sub-themes. The first five major themes were (a) contextual factors in rural, remote, and Northern practice; (b) problems associated with compassion fatigue; (c) the expressed need for praxis development in this area; (d) unresolved points of tension in the practice of clinical supervision; and (e) ways in which clinical supervision is helpful to maintaining wellness. These themes support what has been identified in the literature as noted above. Because this project aimed to understand how video conferencing specifically can alleviate some of the burdens and challenges identified thus far, the following three other main themes will be elaborated on in detail: (a) technology as a solution, (b) unique opportunities inherent to the medium of video-conferencing technology, and (c) unique challenges inherent to the medium of video-conferencing technology. These findings offer insight into how counsellors in Northern, rural, and remote contexts can be supported through the integration of technology and clinical supervision practice.

Technology as a Solution

A clear and emergent theme centered around the ways in which technology can act as a solution to the complex and extreme nature of rural, remote, and Northern clinical conditions. Respondents spoke about technology being useful in clinical supervision but also in order to

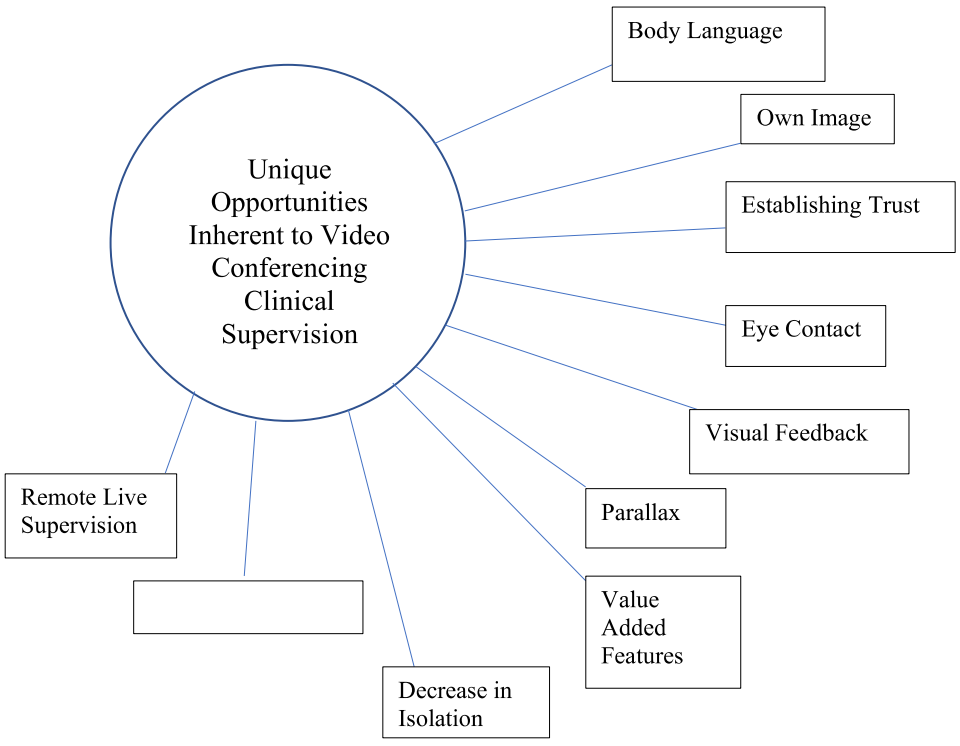
access clinical training opportunities, peer consultation, and their own personal therapy support. Technology was discussed in broad and general terms as a practical way to mitigate geographic distance and as a solution in such challenging circumstances. One respondent works with visually impaired individuals and noted that “distance technology is good so it just depends on the person. Yeah, and what kind of technology you're using so far. A lot of people who have visual impairments they can use an iPad.” They discussed how both clients and supervisees in rural or distant community can make use of technology to connect and access necessary services.

Unique Opportunities Inherent to the Medium of Video Conferencing Technology

Another more complex theme emerged from the data set pertaining specifically to the unique opportunities inherent to the video conferencing technology. This differed from the technology as a solution theme, since data coded in this theme was specific to the properties of video conferencing and exclusively included reference to its application to the practice of clinical supervision. The sub-themes and exemplars in this section provide insight related to how the medium itself provides unique features that may lend themselves to innovative and effective supervision practice; they are represented below in Figure 1.

Figure 1

Unique Opportunities Inherent to the Medium of Video-conferencing Technology



contact, making conscious use of parallax, visual feedback, seeing one's own image, replacing two-way mirror supervision, value added functionality and practice recommendations. Each sub-theme will be expanded upon with exemplars in the sections below.

Body Language

Several respondents identified the importance of and value of being able to view body language through video conferencing technology, which differs radically from doing clinical supervision by telephone. One respondent stated

> I need to have the visual of people so the comfort of actually being able to see if something I said, has made people make a face, [or] where I need to clarify it or if I'm like that was perhaps inappropriate say. I need to have those visual feedbacks.

Visual Feedback

The body language sub-theme is quite strongly related to the visual feedback sub-theme. There is likely some overlap between these two, as it seems that being able to witness the body language of the other person helps to create a strong and useful conversational feedback loop. Video supervision offers more information than the telephone because one can view facial expressions and some body language. It is also possible to ask about the body language that may not be viewable on the screen. Another participant noted the following:

> I very much need to have like a visual feedback when I'm being supervised. I can provide counselling to people over the phone and be fine but when it's my own I want to see the reactions of my supervisor. So initially we had discussed like just doing telephone conferencing and I was like "no, no," I actually want to see your face as I explain things to you. So, like the technology to have video is huge for me because of just the way that I process.

This respondent indicates the importance to being able to see their supervisor's facial reactions in order to be able to gauge their reactions to the material being shared. Related to this, another respondent expressed the following:

> Well just seeing someone listen to you is nice. And you know what? Actually, like in person when I am talking to my supervisor, you know he's like scribbling stuff down or like looking at his notes or whatever. When you're on video I just feel like people are almost very attentive. And you would think that it wouldn't be because you could get something under the table or whatever. But I don't feel that, I really feel people are watching are watching and looking and listening. And my clinical supervisor even just gives me encouragers when I'm talking.

This respondent noted the felt-sense of being better heard and better accompanied when witnessed by video as compared to in-person supervision. It appears that she experiences a quality of attention that is more satisfying through the technology.

Eye Contact

Both body language and visual feedback are connected firmly to the eye-contact sub-theme. One participant felt strongly that the eye contact offered via video-conferencing technology facilitates communication of "empathy through the screen"; they noted that "I would intentionally look at the camera so that I was offering my eyes." Another participant commented on the

unusual nature of eye contact through video conferencing and noted that given the parallax it can seem as though the other party is making eye contact even though they may not be: "they're really looking at a screen which I can tell they're looking at the screen. And even if I wouldn't even know if they're looking at a document it looks like they're looking at me."

Yet another respondent expressed, "I think you are making mind contact. Eye contact may not be very good. But mind contact is." This same respondent identified this as a possible benefit:

> take a client where culturally they are not used to looking in the eye. It could be normal to them and go unnoticed. It depends, I have First Nations clients and they look at me in the eye. I have First Nations clients that preferred to look to a point on the floor, somewhere to the side.

Another respondent who also works with Indigenous clients echoed this sentiment and noted that the option to avoid or vary eye contact in video conferencing could enhance or meet the need for cultural sensitivity and competency. Direct eye contact is not necessarily appropriate in all culture contexts (Bailenson et al., 2001; Bohannon et al., 2013; Hall, 1959; Jaklic et al., 2017; Nixon & West, 1995). In several Indigenous cultures, holding a direct gaze could be considered to be quite offensive (Caron, 2006). This merits particular attention as the importance of cultural competence is highlighted in several clinical supervision competency profiles (CCPA, 2016). As in face-to-face communication, variance in eye contact is possible which supports cross-cultural communication. Some may feel obliged to look at the screen, but it is also possible to give permission to look away; this may not only be important cross-culturally but also in cases where brain injury is present and extensive screen viewing may exacerbate symptoms.

One's Own Image

Deeply associated to the eye-contact sub-theme was the sub-theme into which responses were coded pertaining to the fact that video-conferencing software often includes a window showing one's own image, in addition to the image of the conversation partner. When speaking about the nature of eye contact in video conferencing one respondent noted:

> Yeah, I think that generally the eye contact seems to be more with my own. Which sounds weird… being able to move my little bubble to a different part of the screen is helpful too.

This respondent went on to talk about how viewing one's own image in clinical supervision, and the self-monitoring potential it provides, can be helpful:

> So, it's always strange when people are like 'you are a good counsellor' and I'm like 'you never seen me work'…. the video thing is painful but has been helpful and I think is a piece that I enjoy in my supervision with my face in a window also.

In this exemplar, the respondent discusses how the visual feedback loop happens not only with supervisor but also with oneself. The respondent likens this to clinical supervision via recorded sessions, in which the counsellor is able to observe their own facial reactions and body language. Watching one's own body language through the video-conference screen, while discussing clients in clinical supervision, may provide the supervisee with some insight into what the client sees when they are in session. The video conferencing technology may act as a sort of parallel processing mirror or feedback loop in which the supervisee is able to gain insight into their own non-verbal behaviour as one might do when watching recording sessions. This may add a layer of self-supervision within the video-conferencing clinical supervision session. This

feature is built into the technology by virtue of the fact that many video conferencing software programs enable one to see the image that one is projecting to their conversation partner.

Making Conscious Use of the Parallax

Closely related to the eye contact sub-theme was the parallax-sub theme, where respondents directly addressed how the parallax affected their experience of eye contact in video conferences. As noted in an earlier section, for the typically used video conferencing systems, the camera that captures the user's image is located at the top of the screen, whereas the image of the conversational partner tends to rest in the middle of the user's computer screen. True eye contact is somewhat impossible as it would necessitate both partners to look directly into the camera, which would be unnatural as this would prevent them from seeing each other's image. As noted above, some respondents thought that having the ability to vary eye contact could be a strong advantage, especially in instances of inter-cultural communication. One respondent actually identified making conscious use of the parallax to create humour or levity in the conversation: "I'd like look straight into the camera and like almost to like this weird like creepy but I go close and kind of funny." The respondent exploits the parallax to vary the emotional tone of the conversation and may indicate a certain degree of comfort and ease with this technology.

Remote Live Supervision

One respondent identified a compelling use of video-conferencing technology to facilitate a technologically enhanced live two-way mirror supervision:

> One of the ways that we're using it that I like though is not distance is just distance across the clinic. So, we don't have the ability to see and but I don't have to a mirror or anything in our clinic. So, what we do is we have Skype for business set up so we set up a phone call and then I tape the session.

The respondent explains how the supervisor can watch the session live, which can also be recorded for later viewing. This is similar to a practice described by Rousmaniere and Frederickson (2016) who termed this practice Remote Live Supervision. This method also allows the supervisor to input text messages into the text box if the supervisee appears to be needing prompts or suggestions. This provides a less intrusive way of providing live-real time feedback to supervisees without disrupting the session by interrupting or phoning in. This respondent thought that it was also less intrusive and provided more autonomy to the supervisee than session co-facilitation. This innovative use of technology could provide this supervisor with a less invasive means by which to offer live observation

Several other respondents identified that the chat box feature as being a value-added feature inherent to the technology. Most video-conferencing applications include a chat box which enables the supervisor to provide links to resources such as research articles or client worksheets, in real time as they are being discussed.

Decrease in Isolation

A perceived decrease in isolation emerged as another sub-theme. As one participant explained, "I find it really interesting now that we're talking about it like how I feel less isolated with people online versus my in-person counselor, or in person clinical supervisor." Some respondents also commented on the cost effectiveness of this technology:

> I personally believe that decisions are very easy to justify to the employer because what the clinicians do, they take days off. They get saturated they get to a point, the compassion fatigue, they're close to burnout, they're going to "blow a fuse" they tell you "any day" and then they take days off. If you… add those days lost, I bet you it's much cheaper to contract some remote counselling or remote supervision.

Finding ways of making supervision affordable is key; as noted in the quantitative results section of this study, cost emerged as a statistically significant barrier to accessing supervision (Slipp, 2020).

Privacy and Confidentiality

In terms of client privacy, one respondent identified that accessing through video conferencing allows her to secure her client's confidentiality, which is particularly crucial and difficult to do in small community: "that's why my supervisor is out of territory so that I could offload all my things and not have it circle back. Not that it ever would. But sometimes does."
This respondent actively chooses to access supervision by distance, because accessing a clinical supervisor in community might inadvertently result in an accidental breach of confidentiality and anonymity. Even if details are disguised, it is possible that the supervisor may figure out the identity of the client whose case the counsellor is seeking to consult about. This would not be unlikely in a community with a population of 3,000 people, for example, in which the supervisor and counsellor may both have interactions with the client as community members in non-clinical contexts.

Several respondents discussed the importance of developing competency in using the technology, particularly if using it for clinical supervision. One respondent asked, "how do we do connection differently when using technology?" This respondent discussed the experience as being impacted by, "the mixture of the technology itself and maybe the individual's competency level within that technology and with using that technology."

Finally, some respondents offered some recommendations for using video conferencing for clinical supervision. One respondent noted

> If I could make a recommendation what I would suggest is to meet first face-to-face. What I would do is if I would know that in a place there is there are three counselors are going to population of a thousand people or whatever. I would go there introduce myself in person and have a group more opportunity to interact and then meet with the three counsellors one-on-one individually and following that, the remote contact such as the one you and I are having now would suffice without any doubt. The other way of doing it. Doing it only remotely do it do it. Skipping the face to face might work too but I think that is much more effective when they had an opportunity to see you first in person because of a question of trust and rapport that can be established and that opportunity which is more difficult to establish remotely.

Unique Challenges Inherent to Video-conferencing Technology

The final higher order theme to emerge from the data included a focus on the unique challenges inherent to video conferencing technology, particularly when it is used for clinical supervision. This theme included the following sub-themes: a focus on a bias against technology, newness of video conferencing, poor connectivity, time zones, and trust in the technology's ability to maintain privacy.

Bias Against Technology

Some respondents commented on having a bias against technology and one noted that if given the choice between video conferencing and "in person and both were the same prices same person you're going to get I would choose in-person over doing it online." Technological bias may come from the fact that most counsellors are training and professionally socialized through in-person teaching and learning environments. Related to this bias was a sub-theme which clustered around the newness of technology and the difficulty of acclimatizing to this novelty. "Like it's new. Anything new is hard and difficult but not that it's bad. So, I think there's this newness and I haven't determined whether I'm still working through it."

It is possible that both the bias and ambivalence about technology's newness can be understood by considering Davis' (1989) technology acceptance model (TAM). As noted in an earlier section of this paper, professional caregiver perception plays a strong role in the acceptance and integration of technology within mental healthcare (Austen & McGrath, 2006; Perle & Nierenberg, 2013). As Davis (1989) suggested, it is likely both perceived usefulness and perceived ease of use that contribute to the doubt expressed by some respondents (Monthuy-Blanc et al., 2013).

Privacy and Confidentiality

The literature also showed that clinicians experience considerable reservation about technology's ability to maintain privacy and confidentiality (Austen &McGrath, 2006; Perle & Nierenberg, 2013). This bore out in the sub-theme that included respondents concerns about trust in the technology itself and whether or not it can maintain the users' privacy. One respondent noted

> If I was doing real clinical supervision where I wanted to have a heart to heart with an individual or with a group that you know, things were really a mess the last or this client… I would want that to be very private you know, to have the assurance of private and I would sort of like… the Patriot Act is in the US and the boundaries and so on…I would want us to find Canadian technology.

The concern expressed by this respondent is supported by the fact that codes of practice and ethics place a high degree importance on the maintenance of client confidentiality (CASW, 2005; CCPA, 2020; CPA, 2017).

Poor Connectivity

Several respondents commented on the nature of poor connectivity and how this impacts relational connection within clinical supervision via video-conferencing technology

> So, I find like right now there's feedback on the on the system and that's distracting. There's a bit of a lag and that's distracting. And so, it breaks up my train of thought. So, whether I'm the supervisee or the supervisor I don't get the same connection with the person I'm talking to because it's because of these distractions… distractions were major and again it didn't feel like we could go into as much depth. Like there wasn't the support there. I didn't feel held right. I didn't feel held. I didn't feel safe in unwrapping things beyond sort of the level that she engaged at. Whereas normally I would make an observation that would bring us deeper even though it's my supervision right. But I would take us deeper or she would. But in this case, it didn't go there so it didn't. I didn't feel held and it didn't feel safe.

This respondent's comment speaks both to the importance of supervisory competency but also highlights how disruptive poor bandwidth can be, for example, constant interruptions dropped calls may lead to frustration or to difficulty discussing complex topic areas. Although this situation is changing as an increasing number of communities are able to access better service, inequity in broadband access continues, particularly in rural, remote, and Northern regions (MHCC, 2014).

Limitations

Given the small sample size, the results of this research cannot be generalized to the larger population of counsellors across Canada. It is also worth noting that this research was conducted prior to the onset of the COVID-19 pandemic. It is likely that many more counsellors now have experience using video conferencing technology due to the public health mandates requiring social distancing. Although there is likely still some hesitation with respect to technology use, it could be that this aspect has dissipated somewhat throughout the COVID-19 pandemic. Counsellor ambivalence towards technology could be explained in part by the technology acceptance model (Davis, 1989; Monthuy-Blanc et al., 2013). It is also likely that this ambivalence might be healthy and natural, as the technology is still relatively new and there is much that is yet unknown both about the modality for supervision but also about the nature of privacy and data security of internet communication technology (Austen & McGrath, 2006; Perle & Nierenberg, 2013). Many would suggest that an assurance of absolute privacy and security in internet communication should be held with skepticism (Snowdon, 2019) and that much more work needs to be done in the development of cyber ethics (Pardo & Siemens, 2014; Richards & King, 2014; Slade & Prinsloo, 2013; Zwitter, 2014). For strategies to mitigate this risk, the reader should consult Rousmaniere (2014), Rousmaniere et. al (2016), and Schell (2018). This uncertainty alone is likely to bring up strong reactions in both supervisors and supervisees that may have an important impact on the work. Communication through technology, as opposed to face to face, in person communication, has implications in terms of unintentional breach of confidentiality which may limit what and how the supervisee shares within this modality.

Clinical Supervision Versus Clinical Consultation

It should be noted that since this research was conducted, the Canadian Counselling & Psychological Association (2020a) has done significant work to define and discern the practices of clinical supervision and professional consultation. This research was done in 2019 and at that time, the same understanding and definition of clinical supervision applied both to students in training and to certified professionals working in the field with several years of experience. This research was conducted solely with professionals who had graduated from training and had anywhere from zero to twenty-five years of professional experience. As such, the current definition of "consultation" offered by CCPA (2020a), would be more appropriate than clinical supervision:

> Consultation is an arrangement between professionals in which the consultant provides a service, such as sharing of skills, providing opinion on a case, problem solving, and brainstorming but the professional receiving the consultation has the right to accept or reject the opinion of the consultant. A consultant does not take on the legal responsibility or liability for decisions made by the therapist. Consultation also may be undertaken as a formal arrangement with fee requirements. (p.33)

The current definition of clinical supervision is likely a better fit for students who are in training. None of the participants in this study were students and all of them chose voluntarily to engage in consultation as part of their professional roles. The practice of counselling therapy is going

through significant change with the establishment of statutory regulation (CCPA, 2020b); therefore, the practices of supervision and consultation are also in significant transformation as the profession attempts to delineate these subspecialties within the scope of a newly regulated profession.

Discussion

The results of this research apply beyond the scope of counselling and supervision but may offer guidance for supportive use of video conferencing technology broadly across educational or consultative settings in general. Far from being a detractor in communication, video conferencing can facilitate and enhance the relational experience. As noted above, one participant identified her preference for communicating in this modality as she noted a quality of presence in which she felt she was more deeply heard, understood, and supported than in some face-to-face, in person exchanges. Perhaps not only the convenience and ease of communicating through this technology but also the intensity of focus and attention paid to the screen can create a relationally intimate and satisfying experience for users.

In order for a fluent dialogue to function through video-conferencing technology, it is quite likely, as noted by one participant, that competency and familiarity with the technology itself is crucial. It is expected that the ease in of interpersonal exchange and the felt sense of support is aligned with comfort in use of the technology itself. Fortunately, this can be achieved; it is this author's anecdotal impression that during the pandemic that educators, counsellors, and supervisors have developed more skill and familiarity with video conferencing, if only out of necessity. At times supportive coaching and encouragement along with some practical tips is what is needed to instill some initial confidence in those who are most resistant or hesitant.

Eye-contact plays a significant role in terms of the opportunity and felt sense of connection that is experienced through video conferencing. Not only does it potentially enhance intercultural communication but, as noted by one participant, the parallax can be used to enhance the communication in a way that is humorous or intentionally emphasizes or exaggerates the speaker's intention. This light-hearted approach seems to humanize the technology and offers playful and spontaneous opportunity for engagement. This may be a delightful way to project one's personality and presence into the virtual space. The intentional use of eye contact and the parallax may also be an important way in which we can go about offering "empathy through the screen" as described by one participant who emphasizes awareness of how they "offered my eyes."

Related to the role of eye contact is the importance of visual feedback between conversation partners. Interestingly, as noted by one participant, video conferencing software often involves both feedback with another person but also a feedback loop with oneself if the feature allowing the speakers to see their own image is enabled. One participant noted using this to her advantage as she observed her own reactions when discussing certain topics. This element of self-supervision or self-surveillance is a feature that differentiates video conferencing from telephone or in-person exchanges because there is not any other mode of communication that reflects a real time image of oneself into one's visual field. As much as viewing one's own image could be useful, it could also be a feature that enhances self-consciousness and creates distraction. The particulars of this aspect and how it effects interpersonal communication in video conferencing would be an interesting avenue for future research.

Of note is respondents' feedback about low bandwidth and poor internet connectivity. Reliable internet is crucial in being able to access consistent video conferencing support. It is imperative that rural, remote, and Northern communities have equitable access to strong, reliable, and affordable internet access. The digital divide and inequitable access to broadband is a human rights issue (United Nations News, 2017) that needs to be remedied at a systemic level. This is a broader issue that impacts this populations access to economic development opportunities, education, and access to eHealth services. In order for communities to access video conferencing services, whether for business, education, or health, they must have the broadband and equipment to support it. The fact that over half of the 1.4 million Indigenous peoples in Canada live in rural, remote, and Northern communities (Ministerial Advisory Council on Rural Health, 2002) means that a large number of Indigenous individuals are at a systemic disadvantage in terms of accessing opportunities offered by reliable internet technology. In the spirit of the TRC's (2015) *Calls to Action*, this omission in equitable access requires immediate remedy.

Finally, a number of respondents mentioned finances as barrier to accessing services. This result emerged in the quantitative aspects of this research (Slipp, 2020). Further research is needed to understand the costs involved in service delivery and to find ways of easing this burden for counsellors. Because clinical supervision supports health and wellness, it would be imperative for employers and workers compensation boards to consider how financially supporting the integration of this service can contribute to longevity and vitality to the mental health workforce.

Conclusion

The qualitative results from this mixed methods study showed how awareness of eye-contact and the parallax can be facilitate connection and enhance communication in video conferencing platforms. It also discussed how the integration of video conferencing facilitates live remote supervision. Respondents described how video-conferencing technology and its unique features provide a possible solution to the experience of isolation and the expression of compassion fatigue symptoms that often accompany work in these challenging contexts. The insights provided by respondents extend beyond the field of counselling and have implications for how to best use video conferencing to support communication and relational connection at large. Respondents feedback about the use of eye contact can be applied across disciplines and could be useful particularly in educational settings that employ this technology. The pandemic has brought an influx in the use of video conferencing to support education and as the world adapts to a new normal, awareness of these particular features is crucial to enhancing the benefits of video-conferencing technology.

Author's Contributions

Micheala Slipp completed all of the data collection, analysis, and writing in this piece of original research under guidance of a dissertation supervisory committee.

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Ethics Statement

Ethics approval was obtained through Athabasca University's Research Ethics Review Board.

Conflict of Interest

The author does not declare any conflict of interest.

Data Availability Statement

Codebook is available for download through the Zenodo repository:
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Appendix

Semi-Structured Interview Schedule

Rural and/remote and/or northern respondents who have experienced compassion fatigue.

1. What are some of the benefits of working in a rural, remote, or northern community?
2. Please describe some of the challenges you have experienced as a certified counsellor working in a rural, remote, or Northern context.
3. Tell me about your experiences in receiving clinical supervision while working in a rural, remote, or Northern community.
4. Sometimes also referred to as “vicarious traumatization” or secondary traumatization, Figley (1995a) suggests that compassion fatigue occurs as the consequence of emotional residue or strain of exposure to working with those suffering from consequences or traumatic events. It differs from burn-out but can co-exist. Compassion fatigue can occur due to exposure to a single case, or it can be due to a “cumulative” level of trauma exposure. Please describe any experiences you have had with compassion fatigue while working in a rural context.
5. What strategies have you found to be effective in preventing or minimizing compassion fatigue? Please describe.
6. Clinical supervision is significantly associated with greater feelings of competence and successful achievement at work (Hayden et el., 2015; Lenz & Smith, 2010) and as a way to address compassion fatigue. Those counsellors living in rural, remote, or northern communities often lack access to clinical supervision. What could you foresee as being among the possible benefits and/or challenges of video-conferencing clinical supervision for rural counsellors in Canada?
7. Reflective exercises such as arts-based exercises, journaling, creative writing have been used in clinical supervision to enhance wellness. Please describe any such exercises you have used in clinical supervision.
8. Video-conferencing technology, like the technology we are using right now, has been used to support counsellors in rural, northern and remote communities. Please describe your experiences using this method of clinical supervision.
9. If you have not used video-conferencing for supervision, please imagine how you could see it being helpful to your practise, specifically, in mitigating compassion fatigue.

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The Design and Evaluation of Online Faculty Development for Effective Graduate Supervision

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Abstract

This design-based research aims to improve the quality of graduate supervision using a Massive Open Online Course (MOOC). The Quality Graduate Supervision MOOC brings interdisciplinary faculty, postdoctoral scholars, and expert supervisors together in an online learning community to discuss and consider effective supervision practice, strategies for relationship building, supports for academic writing, mentoring for diverse careers, and how to combine excellence and wellness. The survey, interview, and system data were analyzed to inform and assess the design and development of the QGS MOOC, to gain insights into learner experience and engagement, and to assess the impact of the online learning community on graduate supervision practices. Through ongoing design and evaluation of this online learning course for graduate supervisors, the research team found the learning community influenced faculty members' awareness, collective knowledge building, goal setting, and actions for graduate supervision practice. We present results from our evaluation of the design components in the QGS MOOC, the learning benefits for supervisors, impacts on graduate supervision practice, and make several recommendations for research and practice.

Keywords: massive open online course; graduate supervision; faculty development; online learning; media development; micro-credentials

Introduction

Graduate supervision is a complex and demanding part of a professor's research and teaching responsibilities (Walker et al., 2008). Graduate supervisors serve many roles, from coach, mentor, teacher, guide, and critic. Supervisors need to be flexible and adapt to what individual students need at various stages of their program. The most effective graduate supervisors combine their passion for research and teaching in their discipline with a commitment to student mentorship. Quality graduate supervision pedagogies are a key factor in student success (Adkins, 2009; Kamler & Thomson, 2014; Skarakis-Doyle & McIntyre, 2008), while marginal supervision is associated with high doctoral student dropout rates in Canada and Asia (Ali et al., 2017; Erichsen et al., 2014). The quality of supervision has an impact on a graduate student's learning and development as a new researcher (Beaudin et al., 2015; Bloom et al, 2007; Williams, 2005), their writing and defense of the thesis or dissertation (CAGS, 2018a; Ciampa & Wolfe, 2019), and timely completion of their degree.

Most supervisors want to be effective at mentoring and guiding the next generation of researchers and leaders. However, academics tend to develop graduate supervision practices on the job as opposed to being actively and intentionally educated as a research mentor (CAGS, 2018b; Eley & Jennings, 2005; Wisker, 2012). Some institutions require an orientation before granting supervisory privileges; however, the type of short seminars usually on offer fails to address the scope and variety of supervisory practices and understates the potential challenges facing students and supervisors (McAlpine, 2017; Wisker, 2012). Academics welcome opportunities to develop their supervision practices; however, this enthusiasm may not translate into time for workshops or seminars on campus, even if such events fit their schedule. Faculty attendance in scheduled, on-campus workshops are influenced by: 1) limited time, which means faculty may not prioritize a scheduled workshop; 2) intense workload, scheduled seminars often overlap with other commitments; and 3) physical location, with transit between buildings or sites, paying for parking, arranging childcare, and meeting in person as barriers.

Academics need timely and flexible access to quality faculty development on graduate supervision. Complex issues and situations can arise while working with diverse students (Ali et al., 2017; Roumell & Bollinger, 2017; Saleem & Mehmood, 2018). A lack of supervisor training can result in professors being unprepared to manage challenges in supervision, such as remote graduate supervision (McAlpine & McKinnon, 2013; Kumar & Johnson, 2019; Kumar & Coe, 2017; Maor, et al, 2016). Considering the rapid adjustment to online supervision with the onset of COVID19 in 2020, providing appropriate and responsive supports to both supervisors and students is a pressing concern in higher education.

Massive Open Online Courses (MOOCs) provide a workable solution to transcend temporal and geospatial restrictions of scheduled on-campus workshops and address the need for flexible, accessible, and interdisciplinary faculty professional development on graduate supervision (Alharbi & Jacobsen, 2018; CAGS, 2018a). A MOOC can offer a blend of instructor-guided and self-directed learning opportunities that are relevant and tailored to faculty development needs and goals during times that work best for individual schedules. For example, Alharbi and Jacobsen's (2018) QGS miniMOOC pilot increased opportunities for meaningful discussions and sharing among diverse colleagues about graduate supervision. Sommer et al. (2019) transformed a workshop for researchers into a MOOC to support more learners than could have

been included face-to-face. Salmon et al. (2015) designed a MOOC for academics to replace an on-campus workshop on teaching quality.

MOOCs offer an exciting and flexible approach to online learner engagement for both new and experienced academics (Mackness et al., 2013; Moskal et al., 2015; Salmon et al., 2015). Benefits of MOOCs include schedule flexibility, greater enrolment capacity, increased diversity of learners and ideas, expanded time to access and reflect on resources, and curated content well beyond what is usually offered in a short workshop. Well-designed MOOCs can support large-scale faculty development (Rodrigues & Leinster, 2016) that is open and flexible in how and when participants engage with material (Kiers, 2016). Participants appreciate access to online course content on the go or from their home or campus office (Rodrigues & Leinster, 2016). While some learners appreciate less structure in a MOOC, others appreciate designed tasks, discussion boards, and external motivation to gain badges (Salmon et al., 2015) or other micro-credentials, and established timelines for course completion (Mackness et al., 2013; Moskal et al., 2015). The flexibility of MOOCs can support learner autonomy and the degree to which participants choose to engage with content and community.

The Quality Graduate Supervision MOOC is currently being offered at one university with interdisciplinary faculty and postdoctoral scholars to enhance supervision practice using several guided and self-paced learning modules. Our research on the QGS MOOC is guided by three assumptions: 1) graduate supervisors will engage and benefit from a faculty development MOOC, 2) an online learning community can benefit both new and experienced graduate supervisors across disciplines, and 3) that by supporting supervisors' learning and growth, graduate student experiences can be improved (Alharbi & Jacobsen, 2018). Graduate supervision is undertaken differently by faculty across disciplines, such as arts, sciences, medicine, and education (Eley & Jennings, 2005). The QGS MOOC provides an online community of practice in which graduate supervisors from across campus engage in transdisciplinary discussions and collaborations that transcend faculty and department silos and the time and space constraints of scheduled workshops.

Three research questions guide this study: 1) What design components are necessary for a supervision development MOOC?, 2) What types of scaffolding and support enable supervisors to effectively use the MOOC?, and 3) In what ways does the QGS MOOC support and benefit faculty in the ongoing development of graduate supervision practices? We evaluate the impact of six design components in the MOOC and analyze whether this online course influenced supervision practice. In the sections that follow, we describe our research methodology and methods, the design and development of the MOOC, the analysis and integration of data, and summarize study findings and recommendations to inform further research and practice.

Methodology

Design-based research is a participatory educational research methodology well suited for analyzing problems of practice, the collaborative design of solutions with practitioners, and iterative and cyclical evaluation of innovative interventions in authentic learning environments (Jacobsen, 2014; McKenny & Reeves, 2019). A design-based research approach was adopted for the development and evaluation of the MOOC. In phase one, the online course was designed and evaluated with 23 academics as a closed miniMOOC pilot (Alharbi, 2018; Alharbi & Jacobsen, 2019, 2018). In this paper, we report on phase two and the second iteration of the

QGS MOOC (version two or V2) developed in Fall 2019 and offered to academic faculty and postdoctoral scholars in Winter 2020. Multiple and mixed forms of data were collected to address the research questions. Data included 1) survey responses collected at the start (pre-survey n= 53) and conclusion (post-survey n= 46) of the MOOC, 2) interviews with seven participants after the course, and 3) LMS data on design components, interaction, and usage patterns throughout the course. Surveys included select responses and open-ended items and were administered online. Interviews were conducted with six MOOC graduates to evaluate learning experiences, to assess what worked well and what needed to change, to capture reflections and impacts on supervision practice, and to inform general design principles for faculty development MOOCs. Online usage metrics and data collected in D2L and Yuja provided insights on participants' and discussion moderators' interaction in online activities in the QGS MOOC V2. Data on the implementation of the course inform our evaluation of the success and impact of the MOOC for faculty development and for improving graduate supervision practice.

Enrollment and Completion Rate

Offered from February to April 2020 at the University of Calgary, the QGS MOOC V2 attracted 107 academic faculty and postdoctoral scholars from twelve faculties and campus service hubs. While the MOOC was designed with academic faculty in mind, we decided to open the course to postdoctoral scholars to address their professional development and learning needs (Nowell et al., 2020). Originally scheduled for six weeks, we implemented an open-ended completion target given the impact of COVID19 and the rapid pivot to remote teaching and supervision across campus. All participants who indicated a desire to complete the MOOC and earn the Badge of Completion were supported in doing so. Of the 107 participants who enrolled in the course, 50 (47%) completed six modules and earned the QGS MOOC Badge (27 faculty and 23 postdocs). Our completion rate is higher than rates reported for other faculty development MOOCs; for example, Rodrigues & Leinster (2016) report a 37% completion rate, and Salmon et al. (2015) a 17% completion rate. In the next section, we describe the design and development of the QGS MOOC V2 followed by an analysis of data.

Design and Development

Phase one of the course was designed and evaluated as a miniMOOC pilot in 2017 as part of a PhD research project (Alharbi, 2018). Given participants' engagement in a sustained learning community with peers across campus, and the impact of this online learning experience on strengthening supervision practices, the pilot was considered a success (Alharbi & Jacobsen, 2018). In Fall 2019, the second version of the course was designed, then implemented and evaluated in Winter 2020 as part of phase two. The design and development of six modules, activities, resources, and learning tasks in V2 of the QGS MOOC took seven months. Along with weekly webinars, curated resources, engaging activities, and interaction with colleagues from across disciplines, this online learning experience includes the expertise, perspectives, and advice from several award-winning graduate supervisors to inform learning and promote conversations among participants. Fieldwork and surveys with graduate students, faculty members, and subject matter experts informed the development and review of course content, module organization, and navigation design. A month prior to going live, the team carried out a soft launch of the MOOC with three faculty reviewers, chosen for their expertise in online learning and experience with graduate supervision. This review data-informed ongoing revisions and improvements in the QGS MOOC V2 content, navigation, and layout prior to launch.

This online course design demonstrates three of four cMOOC characteristics, adapted from Bates (2019) and originally described by Downes (2014): 1) autonomy of the learner (learners participate when and where, learning is self-directed, accountability through reflection and action), 2) diversity of tools, learners, and knowledge (multimedia, multiple disciplines, diverse and emerging content), and 3) interactivity (collaborative learning, open and ongoing communication between learners, emergent knowledge). Given that access to content and activities in the QGS MOOC V2 was done exclusively through an LMS at the University of Calgary, the fourth characteristic, openness, was demonstrated within but not beyond this learning community in the second iteration of the course. Our vision for the ongoing development of QGS MOOC includes expansion and opening the learning community to colleagues at multiple Canadian universities, and eventually expanding to open access in the global community.

Course Content

Design changes in phase two of course development were informed by the research literature and findings from the pilot evaluation (Alharbi, 2018; Alharbi & Jacobsen, 2018). Key module issues, topics, and content are encapsulated in an introductory essay, learning objectives, a weekly webinar, a set of curated resources and materials, weekly discussion forums, and a set of expert supervisor videos. As part of the learning experience in the course, academic faculty document and reflect on current supervision practices, identify strengths, set goals, and commit to actions for their ongoing professional learning and practice as a supervisor in a Taking Action on Supervision project. A description of each MOOC design component is summarized in Table 1. We describe changes to the design from phase one to phase two in Table 2. The rationale and decisions that informed ongoing development are detailed in subsequent sections.

Table 1

Design Components in each module in the QGS MOOC V2 Winter 2020 (Adapted from Alharbi & Jacobsen (2018))

Design Components	Design and Construction
Introduction and Learning Objectives	Provided an introductory narrative for each topic along with weekly learning objectives and related research.
Expert Supervisor Videos	Featured academic faculty from the University of Calgary, recognized for excellence in graduate supervision. Experts included four male and five female supervisors from psychology, biochemistry, engineering, medicine, education, and nursing. Expert supervisor videos from other Canadian Universities were included.
Webinar	Invited panelists and live conversations on weekly topics and issues in a synchronous webinar; supported by course facilitators.
Discussion Forums	Questions, cases, and prompts in discussion forums expanded upon module topics. Course facilitators and discussion moderators guided, promoted, and summarized discussions each week.

Resources	In alignment with weekly topics, curated resources were offered from the Faculty of Graduate Studies, University of Calgary, other Canadian Universities, and online sources (also available in a printable PDF).
Taking Action on Supervision	Involved in an ongoing writing and reflection project. Supervisors are invited to document supervision strengths, reflect on key learnings, set goals for growth and development, and identify actions to be taken on strengthening graduate supervision practice.

Weekly Topics

The original MOOC topics were chosen based on existing literature and an investigation into the needs of graduate supervisors in working with their students (Alharbi, 2018): 1) Introduction to supervision, 2) Supervisors' best practices, 3) Relationship building, 4) Mentoring new researchers, 5) Anticipating and addressing challenges, 6) Promoting excellence and wellness in graduate supervision. In phase two, all six of the modules were revised, remixed, and updated with new content, media, and resources. Participants in the pilot requested a specific module on academic writing with advice on how supervisors can motivate students in their writing processes (Alharbi, 2018). Informed by research on writing preparation and managing the dissertation (Ciampa & Wolfe, 2019; Roberts et al., 2019), a new "Academic Writing" module was developed for V2 of the QGS MOOC. A module on "Mentoring for Diverse Careers," was created for V2 to expand the focus from academic careers to include the many diverse career paths that graduates often pursue beyond academia (Berdahl & Malloy, 2018; McAlpine & Austin, 2018; Flaherty, 2019; Osborne et al., 2014; Sekuler et al., 2013), and the need for change in how supervisors support mentees' career development (McAlpine, 2017; Berdahl et al., 2019; Nowell et al., 2020).

Given the increased focus on student, faculty, and staff wellbeing and mental health across our campus (University of Calgary, 2015), and more broadly in higher education (Dombroski et al., 2018; Evans et al, 2018; Hawkins, 2019; Wisker & Robinson, 2016), we expanded the sixth module to explicitly address both faculty and student wellness. We curated research and contemporary resources on how graduate supervisors can invest in their self-care and wellness (Cohan, 2019; Freeman & Clare, 2019) and for mentoring others on wellness and self-care (Flaherty, 2019). The QGS MOOC V2, which includes a combination of six revised and two new modules, included these topics in Winter 2020: 1) Best supervision practices, 2) Relationship building, 3) Enhancing academic writing, 4) Addressing and anticipating challenges, 5) Mentoring for diverse careers, and 6) Promoting academic excellence and wellness.

Expert Supervisor Videos

The QGS MOOC V2 included thirty videos of expert supervisors, recognized with awards for excellence in supervision, who shared their approaches, strategies, and experiences working with graduate students. The expert supervisors were five female and four male faculty from across professorial ranks in biochemistry, education, engineering, medicine, nursing, and psychology. The run time for produced video content in V2 is approximately 161 minutes. The development timeframe from capturing raw video, to editing and producing new media content for V2, was approximately two months. Creating the two to six minute instructional videos involved videotaped interviews with expert supervisors using prepared questions and then working with a videographer to create the instructional segments for each module.

Phase two development involved creating a welcome video to introduce the two course facilitators, provide an overview of the course and give advice on getting started with online learning. Another phase two addition was the Graduate Student video to reflect mentee perspectives on effective graduate supervision. Using a vox pop interview format, short interviews were conducted with graduate students and assembled into a composite video. Adding students' perspectives was a recommendation that emerged from the pilot (Alharbi, 2018) as well as from research on variability in graduate students' experiences with their supervisors (McAlpine & McKinnon, 2013).

New to the QGS MOOC V2 was the use of external videos of expert supervisor perspectives, which added approximately 10 minutes of curated content. Also new to V2 was the use of YuJa, the institution's video hosting, and content management system. One advantage of using YuJa was that expert videos were equipped with interactive video transcripts. This built-in universal design mechanism helped enhance the course's accessibility. In addition, the YuJa media player allowed learners to add notes using the Notes feature, which is personal and accessible only to the user. To preview the content, brief, text-based descriptions were added with each video link, along with the video duration in minutes and seconds so participants could manage their time and effort. Lastly, we included a guiding question as a prompt for learners to reflect on while watching videos. Prompts were meant to cue learners to attend to specific content in each video while relating it to their personal experiences; these questions also aligned with the interview questions that expert supervisors responded to when capturing the video.

Table 2

Comparison and Changes to Design Components between Version One and Version Two

Design components	**QGS miniMOOC pilot Winter 2017**	**QGS MOOC (V2) Winter 2020**
Content: Module topics	1) Introduction to supervision 2) Supervisor best practices 3) Relationship building 4) Mentoring new researchers 5) Anticipating and addressing challenges 6) Promoting excellence and wellness in graduate supervision	1) Best supervision practices 2) Relationship building 3) Enhancing academic writing 4) Addressing and anticipating challenges 5) Mentoring for diverse careers 6) Promoting excellence and wellness
Expert Videos / Platform	6 expert supervisors 18 instructional videos 1 promotional video 1 introductory video, all expert supervisors	9 expert supervisors (3 new) 30 instructional videos 1 promotional video 1 introductory video, all expert supervisors

	Vimeo (external to D2L) to host videos	1 graduate student video 1 welcome video with course facilitators 8 Expert supervisor videos included from other Canadian universities YuJa (within D2L) to host videos
Discussion Forums	-Review questions, cases, and prompts posted in each module's discussion forums expand upon module topics -Course facilitator, 5 discussion moderators to guide, promote and summarize discussion each week	-Reflection questions, cases, and prompts posted in each module's discussion forums expand upon module topics -2 Course facilitators, 2 discussion moderators to actively contribute, guide, promote and summarize discussion each week - Participants organized into four discussion groups to create microlearning communities
Weekly task (assessment and accountability)	Not included	Taking Action on Supervision: weekly writing and reflection on supervision strengths, learning in the MOOC, setting goals for growth and development, and action to be taken on strengthening graduate supervision practice (accountability versus assessment)
Webinars	Not included	Invited expert panelists to lead conversations on weekly topics & issues in a synchronous webinar
Credential	Certificate of Completion	-Quality Graduate Supervision MOOC Badge, an 18-hour micro-credential -Transcript, continuing education non-credit course

Discussion Forums

Discussion forums are an interactive asynchronous component of many online courses. Discussion forums in the QGS MOOC were designed to include prompt questions that reflected the topic of the module and encouraged participants to reflect on their practice and dive deep into supervision practices, with discussion moderators who responded to participants (Alharbi &

Jacobsen, 2020). When enrollment exceeded 100 participants, we decided to create four discussion groups of approximately 25 participants each to make the discussion threads more manageable, as well as to create four microlearning communities. Participants were expected to participate in their assigned groups, and at the same time, were invited to engage and roam freely in any of the discussion threads that were of interest.

Taking Action on Supervision (TAS)

The Taking Action on Supervision (TAS) project was added to V2 to provide a weekly learning activity that was explicitly linked to the course objectives. For this writing and self-reflection project, participants were invited to write a reflection during each module that 1) captured key learnings, 2) documented present supervision strengths, 3) set goals for developing supervision practices, and 4) identified actions to enable them to achieve their goals. The outcome of the TAS project was ongoing reflective writing about supervision strengths, and key learning and development outcomes. The TAS project served as an overall portfolio of the supervisor's learning in the QGS MOOC V2, their goals, and stated commitments to taking action in their supervision practice. The TAS project forms the basis for further professional learning and development and can be included as part of a graduate supervision portfolio, or a teaching portfolio. Additionally, the weekly reflective writing and TAS portfolio offer both intrinsic and extrinsic learning value for participants. The TAS project served as an accountability component associated with the MOOC Badge, a micro-credential that recognized completion of the course.

Webinars

In phase one, participants in the pilot requested a more real-time or synchronous connection with peers beyond the discussion forums (Alharbi, 2018). Therefore, in phase two we added a weekly synchronous session, comprising a one-hour Webinar with the two course facilitators and several of the expert supervisors from the videos to serve as panelists. In collaboration with the course facilitators, the panelists planned remarks for approximately 20 minutes of presentation on the weekly topic followed by approximately 40 minutes of real-time conversations and interaction with participants. Webinars were recorded and posted online for on-demand access by participants who were unable to join live or who wanted to review the webinar at another time.

Micro-Credential

The QGS MOOC Badge was a new addition to version two. The researchers collaborated with the Taylor Institute for Teaching and Learning to outline what completion of the course entailed so that participants could earn a QGS MOOC Badge or micro-credential. We estimated it would take two to three hours per week, with a total time of about 18 hours to complete the QGS MOOC. As part of creating the Badge, we considered and weighed the learning outcomes, the features of this hybrid instructor-led and self-directed MOOC, and the design components that were essential to the overall learning experience. The criteria for earning the QGS MOOC Badge were to complete four tasks in each of the six modules: 1) Watch the expert videos each week, 2) Participate in the weekly discussion forums, 3) Attend the weekly synchronous session (or review the recording), and 4) Complete the "Taking Action on Supervision" project.

Navigation

To improve navigation and accessibility in phase two, non-developer D2L design templates were used to create a contemporary and consistent look for all content pages in V2 of the QGS

MOOC. The templates are designed to meet Universal Design for Learning standards (Rose & Meyer, 2002). The QGS MOOC V2 included a new course homepage banner created with a photo from the University of Calgary Media Relations. A Support link was added to the navigation bar on the course homepage and appears at the top of every page for quick access to help and support resources. YuJa was used for the integration of videos which provided closed captioning and support for visual accessibility. Finally, relevant quotations from the expert supervisor videos offered an accessible and time-effective way to introduce content and to amplify a social connection with speakers and resources each week.

Design and Development Summary

The review of current research on graduate supervision, study findings from the phase one pilot, and review by three subject matter experts prior to launch served to inform the ongoing design and development of the QGS MOOC V2 offered in Winter 2020. Trade-offs between design requirements, resources, and time influenced which changes and improvements were prioritized for V2 (Table 2), and what changes had to be deferred for future development. Outcomes of the current research will also influence the ongoing design in phase three of development. The analysis and evaluation that follows amplify participant experience and perspectives on the design components that enhanced learning in the QGS MOOC.

Results

Evidence of Learner Engagement in Design Components

A majority of post-MOOC survey responses and all of the interviews were from participants who had completed the course. Of the 46 participants who completed the post-MOOC survey, 90% had completed all six modules to earn the QGS MOOC Badge. With regards to assessing learner engagement, we were interested in how participants interacted with various design components and participants' perspectives on the flexibility and accessibility of the online course.

Expert Videos

The majority of survey participants expressed satisfaction with the expert videos and how these provided different approaches to the same supervision issue. Several interview participants mentioned they liked the length and professional quality of the expert videos. One experienced supervisor we interviewed said:

> One of the things I liked about them too is it was usually two or three, maybe even four people's different perspectives on things. And so it was interesting, they don't all handle things the same way. They don't all necessarily see the same things as important. Sometimes they had quite different approaches, but it...helped me that it was short and made it easier to fit it in and keep my attention.

Asynchronous Discussions

Given the size of the Winter 2020 cohort (n=105), we organized participants into four discussion groups to support active engagement and interaction among members in smaller microlearning communities while at the same time making the discussion forums, threads, and posts more manageable. Discussion activity and interaction in each module were lively, with the number of active participants declining over the duration of the course. The most active discussion, with

276 responses in 22 threads (see Table 3), occurred during the first module in response to the invitation to reflect on keywords to describe effective supervision. This prompt connected what students said about effective supervisors in their video with the words supervisors selected to describe effective supervision. As part of instructor presence in the course, keywords were collected and represented visually in a word cloud to share back the collective knowledge building within the learning community (Figure 1). Frequency is related to word size; thus, the three words selected the most to describe effective supervision were supportive, guide, and mentor.

Table 3

Number Of Threads And Posts For Each Module

Module	Threads	Posts / Responses
Introductions	48	117
Best supervision practices	22	276
Relationship building	16	185
Enhancing academic writing	14	164
Addressing and anticipating challenges	9	99
Mentoring for diverse careers	16	144
Promoting excellence and wellness	59	166
Total	187	969

Participants valued the exchange and discussion of ideas and strategies with other supervisors in the forums, and with expert supervisors who served as discussants. As such, many participants noted that they believed the discussions were an essential component of the learning experience. Participants indicated they appreciated the safe learning community that was formed and the relational trust that was cultivated in the discussion forums.

Webinars

Participants reported the webinars were helpful for engagement and interaction with academic peers. For example, an experienced supervisor told us in an interview:

> I really felt like I was, that I had other people in the room, you know, and when I was listening to others, I felt that we were all in that room together. It just kind of gave that personal, you know, you heard the voice, you saw the facial expression. It was just more relational. I thought the weekly webinars were excellent and the expert videos as well.

Figure 1

Key Words Participants Used To Describe Effective Supervision

Another supervisor spoke to the value of access to different perspectives on the same issue:

> The Weekly Webinar was fantastic. I really enjoyed being able to connect with everybody that was on the call to be able to learn from the different experts. So whatever expert happened to be speaking at that particular time or on that particular subject. I really enjoyed the chat conversations and, you know, just the conversation in general. ... it was actually really nice to be able to connect with other people on campus. And in this kind of capacity talking about graduate student supervision.

Given the variability in academics' schedules, we anticipated that some participants would be unable or unwilling to attend the live webinars. "I even appreciate that attending webinars was not mandatory and I could review them later as, some days, I was super busy at the assigned time for the webinars". Participants indicated they appreciated the freedom to choose live or to access on-demand recordings.

Micro-Credential

A multipart interview question focused on the QGS MOOC Badge. We were interested in design and impact: 1) whether the addition of the Badge was a motivator for completion, and 2) whether participants valued the Badge for their teaching portfolio, supervision portfolio, their CV, their Annual Progress Report, and so on. Earning the badge was identified as important by 52% of post-survey participants. Several indicated formal recognition of their learning was important for their CV or supervision portfolio, and the micro-credential was valuable for renewal of supervision privileges. One participant explained, "I knew it would be viewed favorably for my

APR [Academic Performance Report] and wanted to be able to write something in my next renewal of supervisory privileges in terms of professional development." Another participant expressed, "it is important for developing my graduate supervision profile and continuation of supervisory privileges in the future." One participant said, "first, it is a celebration of achieving my goal, and second, I can use it as evidence of personal growth." Several participants reported the Badge gave them both structure and motivation to complete the entire MOOC.

Twenty-three percent of survey respondents reported earning the badge was not important to them. One participant explained having a reward is nice, but they do not know what a digital badge is or how to use it. Another participant was unsure the badge counted: "I've never seen an academic's CV with the word Digital Badge on it and I have seen a lot of CVs." Several participants explained the badge was not a motivator for completing the MOOC. "I wanted to engage in the learning regardless of whether or not I earned the digital badge." The variety of perspectives on digital badges suggests that learning and goal setting is an individual experience and that a micro-credential may or may not be a motivator or currency for professional learning.

Engagement Within the Learning Community

MOOC participants valued the opportunity to engage with colleagues from across campus in the discussion forums, through the videos, and via interaction in webinars. Supervisors valued exposure to different perspectives, approaches, and strategies for mentoring and guiding graduate students. An experienced supervisor indicated the highlight was conversations with a diverse group of colleagues: "that's one of the things I like best about it, was the fact that there are people from a lot of different faculties, a lot of different programs which have very, very different expectations. And it was nice to see things through their lens a bit." In an interview, an experienced supervisor explained:

> What I really appreciated was that diversity and just how different things are for different people and how somebody approaches things that might work for them are just not going to be possible for me or the other way around. And, you know, I've been doing this for a long time, but that doesn't mean that I didn't learn a lot.

Another experienced supervisor also described "... it was definitely looking at and learning about other perspectives, not just strategies, but other perspectives and philosophies that other graduate supervisors had with regards to what their role was in supporting students." They also added that:

> There was tremendous diversity in an approach which is great. But it became very clear to me that I think whoever we are, we may have a particular approach, but not all of our students are going to walk in through that same door…And so I think it is the experienced supervisor and the supervisor who aspires to excellence recognizes that and doesn't hold students to a rigid kind of expectation.

Another experienced supervisor emphasized the importance of learning from various opinions and explained:

> It was very interesting to me to listen to some of my good colleagues whose approach was very methodical. And I don't judge that. I think, wow, good for you. And then to see the varied approaches of others that focus a little more heavily on the relational in order to navigate those milestones. And yet, at the end, your student reaches successful completion.

Flexibility and Accessibility

All survey and interview participants emphasized flexibility and accessibility as benefits of the course and appreciated the opportunity to learn online at their own pace. One indicated that, "I probably did 99% of it on the weekends or in the evenings, which is something that I wouldn't have been willing to do if it had been on campus. And I would have found it a lot more difficult to carve out an hour or two, three times a week, during normal working hours. If this had been scheduled during the day, I probably wouldn't have done it." Another explained how they appreciated the flexibility of the course and the fact that it was offered online:

> It worked really well for me as I am a lab bench-based, basic scientist. I can catch up on the work in the evening and weekends. On the scheduled webinars, I can log in with my devices and participate whilst doing the more monotonous tasks in the lab - this is a very good use of my time. It is also time-saving as I don't need to travel for the classes.

Other supervisors highlighted the advantage of being able to access the material at one's own pace. "I could start and stop and do a few minutes here and a few minutes there. And that worked for me." While the flexibility of the MOOC helped many of the participants to complete the MOOC, one participant explained it was a challenge to self-pace in the online environment:

> The online format is excellent… not everybody is on campus all of the time. So it provides that equity of access…it's more inclusive in that way, which is great. Now one of the downsides… when there is so much flexibility, it sort of challenges one to be accountable, to set up their time to then engage in it.

The COVID19 pandemic was a disruption for many MOOC participants. In the middle of the MOOC, all courses and supervision at the University pivoted to remote delivery as physical distancing protocols were put in place. Several participants requested an extension to finish the MOOC and a few dropped out from the impact of the pandemic. One participant explained, "Given the crazy of COVID and everything I had to manage this past two weeks I appreciated the flexibility and ability to complete things at my own pace." Others reported they had more flexibility and time for the MOOC with campus restrictions and the requirement to work from home. For example, one participant mentioned, "So I think the flexibility, the style of the MOOC allowed me to successfully finish it despite some of these other unforeseen challenges that sort of popped up. Like I didn't know that I was going to be quarantined."

Evidence of Impact on Practice: Key Themes

The research team was interested in how peers interacted with peers in the interdisciplinary online learning community and whether the learning experience in the QGS MOOC V2 had any impact on supervisors' work with students. For example, one participant described how they interact differently with their students now given what they learned in the course.

> I'm trying to differentiate between different students because different students would need different things based on what I've learned here, right? So, some students need more hands-on supervision. Some students don't like that. And I'm actually trying to ask students what they would like based on what I've learned in this course. Of course, still with my goals for them in mind as well. Yeah. I think that is something that has changed in my approach to supervision.

The analysis and integration of survey and interview data on reported impacts on practice and the types of actions taken to improve supervision practice yielded four themes: 1) increased awareness of supervision strategies, 2) establishing good communication, 3) the value of reflection on supervision practice, and 4) increased attention to wellness and self-care.

Increased Awareness of Supervision Strategies

The most prominent theme to emerge regarding the impact on practice was that engaging in the MOOC increased participants' awareness of diverse supervision strategies, tools, and ideas about supervision from across disciplines. The majority of survey and interview comments highlighted either a specific new concept that participants had gained or an increased awareness of effective supervision strategies that are common across disciplines, such as the need to support students with academic writing. Several supervisors indicated that the MOOC learning experience reinforced ideas they already had about effective supervision, such as the need to be aware of students' experiences and listening for how best to provide support. New supervisors commented on their changed ideas about supervision as a result of what they learned in the MOOC. For example, "I have learned that my experience as a supervised graduate student is not necessarily the norm and that I can be a better supervisor based on the knowledge I now have." And another, "It has modified my initial perspective of graduate supervision and I hope to go forward with a renewed approach to training students to become the best of themselves."

Supervisors indicated they appreciated becoming more aware of diverse images of effective supervision and claimed that by finishing the MOOC they had more strategies and ideas to draw upon in working well with their students. For example, participants valued opportunities to discuss and exchange strategies for supporting graduate students with academic writing. "Some of the writing ideas were gold and I will be applying them." Supervisors described their commitment to encouraging students to enhance their academic writing skills, to employ strategies such as peer editing so students can help one another, and resisting the urge to edit their students' work in favor of discussing the types of edits needed for continual improvement. Supervisors often described ideas that colleagues had shared in a discussion or webinar that they would like to adopt in their practice. For example, one supervisor indicated "I'd like to try the walking meetings. Just right now with the self-isolation, that's not possible but I think it'd be nice to try." Another supervisor described several ideas they were taking away from their experience in the QGS MOOC, such as "I will start to make changes in my lab, including writing as a daily task, one minute research project pitch, and social sessions for wellness and support."

Establishing Good Communication

The second most prominent theme to emerge about impacts on supervision practice was the need to establish strong communication with students from the start of a relationship. Survey

and interview comments associated with this theme included the need for supervisors to engage in active listening to learn more about their students and their needs, to offer person-centered support along with program advice, to establish a regular meeting schedule, to discuss expectations on both sides, and to become more intentional about building relationships with students. Supervisors identified the need to be more deliberate in how they communicated with students, such as learning more about student interests outside of graduate school, by focusing on managing wellness in graduate school, specifics about program and progress, and initiating conversations much earlier (i.e., with new students) about career interests and non-traditional career options. Supervisors indicated a renewed commitment to being more curious and assuming less about their students, initiating or establishing regular meeting patterns and networking opportunities, and sharing resources more directly with their students.

Several supervisors described their plans to establish strong communication with students by formalizing a project management plan for following up with each of their students, to communicate about time management and balance, plan activities for students to engage with each other, and also plan for discussing expectations upfront to promote collaborative work. Supervisors also indicated a clear understanding that relationships need input and commitment from both sides, such as setting clear expectations, using shared documents to ensure understanding goes both ways, and increasing the number of times they check in on students as some of the cogent lessons they learned in the MOOC and plan to incorporate into their style of graduate supervision.

Reflection on Supervision Practice

A third theme that emerged was the value of reflecting on supervision practice and supervisors setting goals for their continual improvement. Several supervisors commented that the Taking Action on Supervision (TAS) project gave them a sustained opportunity to reflect both critically and positively on their supervision practice. A common thread among responses in this theme was supervisors' renewed confidence that while they had much to learn, the MOOC reinforced that they were doing a good job at supervision. Experienced supervisors reflected a realization that they are supervising in changing contexts, and that the MOOC confirmed that they had a great deal of experience to share, while at the same time they still have a great deal to learn from interdisciplinary peers. Several supervisors identified the reflections and goal setting in the TAS project were valuable, along with the actionable items they created for enhancing their practice. One participant described the impact of the MOOC learning experience and their reflections on their current supervision practice in an interview:

> I am mentoring three students and working with them on a scoping review. I think I would have handled it a little differently if I hadn't taken this course… it really had an impact and challenged my thinking on the role of the graduate student and the role of the graduate supervisor. I went from my own supervisors, right? I had very different experiences with different people. And so that is where I learned how these things should be done… And this course challenged that… I was different with these students and I'm pretty sure it's because of the course.

On the survey, several supervisors indicated a commitment to revisiting their action plan on a regular basis to ensure they are supervising students in ways that align with their goals. Several others described how they plan to keep updating their knowledge and skills about graduate

student supervision by building upon what they learned and by connecting with peers across campus.

Wellness and Self-Care

The fourth theme that emerged with regards to impacts on practice was greater awareness of the need to consider both academic excellence and student and supervisor wellness. “I really enjoyed seeing that balancing excellence and wellness as part of the modules.” Several supervisors indicated that the MOOC introduced new ideas about balancing excellence and wellness, and also increased their awareness of the need for supervisors to become more aware of student experiences and challenges. One supervisor shared that a key insight and realization was they needed to become more aware of the specific difficulties that each student may be facing to better tailor their supervision strategies and approaches. Many supervisors identified closely with the discussion on promoting wellness and self-care along with excellence by checking in with students and talking about the personal first in meetings before transitioning to projects, tasks, and deadlines. Several supervisors made an explicit commitment to finding balance in both excellence and wellness as part of their revised supervision philosophy. “Communication and self-care are the cogent lessons I have learnt and will be incorporating into my own style of graduate supervision.” For some supervisors, the intentional focus on scheduling social events or meetings was a strategy they planned to add to their practice.

Discussion

This evaluation of a faculty development MOOC in graduate supervision offers several key findings about what factors enhanced the online learning experience and the impact it had on practice. We found evidence that each of the six design components enhanced learner engagement in some way. Participants indicated the expert supervisor videos, webinars, discussion forums, and the Taking Action on Supervision project, were highlights of their online learning experience. During interviews, MOOC participants advised that every supervisor, new and experienced, could benefit from engaging in this online course on graduate supervision. The MOOC learning community offered supervisors across the career span an opportunity to share their disciplinary experiences and perspectives on supervision, and to be heard in ways that were not readily available in more formal learning settings and contexts. Participants reported that what they valued most was the opportunity to engage thoughtfully with interdisciplinary colleagues who brought different perspectives, approaches, and strategies for supervising and mentoring graduate students to the learning community. One supervisor shared how they led a major overhaul in the way leaders in their department designed the supervision program and how they worked to reconstruct a more human-centered design that incorporated multiple perspectives on supervision based on what they learned in the QGS MOOC.

Supervisors emphasized that the flexibility and accessibility of the QGS MOOC worked well for their learning even with their busy schedules, and especially when their work and home lives were disrupted by the pandemic and the pivot to fully online engagements. Participants appreciated the opportunity to learn online at their own pace and on their own schedule. They valued engagement in the online learning community through webinars, discussion forums, and access to expert videos. An unexpected benefit from engaging in the QGS MOOC during the pandemic pivot was that several academic faculty and postdoctoral scholars indicated they were able to adapt quickly and more smoothly to remote teaching because of their first-hand experiences as an online learner in the MOOC. Participants’ experiences learning online with

the instructors and academic peers in the modules, during Zoom webinars, and in the discussion forums, gave them timely strategies and ideas for engaging effectively online with their students. The pandemic pivot which required supervisors to work remotely with their graduate students, and the flurry of discussion that this shift immediately cultivated in the MOOC's discussion forums, has prompted us to gather resources and research on online mentoring and supervision (Kumar & Johnson, 2019; Kumar & Coe, 2017; Maor et al., 2016) to inform the design of a new module for the next iteration.

Our results demonstrate that the QGS MOOC offered graduate supervisors an opportunity to grow and develop their supervision practice through interdisciplinary engagements and connected learning outside of their regular experiences (Salmon et al., 2015). Our findings indicate that faculty learning in the MOOC has an impact on supervision practice and the types of actions supervisors have taken or plan to take to improve their practice. Four themes emerged about the impact on practice, such as increased awareness of common supervision strategies across campus along with new ideas and approaches. Second, increased understanding of the value and importance of establishing good communication and active listening to discern student needs, and to offer both person-centered support and sound program advice in their work with students. Third, supervisors gained from reflecting on their learning and supervision practice and by setting goals for their continual improvement. Fourth, supervisors set in motion strategies for their own and their students' wellness and self-care to balance and accompany their focus on excellence.

We experienced a completion rate of 47%, which is higher than average. With expanded temporal and geospatial flexibility and learner autonomy comes the opportunity for dropping in and leaving the MOOC. Low completion rates tend to be a characteristic of many MOOCs (Reich & Ruiperez-Valiente, 2019). However, early leavers can still benefit from a MOOC. Following a 100% attrition rate, Jacobsen (2017) found some participants reported gaining insights to improve their practice and using the course as a prelude to self-directed online learning. Similarly, MOOCs provide opportunities to expand upon self-determined professional learning goals (Milligan et al. 2013). Thus, depending on the goals or learner perspective, not completing the QGS MOOC does not automatically equate to not learning something of value about supervision.

In this paper, we have reported on phase two of the design, development, implementation, and evaluation of the QGS MOOC in Winter 2020 at the University of Calgary. Our research contributes insights on design components that help create the essential mentorship and learning conditions for graduate supervisors' collective knowledge building and ongoing improvements in supervision and mentoring practices. By extension, although we did not evaluate this directly, we contend that improvements in supervisor awareness and commitment to taking action on diverse strategies in their practice will contribute to improving graduate student experience and wellness, as well as improving students' academic success. Through active knowledge exchange and discussion with faculty peers across disciplines, supervisors expanded their understanding and strategies for supporting students in self-care and wellness, along with timely completion of program, knowledge mobilization and grant writing, and diverse career preparation, through an intentional focus on their own and others' learning and development as effective supervisors.

Conclusions and Recommendations

In the present study, we combined the compelling need for ongoing faculty support in supervision with what is known about the features of MOOCs to leverage accessible and flexible online learning during a pandemic. The current study captures the perspectives and voices of graduate supervisors immediately after they participated in the QGS MOOC. While we are aware of the impact of the course on some participants' practices, we do not know the extent to which goals and actions articulated by supervisors in the TAS project have impacted their practice in the medium or long term; more research is needed to follow up with participants who completed the course to examine how any changes in their practice have been sustained. Implications of our research for further design, development, and practice in using this MOOC for faculty development in graduate supervision include the in-depth analysis and findings of the effectiveness of various design components, as well as findings of levels and types of learner engagement. In subsequent offerings of this MOOC, we plan to expand our inclusion of graduate students' perspectives (McAlpine & McKinnon, 2013) on supervision. One idea for continuing the community of practice beyond the conclusion of the course and extending that energy and learning into future offerings of the MOOC is to invite supervisors who earned the QGS MOOC Badge to engage as mentors with new cohorts of supervisors in the future learning communities. Some MOOC graduates may be satisfied with what they learned and want to move on. For others, returning to the MOOC learning community as a mentor would enable them to have a role in extending the network and community of practice.

Academic faculty on the tenure track balance diverse roles and many responsibilities. The Quality Graduate Supervision MOOC offered flexible and accessible online faculty development for both new and experienced graduate supervisors, especially during a global pivot to online teaching and learning during a pandemic. Results indicate the MOOC is an engaging and impactful learning experience that transcends disciplinary and faculty silos. The MOOC provides an innovative and responsive, transdisciplinary learning community that enables interdisciplinary faculty to engage in and contribute to a collaborative learning experience and to collectively strengthen the quality of graduate supervision available for graduate students. We argue the QGS MOOC offers supervisors an opportunity to share their expertise and experiences and engage in a transdisciplinary community of practice in which supervisors gain much from colleagues who share their commitment to effective graduate supervision. For universities, our research provides evidence of the effectiveness of MOOCs for online faculty development in higher education We recommend greater institutional investment in providing widespread access to flexible online learning experiences for all faculty.

Author's Contributions

Conceptualization: MJ, HA; Data curation: MJ, HA, LT, LB, VR; Formal Analysis: MJ, HA, LT, LB; Funding acquisition: MJ, HA; Investigation: MJ, HA; Methodology: MJ, HA; Project Administration: MJ, HA; Resource development: MJ, HA, LB; Software: MJ, HA, VR; Writing draft, review, and editing: MJ, HA, LT, LB, VR.

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Conflict of Interest

The authors do not declare any conflict of interest.

Data Availability Statement

Data is not available as per the ethics agreement for this study. Authors have fulfilled their responsibility for ensuring that all steps have been taken that are necessary to protect the privacy of human research participants.

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Open Pedagogy and Transdisciplinary Thinking: Making Connections Through a Visual Artifact Self-Study

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Abstract

The examination of teacher educators' own practices through self-study research has been well established and self-study aligns with the growing interest in open educational resources (OER) and open pedagogy. This research used a self-study method of a Science, Technology, Engineering, Art, and Mathematics (STEAM) OER project, Form and Function(s): Sustainable Design meets Computational Thinking. Two research questions were pursued: How do open pedagogy attributes contribute to a transdisciplinary STEAM OER pedagogical stance? And how can one apply visual artifact self-study as intentional critical friends to examine professional value and to enhance pedagogical self-understanding? The researcher analyzed visual artifacts of created and documented images that supported the process of her interrogations of transdisciplinary curriculum development and open pedagogy. The sites and modalities of the artifacts were questioned and answers recorded using a critical visual methodology. Klein's (2008, 2018) transdisciplinary thinking and the eight attributes of Hegarty's (2015) open pedagogy frame the interrogation of the images and the connections made to curriculum theorizing. The self-study provides conclusions to the role of visual artifacts when conceptualizing the gestalt of complex ideas and relations. The self-study provides warranted assertions for open educators and researchers interested in the practices of transdisciplinary, open curricular and pedagogical processes alongside the eight attributes of open pedagogy, and the role of critical self-reflection.

Introduction

Openness in education involves practices, pedagogical tools, and the philosophical approach that can potentially cause a shift in teaching and learning. Although it is difficult to state that at one particular moment openness in education emerged (Bozkurt, 2019), it is clear the intertwining of digital technologies alongside social and cultural practices have affected the affordances of teaching and learning. The focus of this study is exploring what open educational resources (OER) are and how OER were made, but concomitant to such inquiry is the examination of transdisciplinary thinking and its relationship to OER, open pedagogy, and open practices. Using visual artifacts as a tool of self-study inquiry, I employ pragmatics and conceptualizing inherent to the OER produced as part of contributing to a meta-perspective relating open pedagogy and transdisciplinary thinking.

Background

In the spring of 2020, an interdisciplinary faculty assemblage from Athabasca University began the Science, Technology, Engineering, Art and Mathematics (STEAM) OER project, Form and Function(s): Sustainable Design Meets Computational Thinking (Blomgren, 2021). The term interdisciplinary in this context is defined as the integration of the concepts, methods, and theories from two or more disciplines as a pathway to solve complex problems (Biox-Mansilla, 2017). Through brainstorming and collaborating, this project brought together concepts from high school Biology, Math, Art, and Computing. With an overall consultancy membership of 13 faculty from Architecture, Biology, Mathematics, Computing, and Education and a smaller design team of five, we collectively created flexible and open learning assets. The partner and funder was Callysto, a Canadian digital portal that supports the teaching of youth with free online tools for learning data analysis, visualization, coding, and computational thinking. The funding through Callysto paid for animation expertise and two research assistants, one developing Jupyter notebook coding assignments and the other supporting pedagogical decisions based in the multi-disciplinary faculty content suggestions. By the end of the project, the OER design plans included teaching and learning activities, Juptyer coding activities, and an eight-minute animation.

The brainstorming for the project originated with transdisciplinary thinking. When architecture, the natural sciences, mathematics and computing intermingle something beautiful and purposeful may occur. The project genesis aimed to challenge high school students to think computationally by considering the notion of “design” through three perspectives on form and function. Firstly, this OER endeavour challenged students to consider a structure’s architectural form in the context of its function within the ecology in which it belongs. Secondly, through the natural sciences students explore nature’s designs created through natural selection. Finally, abstracting form and function through a mathematical and computational perspective focuses on how modelling and coding can emulate natural selection’s form and function. The learning and the three perspectives coalesce when students apply, model, and code evolutionary algorithms to design better buildings, individually and collectively, within a natural environment.

The design team applied a backward design process (Wiggins et al., 2005) focusing on STEAM essential questions framing the learning pathways and introducing different perspectives of form and function in sustainable design. The OER assets, including the animations, have flexibility as granular items or can be stacked and used as an interdisciplinary unit. We aimed for students to recognize that computational thinking does not necessarily equate to mathematics and

computing; rather, mathematics and computing are tools that facilitate computational thinking. The interdisciplinary team's draft OER received peer review feedback from high school teachers, asynchronously as part of an OER Sprint concept, with participation numbers were affected by the global pandemic. The refinement and iterative co-design of the learning materials furthered the practical aspects of teaching computational thinking through three perspectives on "design". By using CC BY licenses, these open assets were shared on the OER Commons platform (e.g., an OER digital library), the Callysto website, and the Callysto YouTube channel, supporting the ability for students to share, revise, remix, or redistribute.

The design team included the roles listed below. In total, more than twenty people had some degree of input and involvement with this project, representing six disciplinary areas (Mathematics, Computing, Biology, Architecture, Art, and Pedagogy).

- A Math lead
- A Computing lead
- An Architectural lead
- A Pedagogy lead
- Two research assistants (one for coding, one for pedagogy)
- Nine additional faculty to support math, computing and architecture content development
- Two studio contracted animators
- Two staff from the partner Callysto
- Volunteer high school teachers (involvement varied due to COVID-19 influences)

Research Questions

This self-study research (Hamilton & Pinnegar, 2013; Hauge, 2021; Samaras, 2009) applies a visual methodology using images found or created during the project (Rose, 2016) to reflect upon the challenges and realities from an educator fluent in understanding curriculum theory, OER, and open pedagogy yet limited in her knowledge of STEAM education. Insights gained relate to the importance of understanding (a) reflection-upon-action (Schon, 1983) and transdisciplinary mental models (Senge, 2006); (b) the challenges of OER co-design with discipline experts and teachers; and (c) the importance of the eight attributes of Open Pedagogy (Hegarty, 2015) to support the co-design processes of STEAM OER. My curiosity centred on the following questions:

1. How do open pedagogy attributes contribute to a transdisciplinary STEAM OER pedagogical stance?
2. How can one apply visual artifact self-study as intentional "critical friends" to examine professional value and to enhance pedagogical self-understanding?

Conceptual Framework

To strengthen self-study research efforts a clear conceptual framing is essential ((Vanassche & Kelchtermans, 2015). Pragmatism, open pedagogy, and transdisciplinarity nest together to inform the theoretical and conceptual of this inquiry and provide structure to the visual interrogations.

Pragmatism

The self-study design of the Form and Function(s) OER project sits comfortably with pragmatism, with its open education and transdisciplinary flavour and long history with

educational research. Fluidity was a secondary flavour to the project through involving a wide variety of people and disciplines, learning activities, and final outputs. Accordingly,

> pragmatists believe that reality is not static—it changes at every turn of events. Similarly, the world is also not static—it is in a constant state of becoming. The world is also changed through actions—action is the way to change existence. Actions have the role of an intermediary. Therefore, actions are pivotal in pragmatism. (Kaushik & Walsh, 2019, p. 3)

Additionally, in pragmatism: (a) actions cannot be separated from contexts (e.g., they are relationally embedded); (b) actions have consequences, both of which are subject to change; and (c) actions are based from worldviews which are simultaneously unique yet through social sharing hold points of confluence with others (Kaushik & Walsh, 2019). For John Dewey (Hildebrand, 2018) one of the noted thinkers of pragmatism, human experience is rooted in in contexts, emotions, and social connections—inquiry forms one type of human experience. Morgan (2014) summarizes Dewey's inquiry process as: (a) recognizing a problem within a situation; (b) determining the problem's definition after considering several perspectives on it; (c) selecting a pathway of action; (d) assessing potential actions with their possible consequences; (e) taking actions that address the situation's problem . Inquiry marks a process whereby "beliefs that have become problematic are examined and resolved through action. It is a process of making choices by asking and answering questions, in which those questions concern the likely outcomes of applying current beliefs to future action" (Morgan, 2014, p. 1047).

Open Pedagogy

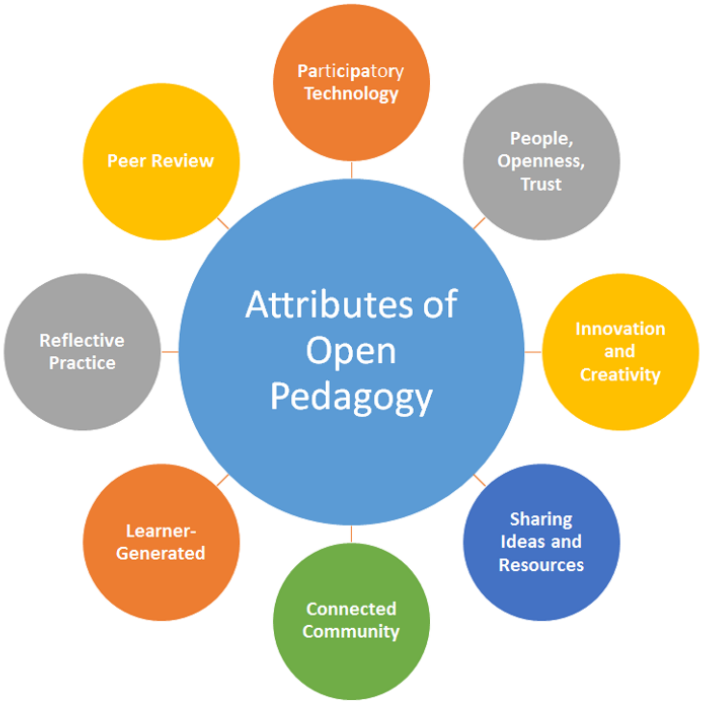
From pragmatism flows the connection to Hegarty's (2015) eight attributes of open pedagogy (see Figure 1). These attributes nest within human experiences of a teaching and learning context, including both emotions and social connections. Participatory Technologies inhere the experiences of participating enabled by digital technologies and energizes the other seven attributes. People, Openness, and Trust come together, coalescing as an attribute larger than the individual parts and signal the importance of both emotions and social connections. Innovation & Creativity infused the Form and Function(s) OER project and the design processes, not only in the process of creating the animation, but also in the coding activities created using a Jupyter notebook for open-source input/output code, text and visualizations. Again, social connections appear in the three attributes of Connected Community, Sharing of Ideas & Resources, and Peer Review. When these experience attributes occur organically, emotions and social connections percolate forth. The seventh attribute, Learner Generated (e.g., content), was included in the initial project design as well as with the affordances of CC BY licensing. Lastly, Reflective Practice informs this visual artifact self-study and enables an inquiry into high school STEAM curriculum and OER beliefs and actions.

Transdisciplinarity

Most scholars are familiar with the term interdisciplinary, as defined earlier using Biox-Mansilla's (2017) framework; however, there is less familiarity with transdisciplinarity (TD) and its movement to transcend disciplines through an "overarching set of axioms associated historically with unity of knowledge and later synthetic paradigms" such as general systems theory, feminist theory, and sustainability (Klein, 2018, p. 11). TD is also connected to "problem-oriented research that generates new conceptual and methodological frameworks and involves stakeholders in society in the research process" (Klein, 2018, p. 11).

Figure 1

Eight Attributes of Open Pedagogy



Note. Reprinted from *Design Attributes of Open Pedagogy by Bronwyn Hegarty*, by Michael Paskevicius, 2017. Licensed CC-BY 4.0.

Building upon the more well-known interdisciplinary thinking, and to assist understanding of TD, Klein (2018) created a conceptual TD vocabulary. Her list includes terms such as adaptive and generative learning, collaboration and collaborative learning, integrative learning, mutual learning, reflexivity and reflexive equilibrium, relational thinking, socio-cognitive platforms for communication, transactivity, transformational and deep learning, and transdisciplinary orientation. She provides an historical overview of TD and relates bonds to Dewey among others with an emphasis on experiential learning. There are also TD ties to gestalt psychology (Zwicky, 2019) and Piaget's *cognitive disequilibrium* amended through *metaperspectives* with the end purpose of *advancing knowledge* rather than truth claims (Boix Mansilla, 2017).

As Klein (2008) noted in her literature review of interdisciplinary and transdisciplinary research "the multidisciplinary–interdisciplinary–transdisciplinary environment is not a set of mutually exclusive categories. Research is too complex…" (p. 117). Learning theories for transdisciplinary theories are nascent at best, with interdisciplinary cognitive-epistemological foundations still emerging within the literature. In her discussion of interdisciplinary learning, Boix Mansilla posits a constructionist pragmatic. This orientation holds a

> pluralistic epistemology [that] invites the inclusion of other symbol systems (visual, musical, kinesthetic) and ways of knowing such as artistic interpretations or literary fictions. Interdisciplinary understanding can thus be viewed as a *'system of thought in reflective equilibrium'— embodying insights and tensions across disciplines, representing an improvement over prior beliefs and remaining open for review.* (2017, p. 8, emphasis added)

As part of interdisciplinary projects, four cognitive processes occur: “establishing purpose; weighing disciplinary insights; building leveraging integrations; and, maintaining a critical stance” (Boix Mansilla, 2017, p. 8). Although the Form and Function(s) OER project was a transdisciplinary project, it scaffolds upon what has been previously established from interdisciplinarity, scant as the scholarship on transdisciplinarity may be.

Reflection

From the overview above, one notices the repetition of inquiry (Hildebrand, 2018), reflective practice (Hegarty, 2015), reflexivity (Klein, 2018), and reflective equilibrium (Boix Mansilla, 2017). These themes resound with self-study research. Self-reflective practices date back to various scholars but especially to the work of Schon (1983) and his interest in the reflexivity that professionals have and continue to develop over time as they reflect upon their work. Schon’s concept of *reflection-on-action* informs this research study which requires one to think back upon a problem or situation in order to pull it apart, analyzing and studying to create new understanding of the situation (Meierdirk, 2016). Within faculties of education, self-study research encourages professors to align their teaching intentions with their professional actions (Loughran, 2007). Arising from the 1990s and the growing awareness of the scholarship of teaching and learning within higher education, self-study research holds two aims: (a) the improvement of an individual educator’s practice; and (b) the published exploration of teaching expertise contributing to the broader scholarship of teacher education (Loughran, 2007). These explorations are part of a broader knowledge mobilization aim that shares out the self-study to strengthen and extend the scholarship of pre-service and in-service teacher education (Loughran, 2007; Vanassche & Kelchtermans, 2015). Integral to this form of research is the commitment to show the ways and means in which personal theories of the researcher are challenged beyond the personal alone.

There is no one method ascribed to self-study research (Vanassche & Kelchtermans, 2015). Traditionally, the use of critical friends has been the primary manner to challenge personal theorizing. For this study, instead of inquiring critical friends, the interrogation of the visual artifacts provide an example of extending self-study research into the realm of digital things and post-human inquiry (Adams & Thompson, 2016). Teaching experiences in the forms of interviews, audio/video documentation of teaching, observations, autobiographical reflections, collage, and poetry have been captured as data in self-study research (Samaras, 2009; Vanassche & Kelchtermans, 2015). Critical visual methodology, a relatively new approach, were not captured in a recent systematic literature review of self-study (Vanassche & Kelchtermans, 2015) yet fits within the varied data collection and genres these authors uncovered.

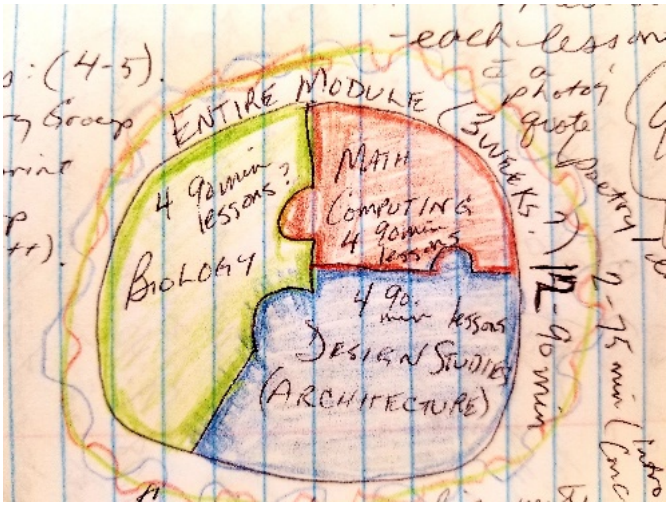
Research Method

To support the reflection process and addressing self-study trustworthiness, integrity, credibility, and authenticity (Vanassche & Kelchtermans, 2015), I applied a critical visual methodology. Critical visual methods have increased in popularity and supply different perspectives on data collection and innovations within research methods (Rose, 2016). Because the Form and Function(s) OER project created an eight-minute animation, a visual methodology seemed highly appropriate. The nature of self-study requires images that have convenient copyright access. This led to artifacts of which I held copyright (see Figure 2) or openly licensed images (see Figures 3, 4, and 5). Additionally, because this project included creating openly licensed learning assets, use of images with creative commons licenses as part of my research decisions reinforced aspects of the eight attributes of open pedagogy. Since the project lasted for nine months, the images correspond to various times within the project’s overall chronology, with the

first image emerging early within the initial stages of the project and the last image occurring in the polished version of the animation.

Figure 2

Visual Artifact 1: Initial Sketch



Note. Photo by Connie Blomgren is licensed under Creative Commons Attribution 4.0 (CC-BY) International

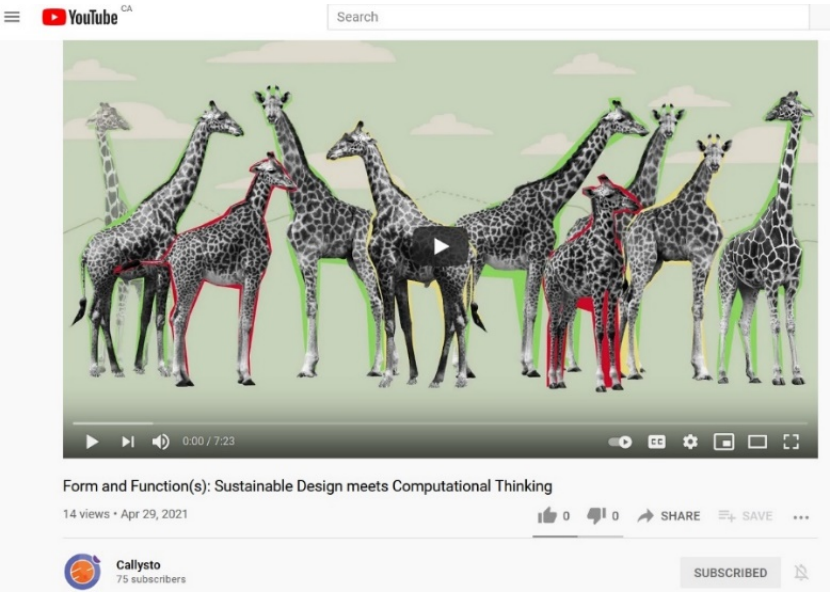
Figure 3

Visual Artifact 2: Fibonacci Chamomile

Note. This image was used in a presentation about the Form and Function(s) OER project for an open education virtual conference. From *FibonacciChamomile*, by Wikimedia, 2014. Licensed CC-BY 2.5.

Figure 4

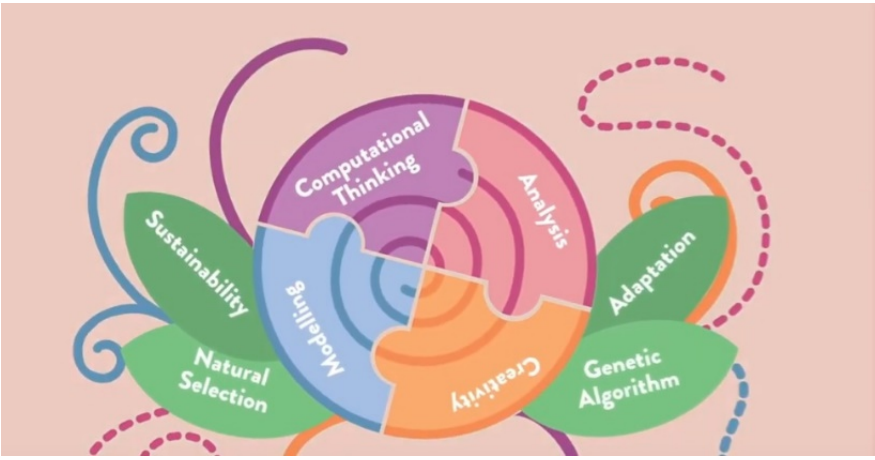
Visual Artifact 3: Giraffe Design



Note. From *Form and Function(s): Sustainable Design meets Computational Thinking*, by Callysto, 2021. Licensed CC-BY 3.0.

Figure 5

Visual Artifact 4: STEAM Form and Function Flower Animation



Note. From *Form and Function(s): Sustainable Design meets Computational Thinking*, by Callysto, 2021. Licensed CC-BY 3.0.

In applying a critical visual methodology, a series of questions were posed of the image artifacts. These questions were nested within the four sites of a critical visual methodology which include: a) the site of production; b) the site of the image itself; c) the site of its circulation; and d) the site of its audiencing. These four sites also have different modalities: the technological, the compositional, and the social (Rose, 2016). The technological modality connotes a "visual technology…[that] can be relevant to how an image is made but also to how it travels [emphasis added] and how it is displayed" (Rose, 2016, p. 25). Technological questions include: how was the image made? How is it displayed? How is it circulated? Composition as a modality refers to the formal visual strategies of content, colour, line, medium. Its interrogative questions include: What is the genre? What is the composition? What is the image relationship to other texts that surround it? Lastly, the social mode encompasses a broad capture of economic, social, and political relations, including the institutional practices that surround an image and through which the image is viewed and may be used. The social modality allows for questions such as: What are the visual meanings? Who(m) organized the circulation of this image? How is it interpreted – by whom and why? (Rose, 2016).

For each image, the sites of production, the image itself, its circulation, and its audiencing were examined through the questions of the three modalities. Using a direct question and answer format, I responded to 15 separate questions to engage in the self-study analysis.

Interrogations of the Visual Artifacts

The framework of the four sites and three modalities for interpreting images allowed for a variety of written responses. The framework questions acted in place of a self-study's critical friend and were therefore used to frame, explore, and challenge my teaching practice and beliefs regarding co-creating open curricular assets. Through interrogating each of the artifacts, three threads emerged.

Thread One: Conveying Complex Ideas

Through the questions, answers revealed the topic of the complexity of developing transdisciplinary OER high school curriculum and the strength of conveying complex ideas through an image that is, through a gestalt experience (Zwicky, 2019). For Aartifact 1, questions of the site of production and its technological modalities produced the following reflections:

> I used pen in my scribbler notebook to help conceptualize for myself how the 4 disciplinary areas would be identifiable yet interlocking into the overall "all path way" interdisciplinary/transdisciplinary teaching plans. I used the coloured pencils to help indicate the discipline yet the wavy lines around the circle are braids of the red, green and blue. I was purposeful in selecting the colours too green = life/biology; blue = ideas & concepts/design studies; red = math & computing, like blood coursing through life and ideas. The pieces interlock with each other, the 3 discipline areas interlocking within the braiding, the transdisciplinary, supercircle that encases it all. (Site of production; Technological mode)

Examining the site of production and composition of Artifact 2 delivered this observation:

> It falls into explanatory/educational photography as it is a derivative of the original photo Fibonacci Chamomile to which the user Alvesgaspar employed software to draw in the blue dots and their connections. The digital overwriting on the image represents

> Fibonacci numbers and their relationship to nature's patterns, such as found in a Chamomile flower (although it looks more like a sunflower to me). Explaining through words (diachronic) may lose someone depending on many factors (e.g. auditory skills, auditory processing, language known, etc.) yet the image with the blue overwriting is a synchronic, gestalt of how Fibonacci numbers "work." (Site of production; Compositional modality)

The screenshot that captured the giraffes depicting hereditary gene selection (AArtifact 3) offers this insight regarding the site of the image and its technological modality:

> Visual effects? Yes – there are loads of them within the animation – yet I am only looking at the screenshot. The giraffes are looking in various directions and angles, with different heights…I read this as personalities and the various heights of the animals also speak to diversity (which is a sub-theme throughout the content created). Yet there is similarity in the black and white spots, and their curious faces, looking at the viewer. The use of the coloured outlines provides visual emphasis. So these are subtle design choices that shape the experience of looking at the giraffes. (Site of image itself; Technological modality)

Artifact 4 (interrogations lead to the following reflections:

> Who? When? Who for? Why? The hired animators co-created this image from the one I emailed to them in November of 2020. I sent them the image because I felt we needed a graphical advanced organizer to help provide a conceptual map of the discipline areas and major topics covered in the animation. Labelling the parts (as one does in a science illustration) helped to ensure all concepts were acknowledged at the beginning of the animation. Without this conceptual framing, that is returned to at the end through metaphorical book ending, the interlocking pieces may have been lost to STEM entry-level high school students. For teachers it also helps them understand how the animation unfolds (a visual metaphor embedded in the flower opening up). (Site of production; Social modality)

Additionally, Artifact 4 generated imaginative thinking:

> How interpreted? By whom? Why? When I first saw this transdisciplinary flower image, I smiled. I imagined myself as a high school viewer, a grade 10 girl having this animation shown to me in math or Science 10 (Biology) class and felt "at home". I could "get" this complex interlocking pieces and even begin to make friends with a high-level concept such as genetic algorithms. I could also imagine myself using this animation as a teacher, and that in watching my students view the animation, the majority of them, would be more engaged than usual – perhaps chuckling at the giraffes necks changing. I imagined that I could see students processing, really thinking about what the animation explains. And maybe even students asking to watch it again, because they got some of it but not all of it and that they wanted to get it all. That the flower image helped them dive into some complex ideas, and that the flower invited them all – male and female, STEM kids and non, to think differently about this very gendered, technical concept of genetic algorithms. (Site of audiencing; Social modality)

Transdisciplinary curriculum content requires the integration of nesting complex ideas into accessible convergences of disciplinary knowledge represented anew. From the interrogations above, the artifacts spoke to the role of gestalt thinking as a means of representing such integration. This first thread flows into the observation of complexity unfolding over the months of the project.

Thread Two: Complexity Processes

The second thread uncovered through the interrogations resonates with the observation that processes to deal with complexity emerge over time (Klein, 2018; Senge, 1994). Artifact 1, which I drew early in the project, speaks to my initial thinking of co-creating transdisciplinary open educational resources:

> Who? When? Who for? Why? As the pedagogy lead for the project, I felt it necessary to enable bringing together all of the parts that ordinarily would not be braided together. Perhaps bi-disciplinary, or interdisciplinary but encountering transdisciplinary thinking and then deciphering it to make it intelligible into something unique and beyond the sum of the parts was my intention. In effect, I wanted to share it with the design team to say, "hey – this is somewhat where we are headed". I felt a bit overwhelmed by the concepts involved (computational thinking especially) yet I knew that sketching out my ideas would help me understand what my colleagues were saying and would be a means to check our understandings. I made this sketch early in the project, late August. I made it firstly for myself, then when it seemed to summarize conceptually (at least in a rudimentary way) the project, I did share it with the design team. (Site of production; Social modality)

Artifact 1 also reveals that this initial sketch lingered in my mind well past its initial creation. This lingering speaks to changes and revisiting initial understandings of transdisciplinary complexity.

> Visual effects? I have thought about the image at different times in the project. The concept of the interlocking pieces – whole yet separate. I have also thought about what a big task it was to take these pieces/disciplines/threads and to create something beyond those pieces. About how this task involved hours of work that I did not see or know about through the efforts of my colleague … and her shepherding the computing aspects. She is a transdisciplinary thinker – and will state gestalt insights. I noticed this early on in the project – a higher octave of how scientific thinking is often generated. (Site of the image; Technological modality).

Artifact 2 has a long and complicated provenance as an openly licensed image first uploaded to Wikimedia. Because of attribution practices, one can trace out who has used this openly licensed image and at the time of my interrogating this image, there were four file usages within the English Wikipedia. For global file usage, 12 different Wikipedia sites (all non-English) attributed using this derived image.

> Visual meanings: The technological and social practices conflate here with the following information from the Wikipedia data that documents where and by whom this image has been used. This chain of reuse, revision, and remix speaks to participatory technologies conflating with convergence practices and the open practices of CC licensed images. Unlike a conventional educational image this image has a wild ride of possibilities. The file contributor, Alvesgaspar, likely did not anticipate how his image would be shared out.

(Site of the image; Social modality)

Additionally, I traced back where this Fibonacci chamomile came from (see Figure 6) as part of the site of the image itself and its compositional modality.

> Composition? This is a manipulated digital image. Computer software enables this degree of graphic imaging without having training in the graphic arts and illustration. It is tightly cropped from the original Mother and Daughter image that is shared on the Wikimedia commons site (e.g., a media file repository where the learning objects of photos, images, etc. are held from which Wikipedia draws upon to make its entries). From this tracing back to the original image, one can see that it is a chamomile, not a sunflower. (Site of the image; Compositional modality)

Figure 6

Screenshot of Mother and daughter.jpg

Note. From *Mother and daughter* by Wikimedia, 2007. Licensed CC-BY 2.5.

Change over time was a constant element from the genesis of the transdisciplinary idea behind the project. Through sketches, conversations, scripting, storyboarding, and numerous iterations through consultations with the animators, the images proliferated and required modifications. Artifact 3 speaks to these ongoing changes in the site of circulation and compositionality questions.

> This [giraffe] image is the iteration of numerous meetings with the animators and the design team. Through the process of content and story refinement this screenshot is a more layered image than the one initially created by … . Similar to the interlocking circle pieces this image still has its roots in its original inception. (Site of circulation; Compositional mode)

As part of the final product, Artifact 4 indicates the provenance of visual changes over time. Although at the end, the image circles back to the initial stages of the project.

> Organized by who or what? Why? The animators took my sketch, our comments through the iterative feedback processes and applied them to create this graphic organizer. Like an aerial view, this image provides waypoints for understanding how these different disciplines relate to each other for the purposes of our project. Again, this image is part of the animation on the Callysto YouTube channel. (Site of circulation; Social modality)
>
> How changed? From a sketch, to a digital file, to a email attachment, to a download, to upload into graphic software, then used in animation software that was then exported to Youtube. (along with several uploads to animation sharing/viewing for design team review). (Site of circulation; Compositional modality)
>
> How circulated? During the creation stages, the image was circulated within our small group of users. Even the larger, consulting faculty were not included as it would have slowed the process down and potentially derailed the project. Once finalized this is when the image has a larger circulation. I selected it for the image to accompany the BOLT blog post as I thought it summarized the transdisciplinary nature of the project in an accessible and visually attractive manner. *(*Site of circulation; Technological modality)

Through the questions and answers, these four visual artifacts trace out the layers of changes that were part of the processes of handling complexity and complex curriculum ideas. The artifacts indicate personal changes, changes within our design team, and how complex changes reach out into the interconnected, digital, and global provenance of an openly licensed image.

Thread Three: Open Pedagogy

The third theme of the artifact interrogation resonates with co-designing transdisciplinary content integrated with attributes of open pedagogy (Hegarty, 2015; Klein, 2018), especially the roles of people, openness and trust; creativity and innovation; participatory technologies; and reflective practice. The interrogation of the Artifact 1 artifact communicates the following:

> Organized by who or what? Why? I drew the image in my notebook. Took a photo of it on my cell phone, emailed it to my work email account. Then I save it on my laptop. I then distributed it to the design team for checking of what I was thinking was correct, and that it roughly conceptualized the concept for the project, as well as indicating pragmatics with the time allotments for study. As a project group, we had no experience working together, and didn't really know each other. In sharing the image by email I wanted to check understanding, so I could support pedagogical aspects related to my role. Additionally, I wanted to model my trust in their ability to correct me if I was wrong – which was also an act of vulnerability on my side. Earlier in the project, the initial project manager quit the project because he took offense to my adding content to his powerpoint. From my lived experiences of collaboration, making changes is part of the process, however for this individual with a math/computing and strong military background he took offense to my suggestions (I actually thought he wanted feedback). I felt that I needed to not have that occur again – we never really talked through this change in personnel, and … stepped forward to fill the gap. I am glad she did. Later, in late 2020 I emailed it to …, the animators. I felt that they were also struggling a bit with the dense content and how to bring together these disciplines. As artists, math didn't

> seem like their natural sweet spot. I also emailed it to them because I thought it might help them understand conceptually (gestalt) what the diachronic, discipline-based content that dominated the storyboards was all about. Essentially a map of how the pieces interlocked into a broader, more abstract story. My email to them was around this very kind of thinking. I was surprised how they took this initial diagram and changed it. (Site of circulation; Technological modality)

Artifact 2 interrogations revolve around the role of creativity and innovation.

> How interpreted? By whom? Why? This image is interpreted in various ways. I can only speak to my own self-study position. I interpreted it as a means to point to some of the complex relationships between mathematical and theoretical biology as I was searching the Internet for more information about the relationship between math modelling and biology when I discovered this image. It reminded me of my sunflowers that I love to grow for the birds. It also spoke to beauty within math, and biology – part of STEAM. (Site of audiencing; Social modality)
>
> Viewing positions offered? Relation to other texts? This image was not a major part of our overall project but it does reinforce the manner in which meaning-making through images can be enhanced by "writing over" – which is of course what illustrations are all about. (Site of audiencing; Compositional modality)
>
> How displayed? Where? It was displayed firstly on the Wikipedia page(s), the entry and then when you go to download another location. It was inserted as an image file into the google slides that I created for the panel presentation, which the recording is now on the … website. So a chain of reuse happening, with different audiences and therefore different audiencing occurring. (Site of audiencing; Technological modality)

These responses to the revised and remixed image (Artifact 2) highlights the string of creative choices over time that an openly licensed and shared image may provide. These choices change with each user and need.

Artifact 3 also speaks to creativity and the possibilities of participatory technologies adding to the provenance of an OER:

> Although the animation is on YouTube the pedagogical and transdisciplinary purposes point to several other digital sites, and then also to individual classrooms. With the licenses further reuse and revision, and even remixing is possible – yet difficult to determine. The producers (us) designed with the hope of reuse, etc. but with the dense content involved, revision may be the first forms of converging OEP with the content. (Site of audiencing; Technological modality)

Artifact 4 also generated responses of participation and creative extensions spring boarding from the animation, especially through the genetic algorithm flower:

> Audiences developing other meanings by producing their own materials, from what they see (makes me think of the work of Jenkins and Rose, 2016, p. 41) Potentially, I can see students using this flower image to make notes about the animation – so reworking it into a mindmap of sorts. I can see teachers printing it off as a poster within a high school

> computer lab – to provide visual interest but to also highlight how transdisciplinary thinking is part of computational understanding. With the CC licenses, teachers and students are able to make numerous revisions and remixes to this OER. (Site of audiencing – Technological modality)

Taken together, the four artifacts and the application of the critical visual framework provides a process for directed and comprehensive self-reflection, one of the attributes of open pedagogy. The questions interrogate, probe, and provide different points of examination as a stand-in for critical friends.

Discussion

The act of reflective practice and self-study research through the interrogation of visual artifacts has fostered a different form of reflection beyond what purposeful questions answered through the diachronic processes of typing answers would have produced. The critical visual framework with its sites and modes guided this self-study research to carefully consider the role of the visual within the transdisciplinary development of the Form and Function(s) OER project and its open assets.

Complex ideas require a means of communicating these ideas. Because of their time-sequenced, diachronic format, words, whether spoken or written, have a telegraphic aspect to them (McLuhan & McLuhan, 1992). In contrast, an image is synchronic and holistic. Visual thinking involves the gestalt rather than the analytic mind associated with modern Western and scientific epistemological thinking (Zwicky, 2019). Visual thinking is part of gestalt comprehension which “involves the spontaneous perception of structure: not analytic order – one brick stacked on another – but what might be called resonant internal relations” (Zwicky, 2019, p. 19). Additionally, in the age of digital images and open licenses, the lineage of an image becomes slippery and easily bifurcates (e.g., digital modifications). As demonstrated through the interrogations, the four artifacts each hold a gestalt and such thinking was part of the Form and Function(s) OER project from inception to its final upload. These gestalts resonate with internal relations and, as the modalities indicated, numerous technological, compositional, and social external relations. In sum, gestalt thinking of various reverberations highlighted and informed STEAM processes and the culminating OER.

In symbiotic relationship with the synchronic comprehension ran the processes to deal with both the complexity of the curriculum content and of the manifestation of the OER. These processes emerged over time with co-operation evolving into collaboration. Co-operation enabled ebbs and flows of collaboration which “assumes a high degree of joint attention, communication, interaction, mutual engagement, and co-elaboration of knowledge” (Klein, 2018, p. 15). From the artifacts and questions regarding the social modality, one can notice collective learning occurring (McMurtry, 2013). From the sketch (Artifact 1) to the final animation flower (Artifact 4) one can see the exchange of ideas and the changes over time, format, and medium. The interaction and mutual engagement in the aim to make complex transdisciplinary ideas accessible involved a steady investment of co-elaborating disciplinary knowledge into something more, something transdisciplinary. Such collective learning is one experiential outcome of this transdisciplinary and STEAM project.

The eight attributes of open pedagogy were clearly discernible through the artifact interrogations with them overlapping or reinforcing each other. As the responses to the sites and modalities showed, these attributes work together, articulate from, and are energized by participatory

technologies. These layers of experiences hold different characteristics and even educators aware of OER may not fully recognize how their choices and practices correspond to these attributes.

As with all self-study research, there are limitations of relevance and rigour. To this end, a clear theoretical positioning within emerging OER transdisciplinary co-creation projects has been applied, as this lack has been identified as a weakness by Vanassche and Kelchtermans (2015). To support research thoroughness, the critical visual methodology of interrogating artifacts is repeatable and would be further strengthened with dialogue among typical critical friends. Through the questionings, a deeper understanding of transdisciplinary thinking and open pedagogy evolved which will inform my teaching of graduate students, and readers of this research may note similarities of experiences or learn from my exploration. If so, this fits with the aim of self-study research: to share insights gained from reflective practices. Although this purpose was first stated in the early 2000s (Loughran, 2004), it now resonates with the growth of open pedagogy, demonstrates a linkage to the roots of openness (Bozkurt, 2019), and expands educational research. Through the use of this self-study other open or transdisciplinary methods, educators may recognize and examine their own pedagogical possibilities.

Recommendations for Future Research

Due to the short timeline of the project, the effects of the COVID-19 pandemic upon all levels of education, and the trust required for collaborative self-study, visual artifacts were solely interrogated as things that can be interviewed and that speak (Adams & Thompson, 2016). To further the extension of this visual document analysis would be to include members of the Form and Function(s) OER project design team in a larger self-study research project. Now that the level of trust has been established among primarily quantitative researchers, a qualitative and more intimate inquiry is possible and would contribute further to the understanding of what necessitates transdisciplinary OER development.

Conclusion

This small study contributes toward Dewey's "warranted assertions" rather than "knowledge" claims (Morgan, 2014). Additionally, it builds understanding that involves

> a series of delicate adjustments by which new insights are weighed against one another. A conclusion is deemed acceptable…through a host of sources of evidence (much of which may not precisely 'match up' but paint a telling picture) which include findings, statements and observations. (Boix Mansilla, 2017, p. 8)

Visual artifacts as part of an educator's self-study trajectory enabled this research to explore aspects of TD as part of co-created OER and open pedagogy. Through the interrogations and the visual artifacts, a telling and complex picture of reasonable assertions have been sketched out for those who pursue comparable transdisciplinary OER and open pedagogy projects.

Author's Contributions

Connie Blomgren completed all of the data collection, analysis, and writing in this piece of original research as part of the Form and Function(s) OER project.

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Ethics Statement

An ethics review was not applicable.

Conflict of Interest

The author does not declare any conflict of interest.

Data Availability Statement

The encrypted data resides with the author. Access to the data is possible through an email request.

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OTESSA's Submission for the Government of Canada's Federal Pre-Budget Consultations

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Abstract

Governments have the opportunity to influence policy in education and to facilitate funding to support its implementation. This document contains seven recommendations made to the Government of Canada as part of its public consultation in developing its federal budget. It was developed with input from both members and public contributors involved with the Open/Technology in Education, Society, and Scholarship Association (OTESSA), then submitted to the Canadian federal government in August of 2021. The document was originally posted on a blog post on the OTESSA website at https://otessa.org

Keywords: open education, open educational resources, educational technology, online learning, e-learning, blended learning, economic recovery, K12 education, higher education, educational change, Canada, federal government, budget submission, advocacy, leadership

Overview of Recommendations

- **Recommendation 1:** That the government provide $100,000 annually:
    - to convene an expert panel to support evidence-informed decision-making at the federal level in relation to digital, online and open teaching, learning, and scholarship, spanning post-secondary, K12, workplace, and informal learning as it pertains to equality, diversity, inclusion, employment, and business and social development.
    - to support a pan-Canadian collaboration to network researchers, research funding bodies, and institutional support associations with the federal expert panel in educational technology, with attention to digital, online, and open education and scholarship
- **Recommendation 2:** That the government provide $300 million annually for provincial/territorial funding envelopes to support research excellence in digital/online/open teaching, learning, and scholarship for the K-20 and workplace sector, similar to provincial health research.
- **Recommendation 3**: That the government provide $25 million annually to support cutting-edge research in educational technology, with a focus on digital, online, and open education and scholarship by way of Tri-Council funding for research grants, graduate scholarships, and business development projects.
- **Recommendation 4**: That the government provide $20 million to create Digital Learning Leadership Chairs (teaching and service leadership to create capacity within sectors) and Digital Learning Research Chairs (creating capacity for research).
- **Recommendation 5:** That the government provide $10 million to create or maintain existing provincial digital/online/open learning non-profit associations for both K12 and post-secondary to provide supports for institutions as they adopt and evolve their teaching and learning practices based on evidence-informed knowledge created by research.
- **Recommendation 6:** That the government provide $50 million to create essential open educational resource infrastructure to support sharing and open learning culture for K12, post-secondary, and workplace learning.
- **Recommendation 7:** That the government provide $250,000 for start-up to support OTESSA in supporting its growing community and developing a certifying process for post-secondary learning designers, post-secondary online instructors, and for K12 teachers.

Recommendation Descriptions

Recommendation 1: Convene an Expert Panel and Establish a Pan-Canadian Collaboration Network in Digital, Online, and Open Education

Canada and its provinces and territories lack an integrated approach to the advancement of digital, online, and open teaching, learning, and scholarship, both to support public good as well as socially responsible corporate development. To address inequities within and between institutions and provinces/territories, a federally-convened panel could pool expertise from educational institutions and related associations. Our institutional and governmental roles have typically comprised education or CIO/IT positions, yet educational technology with expertise in digital, networked, and open education and scholarship is a specialized area, requiring digital, networked, and open literacies, a strong IT background, and robust pedagogical knowledge. Canada and its provinces need advisors from our field to help navigate the way forward for public good, government strategy to build flexible educational systems to address equity and human rights, and also to build nimble educational systems amidst emerging and ongoing crises (e.g., COVID-19, climate crisis, etc.). We are not realizing Canada's full participation in a global educational technology market, which is expanding rapidly. Venture capital investment in EdTech is up 2x on 2018 at $16 billion in 2020 (HolonIQ, 2021). This market

- has an estimated global worth of 90 billion USD and expecting a compound annual growth rate of 19.9% from 2021 to 2028 (Grand View Research, 2021) while
- is expected to be a $7 trillion USD industry by 2025 (HolonIQ, 2021)
- is expected to add an additional 2 billion more learners for upskilling between now and 2050 (HolonIQ, 2021)

In BC alone, educational services make up 5.2% of BC's GDP (Statista, 2021). Total US govt expenditures on education in 2019 (all levels of education and all levels of government was 1,021 billion or 4.8% of GDP of government spending alone with combined spending with government and private being 6.3% of GDP (Federal Reserve Bank Economic Database, 2019, 2020). Much of this investment is driven by a realization that education is a huge market that is grossly under-digitized and is starved of capital compared with other sectors. Significantly, China is a key driver of growth in VC investment making up 60%+ of all Global VC in 2020 (HolonIQ, 2021). HolonIQ further cautions that the "devil is in the details when it comes to education. **Education is a complex system. … it pays to understand the nuance**."

This panel and collaboration network can position Canada to play a significant role in this global market. Recommendations from this panel, for instance, may help Canada and its institutions understand the nuance. Some of the educational technology market belongs to socially responsible corporations; however, others are not, and we need to critically examine the role of private companies in the ecosystem of teaching, learning, and scholarship, especially with regard to data ownership, control, intellectual property, and data rights. Furthermore, some of that market is expenditures by the federal and provincial governments by way of educational institutions and libraries, where it is in the best interest of the Canadian taxpayer or their government to reduce ongoing for-profit corporate expenditures by investing in open infrastructure and open research, teaching, learning, and scholarship as supported by UNESCO recommendations (UNESCO, 2019). It is also important to note that educational technology spending and investment estimates is a primitive cut at economic impact, as it does not take

into account: reduced unemployment rates, higher labour force participation rates, externalities on communities that is not captured in GDP (e.g., impact of education on pollution, crime rates, creativity and art, vaccination rates, etc.), and increased productivity (J. Luke, economics professor, personal communication, August 4, 2021).

Overall, we believe Canada has a strong potential to provide leadership in the areas of socially responsible, educational technology market participation, government savings with investment in open access initiatives for education and scholarship, and ethical national and international policies and regulatory frameworks, which guide and steer post-digital teaching, learning, research, and education business models for the public good. We recommend the government:

- Convene a panel of Canada's most experienced online/open education researchers and professionals to advise on, and potentially assist with, decisions regarding research and evaluation, critical digital pedagogy, capacity-building, partnerships, strategy and business development, infrastructure for access to education for rural and remote areas or learners facing socioeconomic barriers, and policy and legislation. OTESSA would be happy to serve as or contribute to this panel.

- Establish a federal digital education officer as a chair of the panel. We have experienced a health crisis and worked collaboratively due in part to our government's efforts and that of our federal health officer. Education is a major sector impacting all areas, from employment, economic well-being, climate change, social development, health, etc. This role can oversee deliverables and ensure that all Canadians are equally supported in their ability to access quality education.

- Establish a pan-Canadian collaboration to network the federal expert panel, researchers, funding bodies, and institutional support associations. This network will ensure a cross-pollination of ideas, strategies, successes and failures, research collaboration, database development and connectivity of research, institutional, and governmental data, development of policies and legislation, responsible business development, and result in a comparison of regional responses to inform how we conduct education in a post-digital age.

Recommendation 2: Provincial funding envelopes to support research excellence in flexible digital/online/open teaching, learning, and scholarship for the K-20 and workplace sector

The federal government needs to build capacity for research and evaluation of digital, online, and open education and scholarship in Canada's educational institutions (K-20) and the workplace. The amount will vary by province/territory, but should be approximately $30 million on average, with a total funding of $300 million across Canada. Matching arrangements could potentially be set up with provinces/territories. Currently, the health sector receives upwards of $60 million in provincial grants to advance the provincial health sector in B.C. (e.g., Michael Smith Foundation for Health Research), yet neither K12 nor post-secondary sectors receive funds to advance research and innovation into our system and practices to support its adaptation for our current society. This will support flexibility in systems that have faced challenges due to COVID-19, but was required even pre-pandemic. Provincial and institutional leadership requires evidence in order to make appropriate decisions for the benefit of all. We recommend the government:

- Leverage the convened panel to work with federal and provincial staff to identify essential data collection and research needs to support evidence-informed decision and policy making.
- Develop a research network for flexible digital, online, and open education and scholarship with funding support, which advances its research excellence in Canada.
- Task the network with providing strategic guidance on what works, in what contexts, how it works, where inequities exist, and how inequities could be addressed.
- Connect the research network with innovation networks to find socially responsible business opportunities to replace irresponsible ones.

Recommendation 3: Tri-Council SSHRC funding for research in digital, online, and open education and scholarship

We recommend the government under a new specific committee for SSHRC insight funding, to rectify decades of underfunding in educational technology research while also falling into a gap between hard and social sciences, which must be addressed. For example, only 10% of SSHRC doctoral funding goes to Education (generally), and rarely to educational technology or flexible, online, or open education. Only around 1% of SSHRC Insight grants go toward the area of ICT. More targeted funding is needed. Business development initiatives like the Digital Supercluster exclude the low hanging fruit of educational technology expertise and innovations, where educational technology is a multi-billion-dollar, if not trillion-dollar, industry globally.

Recommendation 4: Digital Learning Leadership and Digital Learning Research Chairs

These would operate similar to the Canada Research Chairs program, which has not yet addressed the demand for new knowledge in our field or for capacity-building for developing a society with digital, networked, and open literacies, through new research, new programs/courses, and campus leadership.

Recommendation 5: Provincial Non-Profit Associations to support adoption and implementation of evidence-informed practices in digital, online, and open teaching, learning, and scholarship

Funding for these associations will address inequities between provinces/territories, which then creates inequities among Canadians. Amount to vary by province/territory based on number of students, but approximately $500,000 per K12 and post-secondary association per province/territory on average, totalling $10 million annually. Currently, only a few exist at the post-secondary level only (e.g., BCcampus, eCampusOntario, etc.), but they are impactful.

Recommendation 6: Create and support open infrastructure to develop and share open educational resources and to support open culture

We must develop: essential open infrastructure for teaching and research, OER grants, Open Hubs within institutions, and increased funding with no start-up delay for Tri-Council scholarly journal funding. This must serve K12, post-secondary, be inclusive of workplace and informal learning, and must establish connected databases between sectors.

Recommendation 7: Support growth of OTESSA community and a certifying process

Start-up funds to support OTESSA will accelerate its operational growth, support its growing community, and develop a certifying process for post-secondary learning designers, post-secondary online instructors, and for online K12 teachers. Currently, there are no consistent requirements for these roles and they should be filled with highly qualified personnel in digital, online, and open education per explicit standards.

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OTESSA JOURNAL

Building Bridges and Breaking Barriers: OER and Active Learning in Mathematics

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Abstract
This article will discuss how open educational resources and instructional technology are used to support student academic success and continuous faculty pedagogical development, as well as reduce barriers to access at an R1 university. This article uses case examples from two instructors from a Mathematics and Computational Sciences department who are using open educational resources and instructional technology as part of an inclusive active learning pedagogy. The first case study is from an integral calculus course and the second case study is from a discrete mathematics course. The article highlights the role of the educational developer in providing pedagogical and technological support to the faculty. The support the educational developer provides is framed by an inclusive pedagogy that foregrounds access and accessibility. Future considerations provided in the article highlight the need for connections and collaborations supported through a Teaching and Learning Collaboration with an emphasis on active learning, classroom training, and open educational resources to create more pedagogically comprehensive and inclusive learning environments.

Keywords: active learning, open educational resources, barriers, community, teaching and learning

Introduction

This collaborative article is an exploration of how open educational resources and technology can be used to support student academic success and continuous faculty pedagogical development. In its presentation and content, the article models the building of bridges and the importance of addressing and reducing pedagogical barriers in the authors' pedagogical theory and praxis. Through two case studies from instructors affiliated with a Mathematics and Computational Sciences department at an R1 university, the authors explore how open educational resources and technology are an integral part of an inclusive active learning pedagogy. The first case study is from an integral calculus course and the second case study is from a discrete mathematics course. We expand on the open educational resources and the active learning strategies used in the courses to discuss how educational developers can provide both pedagogical and instructional tool support for faculty that enhances community building. If the support the educational developer provides is framed by inclusive pedagogy, as demonstrated in this article, there is a foregrounding of access and accessibility that can build bridges between departments and courses as well as address barriers commonly found in courses: barriers that tend to impede student success. By highlighting the connections and collaborations supported through a Teaching and Learning Collaboration community at the R1 university, with emphasis on active learning classrooms and training as well as open educational resources embedded in courses, this article provides an approach to creating a pedagogically comprehensive and inclusive learning environment that is evidence based.

The first case study highlights active learning strategies and open educational resources used in an integral calculus course, where instruction was conducted across interconnected smart classrooms, with a single professor, eight teaching assistants, and over three hundred undergraduate students. This case study demonstrates how to leverage a unique infrastructure so that all classrooms of students are actively engaged as a single learning community, and how to enable students across all classrooms to construct a community knowledge base that serves as a resource for subsequent learning activities. This case study models a bridging of knowledge using active learning patterns that take advantage of the affordances of the synchronous smart classroom. Theoretically, these classrooms are guided by the Knowledge Community and Inquiry (KCI) model (Slotta & Najafi, 2013), and the case used several open technology tools and environments, including Rain Classroom, GeoGebra, Desmos, and Padlet, to facilitate the active learning activities.

The second case study expands on strategies used in a discrete mathematics course at an R1 university. For the past several years, the method of course delivery for the discrete math course had been a traditional lecture model. In the fall 2019 semester, this discrete math course was taught in an Active Learning Classroom (ALC) in a new building at the R1 university. A flipped classroom method was used to deliver the course: presentations of definitions and basic examples were provided as pre-class material that students review before coming to class, then students would form collaborative teams and engage actively with the material during the scheduled class time through solving problems and working on various activities in the classroom.

The first author, an educational developer at the R1 university, works with faculty, sessional lecturers, postdoctoral fellows, and teaching assistants to find theoretical and practical resources that will best fit the pedagogical goals of the courses they teach, while consistently putting access and accessibility to the forefront. In the first case study, the educational

developer used the important outcomes from the use of open-educational resources and active learning pedagogy to advocate for the integration of these tools in other courses in the math department, and other courses that have a need for visual interpretations of math, such as geography. This encourages active learning that is supported by evidence-informed pedagogy and educational tool literacy to ensure student access to authentic academic experiences. In the second case study, the educational developer provided support in the form of instructor and teaching assistant training in the active learning classroom as well as consultations for activity ideas, lesson plans, and ways to foster inclusivity and accessibility in this new classroom environment. By prioritizing accessibility, the educational developer or those in similar roles at other institutions (which fall under role titles such as faculty developers, academic developers, and instructional designers) can provide a holistic guiding vision for inclusive pedagogy on campus.

Review of Literature

Active learning is characterized as a pedagogical approach in which students are involved in activities in the classroom (e.g., writing, problem-solving, peer discussions) other than passive listening and note-taking, where the classroom is used for student skill development instead of instructor-student transmission of information (Bonwell & Eison, 1991). It has been shown that incorporating elements of active learning in STEM courses leads to better student performance when compared to traditional lecturing (Freeman et al., 2014; Laursen et al., 2014; Lo et al., 2017), even when students may perceive the opposite (Deslauriers et al., 2019). Moreover, there is evidence that active-learning methods reduce racial (Carter et al., 2018) and gender (Laursen et al., 2014) gaps in student performance.

This definition of active learning as “anything that isn’t passive learning” is quite expansive and subsumes teaching methods of many different varieties; for instance, *collaborative learning*, *cooperative learning*, and *problem-based learning* can all be characterized as having components of active learning in their respective methodologies (Prince, 2004). The case studies in this paper use the *Knowledge Community and Inquiry* and *flipped classroom* methods, and we explicate their characteristics here.

Knowledge Community and Inquiry

In recent years, a learning-community approach has been developed (Scardamalia & Bereiter, 1996) in education. Senge (1990) defined learning organizations as “organizations where people continually expand the capacity to produce the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspirations are set free, and where people are continually learning how to learn” (p. 3). A learning community, similar to a learning organization, fosters an environment where people can learn to learn together, advancing collective knowledge and supporting the growth of individual knowledge. This learning community approach is applicable to the learning done by students in the R1 university, but also by the community of faculty and instructors that become part of a teaching and learning collaborative.

Guided discovery (Brown, 1994), where the instructor plays the role of facilitator, guiding the student's learning journey, is effective when student interactions and inquiry processes are assessed in a timely fashion and the instructor has an awareness of when to intervene. The instructor plays a critical role in this model, as they must guide the discovery process into forms of inquiry that may not be otherwise reached.

In order to bridge the perspectives of knowledge building (Scardamalia, 2002) and foster a community of learners (Brown, 1997), a pedagogical model known as Knowledge Community and Inquiry (KCI; Slotta & Najafi, 2013) was designed. The KCI model emphasizes community epistemology and knowledge construction, and places importance on the designed sequence of student's activities. In this model, the learner community comes together and collectively constructs a knowledge base. The learning outcomes are assessed constantly and are aligned with learning goals. The teacher's role includes guiding the flow or sequence of activities, assessing student's progress, and giving feedback. KCI always starts from assessable learning outcomes with collaborative and scaffolded inquiry activities producing these outcomes.

The Flipped Classroom Model

The *flipped classroom* is an active learning approach where students are introduced to basic definitions and examples in pre-class material (usually in the form of videos or readings), and in-class time is used to engage with material more meaningfully through formative activities such as group problem-solving, think-pair-share, and the use of clickers (Jungić et al., 2015; Love et al., 2014). This strategy is motivated by the idea that bringing the more difficult parts of the course inside the classroom where the instructor is available for assistance will lead to better student learning, as opposed to covering foundational material in lectures and letting students struggle with higher-level concepts on their own (Love et al., 2014).

A more recent meta-analysis of comparative studies on flipped classrooms found a "statistically significant effect size in favour of the flipped classroom instructional strategy" (Cheng et al., 2019, p. 793), though we note that there are also studies that report neutral effects on student learning (e.g., Guerrero et al., 2015; Yong et al., 2015). Another study (Zack et al., 2015) determined that preferences of students in a flipped finite mathematics course shifted away from the flipped model in favour of the traditional model, but also

> when asked what was most beneficial about the videos, many students highlighted that they could easily stop, rewind, and/or pause the videos while watching them and taking notes. Students also frequently mentioned the benefit of being able to go back later to reference the videos when studying for an exam. (p. 806)

Cheng et al. (2019) in their meta-analysis of flipped classroom studies, saw a general lack of detail about their implementation in the instructor's courses, specifically concerning pedagogies of learning and instructional strategies. This suggests the need for a more robust Scholarship of Teaching and Learning (SoTL) framework in flipped classroom use and theory in higher education.

Traditional lecture halls with a fixed podium in front, and immovable tables or seats, which may be less open to flipped classroom activities, are remnants of attempts to emulate the efficiency of mass factory production in education (Bransford et al., 2000; Park and Choi, 2014). With recent advancements in technology, many institutions of higher education are adapting their educational spaces to better accommodate active-learning pedagogies (Johnson et al., 2019; Park and Choi, 2014), including the R1 university where the authors work.

Active Learning and Open Educational Resources

Open educational resources (OER) are also increasingly part of active learning in mathematics. OER is a term that was first coined at a UNESCO forum on open courseware in 2002 and refer to "teaching, learning and research materials in any medium—digital or otherwise—that reside

in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions" (UNESCO, 2019). Ahn and Edwin (2018) suggested an open source platform to increase the social constructivist pedagogical frame for teaching mathematics, and this use of open source e-learning tools can also help support student success (Akugizibwe & Ahn, 2020). Not every department or institution is ready to adopt these open educational resources however, because as Masterman (2016) addressed, the challenges of bringing Open Educational Resource practices to research intensive universities is particularly difficult. Contact North (n.d.) created a resource to help dispel the myths about OERs by focusing on the facts about OER use. Similar to work by Jung at el. (2017) on open textbook adoption, Masterman (2016) showed the tension with a presentation of quality in relation to research models at R1 universities. The reinforcement of the role of inclusive pedagogy and student accessibility, alongside rigorous scholarly approaches to open resource creation are often the best incentive for faculty adoption in the face of concerns over quality. Recent pivoting to a remote delivery due to COVID-19 has yet to determine how much an increase in OER use will occur in research-intensive universities, but the ease of access, quality of the product, and ability to be made context specific, is important in a distance-learning environment. Chiorescu (2017) echoed the financial savings for students, especially in relation to mathematics textbooks, and thus the ability to support student success.

Educational Developers and Similar Roles as Supporting Faculty

The educational developer role may be named differently at many institutions in terms of scope and administrative placement. For example, much of what the educational developer does in their role can overlap with instructional designers and instructional technologists. The name of the role may also differ based on geographical location, where in the United States educational developers are called faculty developers, and in the UK they are called academic developers. From the development of faculty support roles, there has often been overlap in terms of scope of the role with technology services and with career training (Wilcox, 1998). Studies indicate that one of the roles of educational developers is to show the connection between theory and praxis and this is especially true in STEM fields in terms of pedagogy. Mulnix (2016) showed that discipline-based educational research (DBER) has importance for both faculty and student success: “an understanding of the learning principles that are the foundation for alternative teaching and learning strategies can help faculty members develop the ability to transfer knowledge to their own circumstances” (p. 7) and as such, an educational developer can provide access to these DBER resources and supplement how these resources are applied to the instructor’s particular field. This is also supported by Kennedy’s substantial study that suggested the need to align professional development models and research models (2016).

This modeling is an important part of inclusive pedagogy and bridging relationships in higher education. Jenkins (1996) argued that educational developer expertise and faculty’s subject matter knowledge work together to create success for students and ultimately allow for professional development in the instructor’s career. Jenkins outlined the many intersections of faculty and educational developer roles including SoTL research and training of teaching assistants.

Content knowledge as well as pedagogical knowledge is of equal importance for Teaching Assistants (TAs) who are starting their academic career and need both of these knowledge points as foundation. Judson and Leingang’s (2016) study demonstrated the importance of both content knowledge as well as pedagogical knowledge for TAs. Thus, TAs need to have the

support of a teaching community and educational developers as well along with their departmental community. Top et al. (2018), also echoed the importance of relating STEM content to the assistant's pedagogical training if it is to be effective and successful for student support.

Critical Pedagogy, Reflection, and Faculty Peer Dialogue

Bond (2016) suggested the use of online professional learning communities can support math pedagogues with their praxis and identify gaps in pedagogical strategy and instructional technology use. This colleague community dialogue can be taken offline as well (García-Martinez et al., 2018) which also underscores how leadership in mathematical departments and institutions is integral to supporting pedagogical development for instructors and in turn helps foster student success. Work by Tinnell et al. (2019) underscored the importance of faculty peer dialogue, especially to support pedagogical change and innovation in STEM programs, where a community of like-minded scholars that are part of a community of practice or a pedagogical study group can expand institutional pedagogical and curricular quality and mental wellness in the workplace which we will return to in our discussion.

Design and Implementation of Pedagogical Practice Case Studies

Case 1: Calculus and Learning Community

Knowledge Community and Inquiry

In the fall semester of 2019, the second author led the development of 27 lesson plans spanning 16 weeks using a learning community pedagogy for a Calculus II course. This course was offered in a public university in China, and taught by one professor, facilitated by a group of eight TAs. Students occupied seven connected smart classrooms while attending lectures. Each classroom has around 35 students sitting in groups, and was equipped with cameras, WiFi, and overhead projectors. The instructor's lecture was recorded and live streamed to all classrooms. A communication platform called Rain Classroom was used to host students' discussions and allow groups to share their work. Rain Classroom was specially designed to be used in a blended learning environment and it allows students to interact with their teachers and peers in class and out of class using their smartphones. It also provides real-time and personalized analysis of students' class performance.

The professor usually stayed in one of these classrooms while teaching, and students in other classrooms could watch the professor via live streaming. When designing in-class activities, the main goal was to foster a strong culture of learning community among students, and encourage student interactions when they were working through given assignments in small groups. These activities can be categorized into one of the following four patterns; a table of examples from each pattern can be found in Appendix A.

- Peer Instruction (PI): The instructor would post a clicker question to the community and invited students to share their answers and reasons before showing the response distributions. Once students had the chance to hear from peers, they were asked to vote again on the same question for the second round, then the instructor would share both responses with the whole community. By doing this, we could leverage peer instruction and see to what extent it impacted the community learning.
- Community Supported Worksheet (CSW): Students received two worksheets as part of this activity. First, was a basic worksheet provided with the assumption that students would have the skills and knowledge to solve all the questions on it. This worksheet was

then followed by a more challenging worksheet for those who are at a different knowledge and skill level in a differentiated learning model. Students who were able to complete the first worksheet were then invited to add hints or support for their peers.

- Community Problem Creation (CPC): All students were invited to create clicker questions after class, and they would cast votes for the best ones. The whole community would then work together in class on the popular ones and these questions would be used by the instructor later in the course. This activity gives students the opportunity to become course co-creators and reflect on their learning journey, in a social constructivist model.
- Participatory Problems or Patterns (PPP): In this activity, classes worked together to embody a mathematical concept. Usually there are multiple steps in one activity, and the solutions to early steps are necessary for students to solve the subsequent ones. All groups must work closely with each other in order to find final solutions. Padlet was used for students to share ideas with each other, specifically outlining what they already know and the gaps they identified in their knowledge and skill to solve the whole activity.

Student Epistemological Beliefs

In order to run these activities smoothly, TAs and the instructor must receive proper training ahead of time in order to facilitate student discussions and make sure they are proceeding effectively. The skill sets required to facilitate this sort of instructional framework are quite different from those that are needed for traditional face-to-face lecturing. The second author found that students tend to have a positive attitude about the value of peers and teaching assistants as sources of knowledge after going through activities using this framework. We believe community knowledge is a powerful tool that can be used to improve students' learning experience, to bridge knowledge gaps, and to enhance their ability to communicate mathematical ideas more effectively. This case study is grounded in an inclusive framework where the differentiated learning directly addresses knowledge barriers.

Epistemological beliefs are individuals' conceptions about the nature of knowledge and the nature or process of knowing and are considered important for the learning process (Kampa et al., 2016). Students in this case study were surveyed via questionnaires that were distributed by the teaching assistants along with consent forms. The survey (see Appendix B) focused on their epistemological beliefs at the beginning and end of the semester. A total of 308 students were invited to participate and 220 (71.42%) participants provided both pre- and post-course responses. Of this group, 49 identified as male and 171 identified as female. The course year demographic was 206 in their first year of studies, 12 in their second year of studies, and two were in their third year of studies. Significant gains ($p < 0.001$) on all four major categories were observed: personal relevance and learning preferences ($M = 3.24$, $SD = 0.26$, $t = -6.82$), learning from peers ($M = 3.09$, $SD = 0.41$, $t = -5.48$), teaching and sources of knowledge (M = 3.38, $SD = 0.28$, $t = -6.95$), and engagement ($M = 3.32$, $SD = 0.48$, $t = -6.03$). More details about the implementation of this framework and effects on student engagement can be found in Li et al. (2020).

There are limitations to this case study; specifically, the need for more data on how students work together in a group. The structure of this particular case made it difficult to capture what makes group collaboration successful and more in-depth observation is needed in order to answer this question.

PI, Active Learning Pedagogy, and Instructional Technology

In terms of the support provided by the educational developer for this case work, though this study was conducted in classrooms in China, this model showed a lot of promise for use at the authors' R1 university in Canada, especially in relation to Active Learning Classrooms and support needed for the continued use of open educational tools and resources. Many instructors at the R1 university have already been using a Peer Instruction (PI) model, developed by Mazur (1997), to support active learning in their courses, particularly in the chemistry and physical sciences department. The main purpose of PI is to foster conceptual understanding. Mazur's work on PI emphasizes an active learning model where students are given time to reflect, record, and then convince and revise where necessary. As Vickrey et al. (2015) suggested, there also needs to be attention placed on race and gender, as there seems to be a correlation in the use of PI to these data demographics. Ultimately, in terms of using PI as part of pedagogy that enhances student success, Zhang and Henderson (2016) demonstrated that PI has the ability to increase recall and comprehension, which makes it an excellent model applicable across many disciplines, but in particular for use in STEM.

In addition, there has been success using the instructional technology that was used in this case to support the types of differentiated learning. By setting up a practice of having basic, mid, and higher skill exercise questions, coupled with the use of instructor curated resources and tools (for example, etextbooks, discipline specific open instructional technology such as GeoGebra), students can work together through the levels of difficulty in order to attain mastery of a concept. Dosch and Zidon (2014) performed a study that demonstrated that students in differentiated learning environments increased student performance which is echoed in the case study above.

Case 2: Discrete Mathematics and the Active Learning Classroom

Active Learning Classrooms at the R1 University

In September 2018, the R1 university unofficially opened the doors to a new building on campus, which houses a number of active learning classrooms (ALCs). Early planning for this new space saw a subset of project committee members visiting ALC implementations in a number of Canadian and US universities in order to support the architectural design, technological needs, and pedagogical requirements.

The new ALCs at the R1 institution are designed for a collaborative classroom environment, with flat floors and round tables (or "pods") around the perimeter. Each pod has six rolling chairs, its own microphone that broadcasts through speakers in the ceiling to the rest of the room, whiteboard screens, and a projector with device hookup capabilities that include wireless and HDMI ability. A teaching station is in the center of the room, with a computer and monitors, a document camera, microphones, and a room control system where settings for video/audio sources, lighting, and volume can be set. This also allows the instructor to set content to be displayed on any individual pod and on ceiling-mounted monitors around the room, switching between instructional material and student group outputs. Figure 1 below provides an example of this room.

Faculty delivering courses in these technology-enhanced ALCs are required to attend a training session with educational developers. This campus at the time had one educational developer responsible for this training along with support from the library's instructional technologies team. During the training session provided by the educational developer, the functionalities of the ALC are demonstrated and linked to examples of pedagogical approaches that work well using each

tool and affordance, bridging the gaps between pedagogy and technology. Interactive whiteboards used for the pod display screens mean that students can use digital markers to annotate displayed content but—based on the third author's experience—it is not as responsive and easy to use as using physical markers to annotate.

Flipping the Discrete Mathematics Classroom

The Introduction to Discrete Mathematics course at the R1 university is a second-year course taken by students in the mathematics programs; topics covered include sets and functions, counting principles, graph theory, and elementary number theory. Emphasis is placed on abstraction and proof writing; it is typically seen as a continuation of the first-year introduction to proofs course. The third author taught this course in the ALC in the Fall 2019 term, with a class size of 90 students. Prior to this, the course was delivered in a conventional lecture classroom using a traditional lecture format. Discrete mathematics is well-suited for the exploratory and collaborative style the ALC affords: for instance, many problems in combinatorics have several (sometimes drastically different) solutions that students are able to discover and discuss within their groups. Being able to draw on their own whiteboards allows each group to explore the mathematics themselves, centering learning on the students rather than the instructor.

Figure 1

Active Learning Classroom in R1 University

Note. Photo by Ann Gagné.

Notes were also written for this course and posted on the learning management system (Canvas), giving students a cost-effective and accessible reference as new copies of the previous textbook cost about $150CDN. Each chapter of the course notes ends with a number of practice exercises. Additional exercises were also interspersed among definitions, examples, and theorems to give the notes an active learning component as well. Students were assigned weekly readings from the course notes and were asked to complete a pre-class quiz about

basic definitions and examples before coming to class. These quizzes made up a small component of their grade and were mostly multiple-choice or fill-in-the-blank type questions. The instructor would then review the quiz results to prepare for class and address any identified misconceptions in class after a brief review of topics. These quizzes allowed the instructor to address any barriers to knowledge and to bridge those gaps through specific activities and questions.

The majority of in-class time was used for collaborative problem-solving. Students self-formed into groups when entering the classroom and were given daily worksheets. They were encouraged to be physically active: to stand and brainstorm their solutions to the problems on the whiteboards instead of sitting at their pods. This way, the instructor and TA were able to quickly check on student work from afar and give timelier formative feedback.

At the end of the semester, students completed an exit survey about their experiences with the course. The survey was not anonymous and contained three open-ended questions: (a) what they liked about the ALC and active learning delivery, (b) what they disliked about the ALC and active learning delivery, and (c) a space for them to enter any additional comments.

Many of them found the classes engaging (“less sitting and being talked at”) and liked learning in groups (“everyone has different ideas”). They enjoyed being able to receive immediate feedback on their work, which encouraged them to participate and attempt the given problems, though some reported longer wait times for help, since there was only one additional TA to help out in class. The third author also notes that the ALC setup made it easier to form a community of learning. Students reported being able to make connections in this classroom and continuing these friendships even after the course. Finally, students were less enthused about the technology in the classroom; pod microphones turned on randomly, and the projectors and interactive whiteboard did not always work properly, which suggests that the architecture and the activities that were part of the pedagogy of the course often take priority over instructional technology affordances, especially if the students are not well-trained or versed in using the technology.

Educational Developer Support to Active Learning and Accessibility Considerations

There has sadly not been enough work done on accessibility and the design of active learning classrooms as a physical space as demonstrated by Grier-Reed & Williams-Wengerd (2018), so there are definitely research possibilities on where active-learning spaces, instructional technology, and pedagogy intersect. Buchenot and Roman (2019) have expanded the understanding of what we deem as the affordances of technology. Their case, which moved through different active learning desk arrangements, demonstrates a use case for each type of arrangement in an accessible manner that supports Universal Design for Learning (UDL) principles. UDL principles necessarily intersect with ALC use and ALC assessment and activity design for the ALCs allow for a choice model of pedagogy that supports inclusion. UDL thus becomes a way to bridge the gaps in understanding access.

As mentioned above, support is provided to both instructors and teaching assistants on the pedagogical affordance of the ALC. One of the topics that was highlighted is how to ensure accessibility in course activity and assessment design in the active learning classrooms to address inadvertent physical barriers in the ALC space. Activities such as collaborating on whiteboards, for example, can be made more inclusive and accessible with digital whiteboard

apps or by accessing the whiteboard through their own devices which means students do not physically need to be in front of the board to participate. All of the ALCs at the R1 university are equipped with “bring your own device” wireless connection through the AirMedia app that students can download onto their device.

Another way of ensuring engagement and reducing barriers occurred in the original consultation on the ALC design. The room is designed with *Accessibility for Ontarians with Disability Act* (*AODA*) requirements in mind so students who are wheelchair users can also use the whiteboard by approaching the board. This adds choice to the engagement opportunities and is aligned to Universal Design for Learning principles. The first author, who is the educational developer, advocates and supports ongoing discussions with instructors about accessibility and inclusivity in the ALCs and in the assessment pedagogy and assessment design used in the rooms. There are many ways to make activities more inclusive in these ALC spaces using open educational resources and the free instructional technology apps that can be projected to all of the screens in the ALC classroom. Other barrier reduction mechanisms that are part of ALC training are asking instructors to be aware of both sound and light barriers in the rooms. A best practice that has been suggested for instructor implementation is to have the lights in the room at medium strength to reduce glare in light pollution in the classrooms when technology is in use. This is in line with the *City of Mississauga Facility Accessibility Design Standard*, *Section 4.4.13* which states, “Light sources and fixtures shall be selected to minimize direct glare or indirect glare on nearby reflective surfaces” and “Lighting in *meeting rooms* [emphasis in original] and assembly areas shall be evenly distributed, and shall be capable of being adjusted (e.g., dimmers)” (City of Mississauga, 2015, para. 13, 22). Another strategy is to ensure all the microphones are originally turned off so that there is no overwhelming sound pollution as a barrier when students are in the classroom and particularly when they are working as groups.

Recommendations for Future Practice

We propose directions for future practice and areas for continued research that arise from these case studies, as well as from experience and engagement with active learning classrooms. They are recommendations informed by research on active learning classroom practice and how to make these classrooms spaces that are more accessible, coupled with using open educational resources as a way to reduce barriers to math education.

There is a large body of evidence supporting active learning and what supports need to look like in face-to-face delivery. Now in a remote teaching and learning environment due to COVID-19, more research on active learning online (beyond the use of classroom assessment techniques (CATS; Angelo and Cross, 1993) needs to be done. There must be reinforcement for the ample support provided to instructors who would like to adopt active learning techniques in their courses regardless of delivery modality. These case studies and research have demonstrated that for active learning to be effective it needs to be done well and supported by contextual practices for each course. There is no singular set of best practices for active learning that apply to all courses in a discipline, but there are certainly good practices that support access and accessibility, as outlined above. Building bridges for students by asking them for their feedback, early and often, as well as building bridges amongst faculty through professional development and training opportunities is one way to embed more active learning (including the use of OERs) in course pedagogy.

A strategy that is useful to increase access to math courses in a more comprehensive manner is to reflect on pedagogical practices and perform accessibility audits to reduce barriers in the class for students. This includes race, class, disability, gender expression, and sexual orientation, as well as intersections of these positionalities. This also includes the need to reduce barriers for faculty who want to implement active learning or other strategies in the classroom, from a curricular and access to technology and training standpoint. These barriers can be even more pronounced for precarious faculty, who may not have the time to develop materials themselves, or access to the resources to support their curricular and pedagogical development. It is important to remember that creating materials takes time and needs support, and these supports can appear in many different ways, for example

- Creating videos, guided readings, and/or activities for pre-class/in-class/post-class settings that can be shared by faculty and readily scaffolded to different aspects of a course.
- If in a technologically-advanced room, providing training on how to use the room, and how to plan classroom activities that take advantage of the classroom affordances. This includes highlighting which features would best support certain types of activities.
- OER support and advocacy to reduce cost of access to the course for students. OERs are often criticized for being less rigorous, but remote teaching and learning has demonstrated how OER can and should have a valuable role in our courses. For example, the third author developed an online version of their course notes using PreTeXt (Beezer et al., 2019) that is more accessible (compatible with screen readers and smaller devices) and is now offering both this online version and an offline PDF version for students.
- Support for faculty to consider what makes group work effective or how group activities can be structured so that they support active learning and inclusion for all students.

These possible practical recommendations also lead to the need for future research on active learning spaces and comprehensive accessible design, as well as student attitudes towards OER as compared to traditional hard copy purchased textbooks from academic publishers.

Conclusion and Next Steps

Both of the case studies described here are demonstrations of how separate practices are informed and supported by the educational developer's work and the teaching and learning community on campus. Scholarship of Teaching and Learning (SoTL) work done by faculty members at the R1 university, even prior to coming to our institution, are entry points for a larger dialogue and advocacy around the need to break down barriers to education through an inclusive and accessible pedagogy. As the case studies demonstrate, the use of OERs and ALCs has been an effective way to engage students in learning and to foster a barrier-reduced environment with multiple means of interaction and multimodal possibilities. The Teaching and Learning Collaboration (TLC) has traditionally been the hub for discussion about active learning pedagogical practices and a place where faculty from all disciplines can meet to discuss pedagogical issues and to be in community. The TLC provides a yearly ALC showcase where faculty, instructors, and graduate students provide best practice resources for future use of the ALC from a pedagogical and instructional technology model. Faculty and instructors also give a series of lightning talks over the span of the school year where they outline instructional technology and OER pedagogical use in their courses.

In a response to COVID-19, this collaboration has also provided webinars to support the transition to remote learning. The webinars are based and model an active-learning and inclusive pedagogy. The webinars model inclusivity and barrier reduction by providing slides and material ahead of time, live captioning the webinar in real time, and a recording of the webinar with accessible transcripts following the webinar. Recommendations for instructional technology use for the faculty is guided by access principles where open tools and resources that are both AODA and WCAG 2.1 compliant are suggested. Faculty, in turn, used these practices when they designed their courses.

A community of learning focused on barrier reduction and bridge building was also provided, before the pandemic, through a monthly lunch series, where faculty and instructors discuss successes and issues in the courses they are teaching. These connection opportunities have now transitioned to an online delivery during social distancing due to the pandemic. These opportunities to communicate support faculty and instructor professional development and strengthens community around teaching and learning. This community building and intersection of the technological and sociological of instructional technology is also emphasized in the bi-yearly newsletter where successes in the form of grants secured, conference papers given, and "it worked for me" type articles are written by faculty and instructors to inspire future possibilities for pedagogy and instructional technology. The important theme here is that community building is integral to barrier reduction and bridge building, and this requires a strong awareness and visibility of teaching and learning practices and theory on campus. The more visible open educational resources and active learning classrooms that use instructional technology are to other faculty, the more likely others are to use these techniques and innovate new inspiring accessible practices grounded in evidence-based approaches that will lead to student success.

Author's Contributions

XW was investigator and main author for Case 1 and the KCI subsections in the Review of Literature; TY was the investigator and author for Case 2, and the active learning and flipped learning sections in the Review of Literature. AG was primary author for the introduction, the second half of the Review of Literature, and the subsections under both cases that discuss continued educational developer support for the projects.

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Ethics Statement

Ethical approval was obtained for the survey instrument mentioned here under RIS Protocol number 38329 and application name "Active Learning Designs for Smart Classrooms in China."

Conflict of Interest

The authors do not declare any conflict of interest.

Data Availability Statement

The data listed in this article is not publically available as the case study data is a result of an international collaboration. Queries about the case study data from this collaboration may be directed to Xinli Wang.

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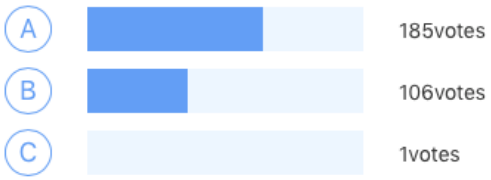
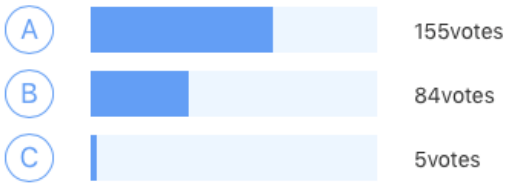
Appendix A
Examples of KCI patterns

Pattern	Topic covered	Example Description
PI	Convergence /Divergence test	级数$\sum_{n=1}^{+\infty}\frac{2+\sin n}{3n+\cos n}$的敛散性为 A 收敛 B 发散 C 无法判别 **Translation:** $\sum_{n=1}^{+\infty}\frac{2+\sin n}{3n+\cos n}$ A Convergent B Divergent C Undetermined First round voting:  2nd round voting: 
CSW	Infinite Series	Suppose you drop a golf ball onto a hard surface from a height *h*. The collision with the ground causes the ball to lose energy

Pattern	**Topic covered**	**Example Description**
		and so it will not bounce back to its original height. The ball will then fall again to the ground, bounce back up, and continue. Assume that at each bounce the ball rises back to a height $\frac{3}{4}$ of the height from which it dropped. Let h_n be the height of the ball on the *n*th bounce, with h_0= *h*. In this exercise we will determine the distance traveled by the ball and the time it takes to travel that distance. 1. For every individual: Determine a formula for h_1, h_2 and h_3 in terms of *h*. 2. Challenging part: Determine a formula for h_n in terms of *h*. Write an infinite series that represents the total distance traveled by the ball. Then determine the sum of this series and the total amount of time the ball is in the air.
CPC	Tangent plane and normal related problems of space surfaces	1. Teacher listed 3 topics for students to work on to create clicker questions. 2. All students vote for a best clicker question within their own class.
PPP	Multivariate differential geometry application	1. Teacher shows the question z = f(x,y) =x^2 + *cos(*xy) + yz + x 2. Class 8402 solves the problem f(0,1) = ? with real time comments 3. Class 8403 solves the problem: on the surface at point (0,1,?), find $z_x\big\vert_{(0,1,?)}$ 4. Class 8404 solves the problem: find $z_y\big\vert_{(0,1,?)}$ 5. Class 8407 solves the problem: on the surface, the normal vector to the tangent plane is: $\vec{n} = (?, ?, ?)$ 6. Class 8408 solves the problem: the equation of the tangent plane at point (0,1,?) is: 7. Class 8409 solves the problem: the equation of the normal line at point (0,1,?) is:

Appendix B
Student Epistemology Survey Questions

Personal relevance and learning preferences (Q1-Q7)
Learning from peers (Q8)
Teaching and sources of knowledge (Q9)
Student engagement (Q10)

1. On a scale of 1 to 5, is what you learn in class relevant to your life outside of school? (1 being irrelevant, 5 being very relevant)
2. On a scale of 1 to 5, do you have any influence over the topics you learn about in this class? (1 being no influence at all, 5 being a lot of influence)
3. On a scale of 1 to 5, do you have any control over how you learn about them? (1 being no control at all, 5 being a lot of control)
4. On a scale of 1 to 5, rank the following activities for learning new things based on your personal preference.
    - Attending lectures
    - Reading on my own
    - Watching instructional videos
    - Studying on my own
    - Small group work
    - Whole class discussions
    - Working on projects
5. On a scale of 1 to 5, rank who do you think is more responsible for your learning in the class.
    - The teacher.
    - Yourself.
    - Your peers.
6. On a scale of 1 to 5, rank the following options when you have questions.
    - Prefer to ask teachers face-to-face.
    - Prefer to ask my peers face-to-face.
    - Prefer to search the answer by myself online.
7. On a scale of 1 to 5, rank the following indicators when you know you have really learned something.
    - Get a high score on an exam.
    - Can apply the learning to a new problem or topic.
    - Can explain it to a friend, to help them learn.
    - Can solve problems using this knowledge.
8. On a scale of 1-5, rank the following statement:
    - Working collaboratively with my peers helps me learn topics more deeply.
    - Sharing information with my peers can help me in class.
    - When peers share information with each other, the total group knowledge is greater than the knowledge of any one individual.
    - Peers who pool their knowledge together are more innovative than individuals working independently.

- The classroom community (all the students in class, considered together) is an important resource for my learning.

9. On a scale of 1-5, rank the following statements.
   9.1. How do you prefer to interact with the teacher?
   - Listening to lecture about conceptual topics.
   - Meeting one-on-one.
   - Meeting the teacher with small group peers.

   9.2. Are students' ideas (your own and those of your peers) important for learning in class?

   9.3. The teacher in this class helps me feel better about myself as a mathematics learner.

   9.4. Our homework should be important to help determine what happens during class time.

   9.5. What are the important sources of knowledge in this class?
   - Textbook.
   - Internet materials.
   - Lectures.
   - TAs.
   - My peers.
   - Figuring things out myself

   9.6. I like the teacher to teach my mathematics class through:
   - Giving lectures of mathematical concepts and ideas.
   - Showing how an equation is solved.
   - Helping me work with a small group in problem solving.
   - Showing how a real world problem is converted to a mathematical model.
   - Engaging me in activities that solving a mathematical problem

10. The following activities matter to me in order for me to be engaged:
   - Participating actively in small group discussions.
   - Asking questions when I don't understand the instructor.
   - Having fun in class.
   - Helping fellow students.
   - Finding ways to make the course material relevant to my life.

Practice Article

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Planning, Implementing, and Assessing an OER Faculty Learning Community: A Facilitator's Lens

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Abstract

A librarian-led Faculty Learning Community (FLC) focused on Open Educational Resources (OER) can be a practical, low risk way to sustain campus-based OER programs during and after initial start-up. Creating a space for sharing teaching successes and challenges is an important goal in the iterative journey toward open. The experiences and trust fostered in an FLC can help grow awareness of and commitment to adopting, deepening, and expanding a culture of openness. FLCs provide an opportunity to lean into open that enhances cross-campus relationships, identifies gaps, and emphasizes collegiality while moving toward enriched teaching and learning. They provide a launching point for sharing pedagogical practice, and a valuable venue for new ideas. Key strategies for planning, implementing, and assessing a multidisciplinary OER faculty learning community are highlighted. Practical advice is emphasized to support successful outcomes that can be easily replicated. Ten top takeaways are summarized from a year spent facilitating an OER FLC in a four-year, public, comprehensive college that included the shift to online courses during the COVID-19 pandemic, and it concludes with suggested next steps for continuing the OER conversation among faculty, students, librarians, instructional designers, teaching and learning center staff, administration, and other stakeholders.

Keywords: open educational resources, OER, faculty learning community, community of practice

Introduction

The world of OER is growing fast and can be overwhelming for newcomers. Getting started with OER, an instructor may feel like a lone voice in the wilderness. Like-minded faculty can provide community and opportunity to voice questions, concerns, problems, and solutions with others in a safe space and provide needed insight for improving pedagogical practice. Embedding OER within a faculty learning community marries these two efforts to foster increased understanding, engagement, and growth.

An FLC provides an in-depth way to host a sustained discussion on a topic. FLCs have been defined as "a cross-disciplinary faculty and staff group who engage in an active, collaborative, yearlong program with a curriculum about enhancing teaching and learning. It includes frequent seminars and activities that provide learning, development, the scholarship of teaching, and community building" (Cox, 2004, p. 8).

This article provides an overview of an OER FLC from a facilitator's perspective. This lens focuses on bridging individual faculty development needs and institutional goals. A librarian led OER FLC specifically devoted to incorporating open teaching materials into college courses has many advantages. In this case, "materials" are all encompassing and include textbooks, videos, online sources and more. An FLC can be adapted to OER in any part of the instructional life cycle. Exploring some of the major dos and don'ts for planning, implementing, and assessing a multidisciplinary OER FLC can help those doing similar work.

The project was part of an OER sustainability plan at a four-year public comprehensive college in its third year of a large statewide initiative to improve course material affordability. It involved faculty with different knowledge, experience, and comfort level with OER. Keeping the conversation going was important to ensure the program continued to develop, grow, and thrive.

Literature

FLCs have been in existence for over four decades (Faculty Learning Communities, n.d.). OER have been developing in different venues and under different names for nearly as long or longer. OER are "teaching, learning, and research materials that are either in the public domain or licensed in a manner that provides everyone with free and perpetual permission to engage in the 5R activities." (Creative Commons, n.d.). The 5Rs include being able to retain, reuse, revise, remix and redistribute materials (Wiley, n.d.).

OER programs may be particularly appropriate as a topic oriented FLC because they embrace members from multiple disciplines working on a common theme or methodology -- value comes from the variety of voices. FLCs typically include eight to twelve members who voluntarily agree to participate (Cox, 2001).

While sharing some common characteristics, FLCs are distinct from academic committees (Ortquist-Ahrens & Torosyan, 2008, p. 7), as well as learning circles (Peer2Peer University, 2015; Pikula, 2018), faculty guilds (Lumen, 2020), project-based teams, support groups, leadership fellow programs (SPARC, n.d.), and other communities of practice (Wenger, 1998). Related phrases are also being used by some companies to offer services, e.g., Lumen Learning Circles. Some naming conventions are regional or consortial; others are based on the

tradition at an institution, and some have more obscure etiology. Some groups are temporary in nature, and others are established, ongoing entities. The FLC model typically emphasizes pedagogical growth and development for faculty.

An FLC can be adapted for any college or university. Many institutions have already found the intersection of OER and FLCs to be useful for building a peer support infrastructure. These colleges include: Boise State University (Boise State, 2018), California State University (Soodjinda, Parker, Ross, & Meyer, 2014), Grand Valley State University (Grand Valley State University, 2019), Metropolitan State University of Denver (Metropolitan State University of Denver, 2019), and Miami University of Ohio (Beazley, Haynes, Myers, & Resnis, 2019; Bazeley, Waller, & Resnis, 2014), among others.

There were similarities and differences among the programs. Each considered the institutional goals, campus culture, and academic and technological trends at the time. A University of British Columbia group, Open BC, has published an extensive library of teaching, support, and advocacy material online to help others. This includes a support staff working group guide, faculty OER toolkit, and accessibility toolkit (BC Open Ed, 2019).

As outlined by Cox (2004), necessary qualities for building a successful faculty community include “safety and trust, openness, respect, responsiveness, collaboration, relevance, challenge, enjoyment, esprit de corps, and empowerment”. These qualities naturally resonate with both libraries and OER, making an OER FLC an especially strong candidate for library involvement. There is plenty of opportunity for collaboration at the intersection of teaching, support, and technology.

Librarians are increasingly being called on to participate and lead FLCs as their roles have expanded beyond the confines of library walls (Burress, Mann, & Neville, 2020). Librarians are taking on additional responsibilities and can be especially well-suited in facilitating FLCs. At times, they may assume blended responsibilities as librarians, educators, coordinators, and community builders as well as lifelong learners (Mi, 2015). Librarians benefit from forging stronger connections and relationships with faculty in the classroom, while enhancing opportunities for their own professional development in the quickly evolving blended educational technology environment.

Conceptual Framework/Design

The FLC literature provides the general framework and structure for a targeted deeper dive into OER. This is a natural extension of the concepts of scholarship as conversation as well as information creation as a process which aligns well with the Association of College and Research Libraries’ (ACRL) Information Literacy Framework (ACRL, 2015). Ongoing dialogue is important.

A basic concept underlying any FLC is that there is tremendous inherent value in learning from others. This is true in a traditional classroom setting with group discussions and applies in this situation when exchanging ideas and insights with professional colleagues. Shared interest in a topic is the only prerequisite for being part of the FLC. A designated group with the discipline of regular gatherings and dialogue is a proven time management technique which ensures some

level of commitment and accountability.

These special interest groups can be tailored to accommodate any type of institution, mix of individuals, timeframe, or topic. In addition to yielding information about the chosen topic being studied, FLCs may also lay the groundwork for possible future interdisciplinary collaboration, mentoring, and partnerships. It is worthwhile to consider inclusivity, diversity, and equity when developing the community. Who might be underrepresented according to any demographic measures used?

Flexibility is a key attribute of most FLCs. Groups are generally based on an informally negotiated combination of the expectations of its members, and each gathering is shaped accordingly. It is accepted and celebrated that each individual brings to the table a unique set of professional experiences, subject matter expertise, technical prowess, focused interests, short- and long-term goals, and time and effort available to commit to this activity. Most are seeking inspiration and motivation, as well as knowledge. Most find that enthusiasm is contagious. The group dynamics can spark both individual energy and collective synergy.

Due to the way that OER are still evolving as part of the academic landscape, faculty perceptions of OER run the gamut. OER is a broad term and means different things to different people. An FLC environment is the perfect place to practice meeting people where they are. Discovering new and often unexpected connections can result when working outside of departmental or institutional silos. Ideally facilitators help foster the benefit of connecting people as well as imparting content. Trust from working together enables the OER FLC to agree on expected participation levels, establish some basic operating guidelines, and help pre-empt or resolve any potential misunderstandings.

Development and Implementation

Hosting an FLC under the auspices of a teaching and learning center, grant department, provost, dean or other sponsoring office provides organizational support which may seem daunting if individually-led. Helpful administrative support can include creating mailing lists, provisioning shared file space, and scheduling meeting rooms. Assistance with publicizing events and subsidizing refreshments are welcomed as well.

A teaching and learning center, or other office that can provide a pre-FLC orientation session, helps facilitators review general FLC history and best practices. There may be one or more facilitators who are appointed or volunteer. Prior experience with FLCs and a well-articulated and shared understanding of the goals and anticipated outcomes provide much stronger scaffolding than a loose community of practice. Lessons learned from other FLCs in other subject areas, with other goals, can strengthen the outcomes of the proposed group.

To assist with orientation, Cox (2009) created an "FLC Goals Inventory" to clarify specific characteristics that go into successful FLCs. These include emphasizing teaching, gaining more in-depth understanding on a specific topic, developing a sense of connection to others and to the institution, enhancing teaching effectiveness, and focusing on the scholarship of teaching, learning, and research. This opportunity to reflect on goals from a higher perspective before starting the FLC can help the facilitator identify specific objectives and deliverables for the

program.

Those undertaking the FLC facilitator role will do well to spend time beforehand reflecting on why OER is a relevant topic for their students, faculty, and institution. Understanding and articulating how the FLC can further the adoption of OER, and the benefit of doing so on the campus at this time, will help others carry the message. Why is textbook affordability a hot topic? Why is the timing right for the department, institution, or system? What background, training, experience, energy, and connections can a potential facilitator bring to the initiative?

With a clear vision in hand, moving to more pragmatic steps will help get the FLC successfully launch. Identifying rules of engagement at the beginning can be very helpful. The rules of engagement may include widely agreed upon general principles for meetings and communication. Examples include: assuming that everyone comes to the community with good intentions, being present in the moment, listening to understand before speaking, encouraging clarifying questions, being open to changing viewpoints, ensuring everyone has a chance to speak, staying on task, and being sensitive about time (Ortquist-Ahrens & Torosyan, 2008, p 21). The group also needs to plan how it wants to handle disagreement and disinterest.

Clearly describing objectives and outcomes helps build enthusiasm for the yearlong endeavor. There can be short term, long term, and interim milestones. The goals for the year may include items such as reviewing OER research (Clements, Pawlowski, Manouselis, 2015; Hilton, 2020), identifying current trends, and suggesting future directions. The impact of how OER is making a difference to students' learning is another rich vein to explore in the Scholarship of Teaching and Learning (SOTL). Which students benefit most, and why (Colvard, Watson, & Park, 2018)?

There are many variations of openness along with challenges and opportunities on the road to OER adoption. Helping faculty develop a focused plan to move from pilot program to implementation and assessment works best when aligned with institutional, departmental, and individual objectives. Documenting success stories and building OER advocacy for campus stakeholders (faculty, staff, students, library, IT, bookstore, etc.) may be of interest for some FLCs. Similarly, developing a program for faculty and others new to OER should be welcome by all institutions.

There are many opportunities for group activities and programs. An example might be to offer facilitated training via online badge certification courses about OER (SUNY OER Services, 2018). It is typically easy to organize participation in an OER panel discussion for Teaching and Learning Day, Scholars Day, or other campus event. Faculty speaking to their peers almost always resonates better than administratively driven scenarios. Member voices strengthen the message. Consider hosting non-traditional events (e.g., 5-10 minute speed networking tables where faculty can demonstrate how they are using OER in a variety of courses and disciplines).

OER FLCs may include a mix of group and individual projects. Individual projects could include sharing self-initiated research efforts. Other efforts may be associated with surveying student opinions formally (e.g., surveys, focus groups, end of semester feedback sessions) and informally (e.g., whiteboard surveys, suggestion boxes, repositionable sticky note displays). Other activities may involve developing advocacy and promotion programs, or participating in OER poster sessions, presentations, seminars, or panel discussions at conferences (e.g.,

OTESSA, SUNY Conference on Instructional Technologies, Ed Tech Day, or more discipline specific venues).

Themes and topics for meetings, exercises, and activities depend on the interests of the group. Examples might include:

- conducting an environmental scan of relevant OER by subject area and updating LibGuides as appropriate
- examining incentives and barriers to OER adoption (Belikov & Bodily, 2016)
- learning about the spectrum of OER licensing from most to least restrictive; hosting a speaker on copyright, Creative Commons, or other intellectual property issues
- inviting a discussion with the bookstore, library, IT, and other stakeholders. Consider including the tutoring and writing center, grants, internships, and other relevent units. Ask OER authors to talk about their experiences in creating materials. Pay special attention to the ways that student voices have been included in developing OER materials as co-authors, editors, and reviewers as one way to reduce disposable assignments
- planning or enhancing course materials (in various formats including textbooks, quizzes, supplemental interactives, and ancillaries), or entire courses, or open degree programs (Z degree)
- determining how to designate OER classes using low or no cost materials in course schedules (Clifton, DeFranco, & Daly, 2020)
- connecting with existing campus opportunities to be part of Teaching and Learning Day (e.g., McCollough, Warren & Harris, 2018), student scholar and research showcases, annual Open Access and Open Education Weeks, and other existing campus events that are aligned with, and contribute to, institutional mission and vision
- listening to and amplifying student voices whenever possible, including student involvement in OER textbook creation (Hill, 2019) as well as town halls, Textbook Broke campaigns, inclusive poster sessions, and advocacy efforts like student government, Student Public Interest Research Groups (PIRGS), service organizations, and clubs
- discussing inclusion of OER in Appointment, Promotion, and Tenure (APT) guidelines
- increasing the size of the community by thinking about how OER could best be used by students with disabilities, online students, traditionally underrepresented students, or those with limited technology access.

Program Evaluation

Evaluations were both formative and summative. They encouraged reflections on both the mechanics and dynamics of how the group functioned, as well as reflections on matters related to high impact practices for OER use (Einbinder, 2018). Formative evaluations were done throughout the year. In the current case, members were regularly asked for their input on topics for meetings. The facilitator was available, approachable, and appreciative of suggestions for the group. Thus, the cohort became a collaborative. In addition, the OER FLC met with the

teaching and learning center director and other FLC facilitators during the year for quarterly check-ins which were useful for staying on track, discussing common issues and problems, and identifying potential solutions.

Summative evaluations comprised one-hour focus groups of faculty participants who were asked about what worked, what did not, and what could be changed in the future. A final report provided another opportunity to reflect on the year and review the work. The report was mostly qualitative in nature, providing insights and laying the groundwork for how the group's work could be translated into follow-on actions. It revisited the original goals of the group, and how time was spent.

Did the program meet all its goals? How was success measured? What is, can, or will be changed? Do metrics about the amount of OER materials used, number of courses taught, and depth of commitment by faculty advocates tell the whole story? Each member admitted individual professional development/growth that was appropriate for them, as well as some level of increased overall job satisfaction as a result. Several faculty members expressed interest in maintaining ties with the cohort going forward. Paying attention to evaluation results can help determine added value to the institution and inform the OER path forward.

Evaluation questions may be related to faculty and student satisfaction with OER, barriers and challenges in using OER, suggestions for changes or improvements in teaching and learning, additional ways that OER can be supported and sustained, and how to develop more advocates and champions. Eliciting feedback about the impact of OER during the pivot to online teaching caused by Covid-19 pandemic was of special interest. Since the pandemic began mid-way through the semester and course materials were already in place, the OER FLC members were able to continue using their course materials without much difficulty. Challenges with inconsistent technology and network availability were more common.

Findings and Limitations

The OER FLC had ambitious goals and not all could be accomplished in a year. The onset of COVID-19 made the timeline even more challenging, yet it also surfaced additional OER success narratives. Members focused on improving the digital accessibility of existing OER. They became more interested in ancillaries like quizzes and other interactive materials. Some also used the FLC opportunity to investigate open resources offered through professional associations and library collections from other disciplines.

Caveats and limitations included the size of the group. Cox (2001) recommends keeping the group size small for best results. Our FLC was somewhat fluid, and we were able to welcome new faculty members with OER interests who joined later in the year and brought additional perspective to those teaching global online courses.

The composition of the group also requires balance for best results. Including faculty who have not attained tenure is encouraged, although it is recognized that OER FLC participation may or may not be counted toward promotion. Since the FLC depends on a voluntary coalition of the willing, new untenured faculty may not have thought they had time to devote to an OER FLC. Participation in a group like this may be perceived to be a luxury for those with time. A diversity

of voices by age, gender, race, academic rank, teaching experience, etc., is ideal. Although FLCs are typically intended for full-time instructors, adjuncts and part time faculty exploring OER can offer additional perspectives and should be welcomed.

Messaging and communications need to avoid the appearance of group exclusivity. Handouts, elevator pitches, talking points, social media, reports, etc. need to be thoughtful and consider their audiences. Public communication should include accessibility accommodations such as closed captioning, alternative image tagging, and more, as appropriate. An OER group benefits from openly sharing information. Weaving news, updates and accomplishments into institutional strategic planning, priorities, and timelines is a skill worth cultivating (Early & Holton, 2016).

There are also limitations imposed by the academic calendar. This is always a challenge for any group and work needs to be sequenced and planned. In this case there were 15 bi-weekly meetings per academic year. Interspersing deliverables throughout the year is generally preferred instead of producing a single year-end report or presentation. Keeping track of events, along with the number of people participating and their departments or disciplines, can be useful metrics for evaluation.

An additional challenge is sustaining long-term vision. Can the energy of the FLC be propelled into future practice at the instructor level (Tinnell, Ralston, Tretter, & Mills, 2019)? Can its work be built into an ongoing OER advisory council? Can the OER FLC efforts be used to recruit new OER faculty, or be used to mentor new OER instructors?

Discussion

It is important to have some structure yet remain flexible with this endeavor. Taken at face value, the three words in the descriptive phrase "Faculty Learning Community" speak volumes. There are many names that could be given to a group sharing interest in a common subject or goals. Depending on the setting, it could be considered as a special interest gathering, an affinity group, an ad hoc committee, a support group, a club, a professional network of colleagues, or a deputized task force.

Concentrating on the purpose and function, not the descriptive title, is most relevant. One of the first things a facilitator needs to do is clarify a shared vision for the group and, with collaborative input, establish realistic expectations. What seems obvious to one person may not be so obvious to others.

During an era of scarce resources, an administrator may question whether an FLC on any topic is a necessity or a luxury. The answer will vary based on the needs of the institution at the time. However, FLCs usually generate distinct benefits in helping to ignite new ideas and programs in a way that is community-based, assists individual faculty to renew and refresh their teaching techniques, and provides a springboard for future innovation.

Impact on Practice

After a year, many participants were more committed, more engaged, and more prepared to move beyond finding and using OER materials to work toward more open pedagogy. Members were better able to evaluate publisher offerings, consider the impact of new models, and

understand the need for flexibility and resilience. The group had greater recognition of other open alternatives, hybrid options, customizable solutions, and more. Although publishers may seem to be incorporating more components claiming to be open, the packaging can be misleading. The group was savvier about how some publishers are co-opting OER efforts and finding new ways to monetize OER.

The FLC group gained a better understanding of the value of librarians and how these professionals can help faculty (e.g., strategic searching, copyright, and Creative Commons licensing). Conversely, librarians obtained a better grasp of some of the pragmatic issues inherent in using OER such as broken hyperlinks, limited choices in some subject areas, and uneven tools for finding and evaluating OER materials. Technological advances, as well as the ever-changing academic landscape, are blurring the lines around job responsibilities.

Some FLCs have been proactive in creating deliverables including articles, blogs, webpages, OER toolkits, and LibGuides (Little, Fallon, Dauenhauer, Balzano & Halquist, 2010) to directly impact teaching practice. OER materials themselves are becoming both more diffuse and more focused. There is a growing awareness of how OER materials and other efforts in open publishing can be helpful in preparing for the unexpected.

Adapting to the Unexpected

Many people in higher education were hit hard by the COVID-19 pandemic as instructors scrambled to move courses online mid-semester in the Spring of 2020. Although hard evidence is not readily available, there are anecdotal reports that OER courses fared better because they were purposely developed to use openly available materials, rather than textbooks. Not all students may have acquired textbooks in non-OER courses. This was an unexpected but fortuitous benefit of OER adoption. Also, the widespread, easy availability of online meeting tools like Zoom and Blackboard Collaborate meant that the OER FLC bi-weekly meetings could continue. Though moved to a virtual format, the ability to informally check in as a community with a small group of faculty members was valued among those who attended.

Recommendations for Future Practice

This article provides a facilitator's perspective in developing an OER FLC during 2019-20 in a mid-sized, public, comprehensive college. Lessons learned include:

1. Stay humble. Review the FLC literature as background. Learn and be inspired by those who have done similar things in the past. Do not re-create the wheel.
2. Provide motivation. Clearly describe intentions and expectations for the OER FLC to help others decide to join. What's in it for them? How can they benefit? Will relevant data be collected that can be shared in a group presentation, publication, webinar, or blog? How can experiences be best communicated at the student, department, school, and college level, and beyond? Consider who is not at the table and how to include them.
3. Plan logistics. Identify how the group keeps agendas and meeting notes. Create email lists, a learning management system group (e.g., Blackboard) or other structures for the members to share readings and other items ahead of time so they are ready from the first day the group meets.
4. Use backwards design. Keep desired outcomes and deliverables in mind from the beginning. Is the goal to write a grant, increase number of OER champions, or develop strategies for integrating OER into additional courses, entire departments, or specific programs? Prioritize these goals into "must do" and "not critical" categories.

5. Stay focused and maintain momentum. Keep moving to prevent loss of interest, share ideas for session subtopics.
6. Take periodic pulse of the group. Be prepared to learn how to pivot and adapt gracefully as needed. This means being ready to leave an established path for unexplored but beneficial intellectual detours. Know when and how to return to the task at hand.
7. Celebrate often. Consider how to appropriately celebrate both small and larger milestones, accomplishments, and successes.
8. Do not lose track of the calendar. Unplanned time can easily slip away. Time management can be critical to ensuring good outcomes.
9. Document success stories as well as lessons learned. Set an example of "walking the walk" by collecting open data and making available in open repositories. Provide research scaffolding, pilot projects, etc. for those who follow.
10. Have fun. Be sure to allow time for joy, laughter, and enjoyment. Nurture curiosity and wonder.
11. Share and express gratitude often. Develop empathy and good listening skills. Capture reflections for next time. Use the community to strengthen a culture of caring (Timmermans et al., 2018).
12. Share with the rest of the campus and beyond through social media, posters, presentations, panel discussions, invited speakers, connections to other campus events, planning activities and assessment initiatives.
13. Remember to listen thoughtfully. Encourage, and leave room for future inclusive connections related to OER advocacy, student involvement, and additional engagement strategies.

Conclusion

The FLC model provides a structured framework for supporting OER after initial program rollout and implementation. Curious instructors frequently want to know more about the benefits of OER for teaching and learning. For some, OER is a springboard to a deeper conversation about teaching methods and open pedagogy (Jhangiani, 2019). For new faculty this can be a just-in-time way to think about how to organize and structure course content. For others, this is an opportunity to refresh and re-engage instruction with new ideas about educational delivery.

The FLC model is especially useful for enabling faculty to consider what happens next, after they have decided to adopt OER in their courses. How can instructors advocate for further OER use by others? How can they best share what they have learned in an ethical, open, and accessible manner? For many, participation in a faculty learning community is the beginning of a journey to explore the OER evidence and improve pedagogy.

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