DESIGNING GROUP WORK IN ONLINE COURSES TO DEVELOP PRESERVICE TEACHERS' PROFESSIONAL COLLABORATION SKILLS

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ABSTRACT

With postsecondary institutions increasing offerings of online courses, there is much to learn about how online group work is designed to support collaborative learning, particularly for professional certification programs such as education. As part of a case study research, we synthesized data collected from instructors and students at two Canadian postsecondary institutions offering online courses in their Bachelor of Education degree pathways. Results suggest four design considerations to help support instructors when planning learning activities involving online group work: (1) clearly articulate the purpose of group work, (2) provide learner support through teaching presence, (3) be intentional in how groups are established, and (4) leverage digital tools for collaboration.

Keywords: *group work, online learning, preservice teachers, teaching methods, instructional design, case study research*

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Since its introduction in the 1990s, online learning has become an integral component of higher education, with institutions worldwide providing a form of online course delivery (Johnson, 2019; NSSE, 2021). In 2019, prior to the COVID-19 pandemic, 76% of Canadian universities and colleges who participated in The Canadian Digital Learning Research Association survey reported offering a form of online learning (Johnson, 2019). Similarly, collecting data from 337 U.S. institutions that provide bachelor's degree programs, the National Survey of Student Engagement (NSSE) found in 2021, that 65% of first-year students completed most of their course work remotely (NSSE, 2021), which was a 58% increase from Spring 2019. There are advantages to online learning that have been reported. For instance, comparing three online courses with three in-person offerings sharing the same instructor and final exam, Soffer and Nachmais (2018) found that online learners reported a better understanding of course structure, better communication, and higher levels of engagement and satisfaction. From an administrative standpoint, online learning can expand access to instructional programming and generate additional income (Meyer, 2014), making it economically appealing (Morris et al., 2020). However, research has revealed student isolation (Alawamleh et al., 2022), fewer diverse discussions (Dumford & Miller, 2018), higher levels of student distraction (Nishimwe et al., 2022), and lower levels of collaborative learning and self-discipline (Dumford & Miller, 2018; Nishimwe et al., 2022) associated with online learning. Arguably, online course offerings will persist; this paper addresses

how to provide collaborative learning opportunities through the design of online group work.

Programs offering online courses include undergraduate teacher education programs. Professional collaboration skills are required in the education field (Alberta Education, 2018; BC Teachers' Council, 2019; Ontario College of Teachers, 2020; Rios et al., 2020), and can be developed through group work (Meijer et al., 2020; Strijbos, 2016). Although there is much evidence that through careful design, group work can support student learning (Brame & Biel, 2015; Clarke & Blissenden, 2013; Hammond, 2017; Hodges, 2017; Kleinsasser & Hong, 2016), research is limited on online learning contexts (LaBeouf et al., 2016; Thom, 2020). This shows the need to study how online group work is designed and used in online education to ensure curricular practices are preparing students for professional contexts and collaborative activities (Hammond, 2017; Kleinsasser & Hong, 2016).

LITERATURE REVIEW

Sociocultural Learning Theory

Rooted in the work of Vygotsky (1993), sociocultural learning theory emerged in the 20th century and brought an innovative holistic understanding of human development that combines cognitive development with cultural, economic, emotional, and social aspects. In this theory, human development and learning occur from participation in a social system. The resulting social interactions allow for the individual to learn within one's Zone of Proximal Development (ZPD; Vygotsky, 1993), defined as the difference between actual development, determined through independent problem solving, and potential development, determined by problem solving with guidance or through collaboration with capable peers. In order for peers to work within the ZPD, defining collaboration is pivotal and should not be confused with cooperation. Dillenbourg (1996) writes, "in cooperation, partners split the work, solve subtasks individually and then assemble the partial results into the final output. In collaboration, partners do the work 'together'" (p. 8). By designing collaborative opportunities, learners can work within their ZPD and develop "functions that have not yet matured but are in the process of maturation" (Vygotsky, 1993, p. 79).

Professional Collaboration

Analyzing 203,272 job advertisements from two online job boards, Rios et al. (2020) conducted an empirical investigation of the most in-demand 21st-century skills identified in job postings that require a college degree. Found in 22% of these postings, collaboration was the third most requested skill. Canadian teacher education regulation boards describe collaboration as providing collegial support, sharing of resources and expertise, participating in professional learning communities, and discussing pedagogical approaches (Alberta Education, 2018; BC Teachers' Council, 2019; Ontario College of Teachers, 2020). Committing over 30 years to exploring collaboration in Canadian K–12 education, Hargreaves (2019) argued a culture of collaboration generally produces positive gains in student achievement and teacher motivation and engagement. Hattie and Smith (2020) reported the effect size of collective teacher efficacy related to student learning is the highest influence among different practices. Further, gathering data from 802 eighth grade math teachers, Narayan (2016) found that professional collaboration can result in increased job satisfaction. Yet professional collaboration is not an easy skill to master. Exploring preservice and in-service teacher collaboration on interdisciplinary task design, Brown et al. (2018) found both groups struggled to narrow focus, maintain agreed upon timelines, negotiate ideas, and make decisions. In-service teachers also struggled to shift from working in isolation to within a collaborative design team.

Collaboration and Group Work in Higher Education

Engaging students in collaboration through group work is common in postsecondary classrooms (Meijer et al., 2020; Strijbos, 2016). This is often referred to as collaborative learning, where students engage in group work with two or more peers (Strijbos, 2016) to negotiate meaning, share ideas, and collaborate with peers (Boyle et al., 2019). Considerable attention has been given to group work as it provides opportunities for students to learn interpersonal and teamwork skills that both enhance content learning and prepare students for professional contexts (Barkley et al., 2014). Many undergraduate teacher education programs often include group work for developing the skills needed to prepare preservice teachers for the education field (Rios et al., 2020). Learning how to

work in peer groups to achieve common goals is an important professional skill for preservice teachers (Alberta Education, 2018). In addition to collaboration skills, preservice teachers can learn how to contribute to the success of a cooperative effort through group work, which requires the use of leadership, decision-making, trust-building, communication, conflict-management, and social skills (Johnson et al., 2014). These skills are also required in the teaching profession and exist in teacher qualification standards that require fostering professional relationships based on trust (Ontario College of Teachers, 2020), making informed decisions about student needs in relation to curriculum, instruction, and assessment (BC Teachers' Council, 2019), and mentoring and encouraging other educators (BC Teachers' Council, 2019).

Through careful design, instructors can create conditions to support learning through group work, including organizing students according to skill sets (Brame & Biel, 2015; Hodges, 2017), providing reference materials to assist in conflict resolution (Hodges, 2017), and sharing their rationale and assessment methods prior to commencement (Brame & Biel, 2015). However, students' success in group work can be difficult for a range of reasons. Surveying approximately 2,600 postsecondary faculty members, LaBeouf et al. (2016) found concerns including a dislike of group work, inequitable contribution of work, lack of real-life authenticity of task design, and difficulties collaborating online due to time zone differences. From the student perspective, Chiriac (2014) collected 210 semistructured questionnaires and identified challenges consisting of conflict within the group, perceptions of group work as being time consuming, absence of cooperation within the group, ineffective communication skills, how groups are established, and poor attendance. Moreover, in education, social intelligence is described as "the propensity to work with others to achieve common goals" and this has "not been well cultivated in the evolution of learning" (Fullan, 2021, p. 23). As a result of these complexities, instructors and learners alike are looking for ways to better support and cultivate learning in groups.

Online Learning

Online learning involves the use of approaches and techniques that inform digital pedagogy, such as connectivism (Siemens, 2005), E-Learning Engagement Design (Czerkawski & Lyman III, 2016), and Technological, Pedagogical, and Content Knowledge (TPACK) (Koehler & Mishra, 2009), to intentionally develop "a robust and sustainable learning experience" (Boltz et al., 2021, p. 1378). Designed and planned in advance of instruction, online learning can include synchronous and asynchronous approaches. Where synchronous refers to learning occurring at the same time, but in different places, such as through a video conferencing tool, asynchronous refers to a design that enables learning to occur at different times and places through the use of a learner management system (LMS) (Irvine, 2020).

Online learning is different from the emergency remote teaching experienced during the COVID-19 pandemic. Emergency remote teaching occurs when instructional delivery is temporarily shifted to quick and easy remote delivery solutions due to a crisis, returning to its original format once the crisis ends (Boltz et al., 2021; Hodges et al., 2020). Both synchronous and asynchronous approaches have been identified as being used during emergency remote teaching. While this research occurred during the COVID-19 pandemic, these courses were intentionally designed and planned for online delivery.

Online Learning and Group Work

With postsecondary institutions adopting online course management systems and students regularly using technologies to support their learning, there is much to learn about how group work is designed in online courses and how students perceive these experiences (Hammond, 2017; Kleinsasser & Hong, 2016). However, underlying negative assumptions about online courses and an absence of positive experiences with group work can limit an instructor's desire to incorporate group learning activities into online courses design (Thom, 2020). This can limit opportunities for students to engage in collaborative learning. Furthermore, group work can be challenging online when groups do not meet in physical spaces during scheduled class time, but only remotely with each other and with their instructor (LaBeouf et al., 2016). This can also limit the design of group activities in online courses and support discourse that online courses require students to mostly work independently with limited interdependent experiences.

Gap

While collaboration and group work have been extensively researched (Brame & Biel, 2015; Hargreaves, 2019; Hattie & Smith, 2020; Hodges, 2017; Narayan, 2016), challenges in how to successfully design group work in higher education remain (Brown et al., 2018; Chiriac, 2014; LaBeouf et al., 2016). These challenges warrant future investigation, particularly in professional programs such as undergraduate teacher education programs that are tasked with developing collaboration and group work skills to prepare preservice teachers for the education field (Alberta Education, 2018; Rios et al., 2020). Further, with the rise in online course offerings (Johnson, 2019; NSSE, 2021) and limited research conducted on how to design group work online (LaBeouf et al., 2016; Thom, 2020), further research investigating how to design group work in online courses is warranted (Clarke & Blissenden, 2013; Dijkstra et al., 2016; Hammond, 2017; Kleinsasser & Hong, 2016).

METHODOLOGY

Study Design

The overarching research question guiding this paper is: How do instructors design group work in online courses to develop preservice teachers' professional collaboration skills? The aim of this article is to examine how instructors in postsecondary online teacher education courses design learning to build the essential professional collaboration skills required for the teaching profession. Using a case study methodology (Merriam, 1988; Yin, 2014), we conducted semistructured interviews and collected learning design documents from instructors teaching online teacher education courses.

METHODS

Data collection included an online survey, semistructured interviews, and course documents. Prospective participants (instructors and undergraduate students in education) were contacted through a recruitment notice sent electronically by a third-party administrative staff member using student and instructor email lists in education. The recruitment notice included a link to the consent form and an online anonymous survey. The final question asked if participants would like to participate in an online interview. Interview questions inquired about the development of professional collaboration skills in online courses. Instructors were given an option to share any qualitative documents related to their instructional design of group assignments they had licensing/copyright permissions to share, such as course outlines, group work task descriptions, and group contracts. Audio recordings were professionally transcribed, and each interview participant was emailed a copy of their personal transcript for review and confirmation.

Participants

Participants included instructors from two Canadian postsecondary institutions who were teaching Bachelor of Education online courses and the students enrolled in these courses. In total, 85 survey responses were collected, with 68 students and 17 instructors completing the online survey. Twenty-two interviews with survey participants were completed (12 students and 10 instructors). Students were at different stages of completion in their Bachelor of Education degree, and instructors taught a range of course offerings in the program. Participants were expected to have access to a digital device, high speed internet, and video conferencing software when they enrolled in online courses. Each interview participant was assigned a pseudonym (e.g., Student1, Instructor2). All quotes from the open-ended survey responses were anonymous and are referenced by the type of survey that was completed (instructor or student survey).

Data Analysis

This paper highlights qualitative findings from our study. Open-text survey responses underwent open coding (Miles et al., 2014). Transcripts were analyzed through a Social Interdependence Framework (Johnson et al., 2014) as well as for professional collaboration skills identified in teacher-education scholarship (Alberta Education, 2018; Barkley et al., 2014; BC Teachers' Council, 2019; Rios et al., 2020). Coding was completed by two members of the research team, and strategies to ensure intercoder reliability were employed. To begin, all members of the research team coded two transcripts. Similarities and differences were discussed, and consensus on thematic codes was reached. A codebook, with a description for each code, was created for the team to follow (Miles et al., 2014). Next, one researcher completed the first round of coding on all transcripts. Once finished, a second researcher began coding, in reverse order. After five transcripts had been completed, the two

met to refine the codes. Analysis continued until two rounds of coding were completed.

Limitations

As with all qualitative research, researcher bias in data analysis due to the subjective nature of qualitative research can be considered a limitation of this study. To reduce bias, transcript validation and intercoder reliability were employed. As well, a codebook was created to document analytic processes and support the credibility of findings. Additionally, data participants were recruited at two Canadian postsecondary institutions that were selected by us because both offered online courses in their Bachelor of Education degree programs and we had access to them. Scope was limited to two institutions to keep the project manageable, and according to the grant funding supporting the research design. Further, the context of this study should be considered by readers when interpreting the findings because the results are based on data provided by a group of instructors and students associated with two Canadian teacher education programs. As such, the findings may not reflect experiences in different program areas or countries, or with contrasting access to digital technologies. Finally, the possibility exists that some participants may not have responded accurately or honestly to interview questions. To increase the likeliness of participants responding honestly to interview questions, participants were assured anonymity through the use of pseudonyms.

RESULTS

Three online group work tasks and four themes pertaining to the design of online group work have been delineated and selected from the analysis of this study. This section will begin by sharing the findings of common tasks designed in online group work. Next, specific design components will be discussed.

Overall Task Design

Through open-text survey responses, interview transcripts, and documents provided by course instructors, the participants identified three common online group work tasks: asynchronous LMS discussion boards, synchronous activities, and group assignments with a shared grade.

Asynchronous LMS group discussion boards. In this design, students were arranged in groups of three to five to post and respond to a weekly question or reading. Students were invited to both post and respond to group members as desired or were assigned weekly alternating roles. For example, Instructor5 required one person to lead the group each week, posing questions regarding an assigned article and leading the asynchronous discussion. A second person would act as a facilitator and was responsible for writing a summary that would be submitted and individually graded by the instructor. Instructor and student participants diverged in opinion on the effectiveness of asynchronous discussions. Instructor2, for instance, argued value in postings as they provided a mechanism to share material related to the theoretical underpinnings of a course and how theory is connected to practice, whereas students shared this task as lacking connection to peers (Student3) and a "forced" obligation for grades (Instructor5).

Synchronous activities. This form of group work commonly occurred during synchronous meetings using breakout rooms in video conferencing software such as Zoom. Instructors perceived this format as simulating the physical classroom where students could "sit around the table, and chat with their table groups" (Instructor2) while working with peers, establishing trust, building community, and forming new connections or friendships. Often, these tasks would begin with large group instruction, followed by group time. The instructor would then invite all students to share a summary of their discussions either verbally or using a digital tool, such as Jamboard or Padlet. Instructors either designed this to be unstructured collaboration or organized students into accountability roles such as timekeeper, recorder, and reporter (Instructor4). During small group time, the instructor commonly visited groups in breakout rooms to check for progress, clarity, and understanding. Commonly, these activities were not graded or included on course outlines. Student perceptions of this task were mixed. While some indicated appreciation in working with different peer groups and forming connections (Student6), others commented that such tasks lacked purpose and felt like "busy work" (Student11).

Group assignments with a shared grade. A shared-grade group assignment is characterized by a learning group submitting one product and receiving a shared grade. Instructors used this design for creating an interdisciplinary study for K–12 students, building an inquiry-focused STEM

challenge, and analyzing an existing unit design. Tasks were open-ended and emphasized no one correct answer. Collaborative digital tools, such as Google Docs, Minecraft, PocketLab, and infographics, were used to demonstrate understanding. A presentation component was commonly incorporated into the expectations of the assignment. At times, synchronous class time was allocated, but more often, students were required to arrange time outside of scheduled course sessions to complete the group tasks. Perceptions of these tasks were mixed. While instructors and students indicated that meaningful collaboration and work could result, the complexity of tasks was overwhelming for some students, resulting in less collaboration as students "pushed through" to complete the assignment (Student7).

Task Design Components

Data analysis revealed four design components that can impact the success of group work: clarity of task expectations, scaffolding of the group work process, inclusion of instructional time for task completion, and the use of digital technologies.

First, assignments that students perceived as communicating clear task expectations assisted with the success of online group work. Both instructor and student participants perceived tasks that involved collaborative discussion, brainstorming, and decision making as favorable when working in groups online. Providing clear criteria on rubrics was identified as being used to solve group discrepancies (Student3). However, students referenced broad task guidelines and rubrics as difficult to complete. They also shared feelings of uncertainty if the purpose of the task was to "divide and conquer" or work as a team where members "do it together" (Instructor9). As well, several student respondents shared the need to clearly communicate time expectations, both instructor-initiated and student-led. Inclusion of instructional time to work on the group task was seen as significantly beneficial, with six student participants sharing that scheduling time outside of class as the most difficult part of the group work.

Second, scaffolding the group work process and how to work in groups was also identified as a design component impacting the success of online group work. Both instructors and students indicated that students need instruction on how to work in groups online. This includes the need to work through the project at the same pace, navigate divergent opinions, and understand the role of compromise in group work. For example, Student2 referenced the need for compromising, "sometimes there'll be a dominating personality. So seeing, accepting the ideas of others, seeing perspectives, can be tough." One strategy identified as beneficial was the gradual release of group responsibilities. This included the creation of a learning framework for students to reference, which provided didactic instruction on group phases and processes prior to group work beginning, and the use of synchronous learning sessions as check-ins to discuss group progress. Another scaffolding strategy was establishing explicit group norms to set collective goals and expectations to foster conformity (Fujishin, 2013). One norm identified by a student participant was the need to set a group expectation of a collaborative dynamic and mutual respect to prevent one or more of the group members from monopolizing decisions.

Last, teaching students understanding how to use digital technologies was identified as a design component impacting the success of group work in online contexts. Digital technologies included the use of synchronous video conferencing software with breakout rooms, such as Zoom, and collaborative cloud-based productivity software including Google Suite, Padlet, and Canva. However, student participants shared frustrations with instructors who assumed students know how to use software required by the instructor. For example, Student7 shared, "I find it is just expected that people know how to use it, which is not the case. I've just used it a couple times and every time I need to refamiliarize myself." Similarly, Student5 reflected on an assignment involving a video presentation:

> I easily made a beautiful presentation. But for other people I heard they were struggling immensely. They had no prior knowledge on how to do this. There were no resources available given to them by the teacher to do this. People had mental breakdowns, basically. It was not a good time for them. I was thriving.... Then I kind of realized that if you were to make a video project or assign such a thing where you would need to use online technologies as well, you should probably give them a decent tutorial.

Role of the Instructor

Instructor factors, specifically teaching presence and feedback, were identified as important to the success of online group work. Participants identified instructor (teaching) presence as checking in with groups, monitoring interactions, assisting with problem-solving, and facilitating the scheduling of group meetings or work periods. Checking in with groups was commonly described as occurring during synchronous class sessions when students were meeting in learning groups. While instructors noted their presence could interfere with group dynamics, they also shared being invited to attend student-organized synchronous sessions "to become a participant in their conversation circle" (Instructor2). Successful teaching presence also included asynchronous communication through discussion boards and collaborative productivity tools. Instructor02 also shared, "while they were designing their interdisciplinary unit, we used Google Docs the entire time. And I was part of the Google Doc, so I would give them suggestions… to kind of push their thinking a little bit further."

One area student participants noted as difficult in the success of online group work was scheduling group meetings or work periods. Thirteen student participants commented that coordinating personal schedules was a substantial barrier. For example, one student shared, "most people in the online program are also still working their regular jobs and have families." A second student shared, "it's challenging to find a time to connect as everyone's schedules were crazy busy. Often found us zooming at 11pm at night." One instructor shared the importance of facilitating ample synchronous learning opportunities, explaining "online courses that require significant collaborative group work cannot be adequately addressed in four 90-minute class Zoom meetings. Accordingly, I offer additional weekly Zoom meetings for each group."

In addition to teaching presence, instructor feedback was identified as important to online group work. Participants described effective feedback as ongoing, formative, provided in written format, and connected to a group's work and activities. Instructors shared feedback through posting to the asynchronous discussion board, commenting on collaborative work documents, and facilitating synchronous peer feedback opportunities through video conferencing software. Instructor8 described these as:

> I assign them typically, depending on the size of the group, to give peer feedback to two other members of these small working groups. And they can do that in two ways. One, they can do it while the person's [sharing] through the chat on Zoom… And then I asked them to go back, reflect on the materials that were posted, and provide some additional feedback on the discussion board for two other members.

Group Composition

Participant responses also pertained to how groups were composed. The need for a small group size was noted by most participants; however, they were divided on either having the instructor create groups or allowing for the students to have a voice in their formation. While instructors commented that creating groups in online environments can be difficult due to not knowing the students, two strategies were identified as successful: continuously generating random groups so students are working with others, and determining group placement based on pre-established criteria. The criteria that instructors shared included previous degrees attained, similarity of time zone, using a sign-up sheet, and students submitting their preference for predetermined group topics. The student survey responses expressed a desire to be grouped based on likeness as "everyone works differently and has different ways of doing things that may not work well in random groups." The likeness characteristics students identified included those who "go with the flow," think alike, and want to succeed. In contrast, instructors mentioned using the organization of groups to remind students that in the profession, colleagues and teaching assignments are not chosen, so they must learn to collaborate with a diverse range of colleagues.

Providing student choice in group formation also had varying perspectives. Some students identified benefits to this approach. For example, one student shared through the survey that picking your own group tends to "work out well because you know the people you are working with." However, a second student commented that giving students choice can be "quite awkward." In an interview, Student15 shared that when allowing

students to select groups, "it would be beneficial to have a better way to connect with the people in your online class so you can join a group that works best for your needs." Further, Student6 commented that a divided approach can be beneficial, sharing, "I think at the beginning I was really, really grateful for just being thrown into a group because I wouldn't know where to put my name, but then I really appreciated the freedom later on because you started to get to know who you worked well with."

The Individual Learner

Data indicated that individual learner participation in online group work impacts the success of the group. Learner attributes included individual accountability, time management, and student rigor. Individual accountability refers to completing one's share of the work (Johnson, et al., 2014). Both instructors and students noted the importance of accountability. Fifteen student survey participants further commented on the role of equity, with 10 frequently indicating that they experience groups where "some students do not do enough work." One student shared, "students who do not contribute are paired with students who are not willing to get a bad mark and they just ride on their coat tails. This provides students who are not willing to work—to get a career as a teacher. This leads to lazy teachers." A second student commented, "I understand the importance of collaboration in education; however, I think at the postsecondary level it is completely ridiculous that my grade should be based on other people's work."

Participant responses identified two instructor-led accountability strategies: individual assessment and assignment of roles within a group. Individual assessment included instructor, peer, and self-assessments. One student survey respondent shared an appreciation of the use of group assessments so "people know they will be held responsible for saying what they contributed." Similarly, an instructor advocated for self-assessment as it gave "individuals the opportunity to speak to what they contributed and also to inform the instructor what didn't work well." Two student survey participants shared that assigning roles within a group kept students accountable for what each agreed to complete. Instructor4 shared how they integrate roles:

> If we're doing a virtual lab, [roles are] very typical in what we would do in a normal science class. So one person would record the data, one would be doing the manipulation of the simulation itself online. It's really saying that no, this is not a free for all, it's take on a role and your role within that group is really important.

Time management and student rigor were also identified as attributes impacting the success of online group work. Participants indicated that not everyone has the same time management skills. One student survey response indicated, "I noticed more people like to procrastinate in an online course." Rigor refers to "the quality of being detailed, careful, and complete" (Cambridge University Press, n.d.). Five student survey participants commented on how perceptions of rigor impact group work. One shared "not everyone has the same drive—not everyone has the same excellence expectations." A second student commented:

> I've also found that my idea of "good grades" differs from peers, so while I'm striving for a 4.0 [high grade point average] for scholarships to help me afford to go to school, I have peers who are happy with Bs and Cs to complete their degree and that level of success is fine for them.

Last, a student stated, "group work is EXTREMELY unfair to the individuals who strive to be the best."

DISCUSSION

Prior research has indicated that scholarship investigating group work in online courses is warranted (Chiriac, 2014; Dijkstra et al., 2016; Hammond, 2017; Kleinsasser & Hong, 2016). Preservice teacher education courses include group work to develop the skills needed to prepare preservice teachers for their professional practice (Alberta Education, 2018; BC Teachers' Council, 2019; Ontario College of Teachers, 2020; Rios et al., 2020), as many jobs in the field require the ability to effectively work in teams. The results from this study show four design considerations for online group work that contribute both to the successful achievement of the task(s) and the development of preservice teachers' professional skills: (1) clearly articulate the purpose of group work, (2) provide learner support through teaching presence, (3) be intentional in how groups are established, and (4) leverage digital tools for collaboration.

Clearly Articulate the Purpose of Group Work

Group work in online preservice teacher education courses can be designed for students to both demonstrate their understanding of content knowledge and engage in the work required to be successful in the field. This work includes collaboration, resource sharing, participation in professional learning communities, and pedagogical discussions (Alberta Education, 2018; BC Teachers' Council, 2019; Ontario College of Teachers, 2020; Rios et al., 2020). Instructor participants identified both interpersonal and academic purposes driving the three approaches to group work. Interpersonal considerations included building community and trust (Ontario College of Teachers, 2020), fostering formation of new connections and friendships (Johnson, et al., 2014), and providing group diversity. Academic objectives included assessment of content knowledge and skill development (Barkley et al., 2014), and meeting course objectives requiring students to work together to achieve a common goal (Alberta Education, 2018; Fullan, 2021). However, examining the task descriptions provided by instructors revealed a much narrower scope of purpose for group work. Of all the tasks shared, only one, building understanding of STEM through the design of an inquiry-focused STEM challenge, explicitly stated a purpose of practicing and developing the skill of collaboration. The remaining descriptors focused on the purpose of content knowledge building, with an explanation of how a grade would be determined.

Consistent with Hodges' (2017) findings, student participants in this study indicated that task purpose and clarity of task objectives were important to the overall success of group work. While instructors shared numerous rationales for why group tasks were assigned, overwhelmingly, the shared course documents emphasized the purpose and objectives that centered on content knowledge building for a summative grade. As such, it is not alarming that students in this study were focused on the grade attached to group results, and were perceived by instructors as approaching group work to "divide and conquer," rather than work together. When writing course syllabi, including the formative and summative assessments used for group work is recommended. While some group tasks may not be graded, if they serve a purpose for the overall success of learners, formally articulating this will assist students in understanding why such tasks are relevant (Brame & Biel, 2015). Also, if the purpose of the group task extends beyond a summative grade, including the reasons in a clearly articulated purpose and indicating through the task description where these additional purposes connect should be explored. For undergraduate teacher education programs, the rationale can connect to the development of the professional collaboration skills required in K–12 teaching practice (Alberta Education, 2018; BC Teachers' Council, 2019; Ontario College of Teachers, 2020; Rios et al., 2020). This may support shifting student perceptions that "at the postsecondary level it is completely ridiculous that my grade should be based on other peoples' work" (SurveyParticipant7).

Provide Learner Support Through Teaching Presence

Teaching presence in the form of communicating with groups, monitoring interactions, assisting with problem-solving, providing instructor feedback, and facilitating the scheduling of group work periods can foster the success of online group work (Garrison et al., 2010). Optimally, teaching presence is ongoing and designed into synchronous and asynchronous task components, such as asynchronous discussion boards and synchronous group work meetings. Through these interactions, instructors can create conditions to support learning through group work (Hodges, 2017). Instructors can also incorporate rotating individual roles in groups, which Brame and Biel (2015) found resulted in both lower group conflict and less dominance of a single student in the group process. Feedback, as a formative measure, should be documented in a format that can be revisited, such as through writing or a multimedia recording (Brown, 2019). Students in this study identified difficulties in scheduling group meetings or work periods outside of synchronous sessions. While it can be challenging for students to work in groups online because they cannot meet in physical spaces during a scheduled class (LaBeouf et al., 2016), instructors can find ways to mitigate this. Instructors can support students by allocating time during synchronous class sessions, scheduling additional sessions to future course iterations, and clearly indicating on course descriptors and syllabi the time expectations outside of scheduled

coursework. These expectations could include daily or weekly time commitments and define reasonable meeting hours to curtail conflicts that result in students meeting at late hours, such as 11pm. Instructors could also include a requirement for groups to confirm a group meeting schedule and agreed upon group norms (Fujishin, 2013) or a group contract, which is submitted to the instructor for review.

Be Intentional in How Groups are Established

As with previous research (Barkley et al., 2014; Chiriac, 2014), our findings indicated that participants vary in their opinion as to how groups should be established. Whether the approach is random, instructor-determined, or student-selected, not all students will be happy. As a component of designing for group composition, we recommend instructors explain the rationale behind the method they choose (Brame & Biel, 2015). As an example, if an approach is taken due to the purpose of the task, consider articulating this to students. Specifically, synchronous group activities are commonly used to establish trust, build community, and form new connections, with groups determined through random selection. If this is articulated to students prior to establishing groups, it can support students in understanding the sense-making behind the design choice. Or, if learner profiling is used to establish groups in order to ensure diversity in expertise, which Barkley et al. (2014) suggests is beneficial as it "exposes individuals to people with different ideas, backgrounds, and experiences" (p. 78), explain to students the process adopted and how this is important for students to meet the assessment criteria. Last, if students are to choose their groups, instructors can tell them why and provide recommendations of what to consider when forming partnerships, such as schedule availability, assigning of group roles, work ethic, and expertise. While proponents of this method argue that self-selected groups result in members being more accountable to their friends (Thom, 2020), online learners may not have similar preexisting social connections.

Leverage Digital Tools for Collaboration

Leveraging digital tools can support group work, particularly in online contexts where there is a need to humanize interactions (Bickle & Rucker, 2018) and reduce issues related to students being socially isolated or disconnected online (Martin, 2019; Usher & Barak, 2018). Online tools, such as discussion forums, can assist students with meeting, building knowledge, and completing tasks (LaBeouf et al., 2016). Participatory technology, such as G Suite tools, can both facilitate group work and be used to identify individual contributions (Clarke & Blissenden, 2013). However, learners will have varying levels of comfort in using technology. When selecting digital tools, we recommend keeping it simple. While a more elaborate program may have additional features, if these are not required for the particular task, use a simplified program that students with novice digital literacy skills can navigate. Ensuring all students can access the program is also recommended. Downloads, logins, and access codes require both device storage space and that the individual recollect their user information. If a program is not used regularly, students will need to refamiliarize themselves with how to attain access and navigate the software before each use. Once a tool has been selected, we recommend the instructor plan to provide an overview to students, even if it is a commonly used tool. Assuming all learners can use a tool can result in student frustration. Instructors can use synchronous class sessions to review a tool, set up voluntary technology support sessions, or provide a video tutorial. Last, if the instructor is not well-versed in using a tool, then the instructor might consider choosing something they are more familiar with or arranging technical support for the students. Unless the purpose of the task is to learn how to use a specific technology tool, the focus of the group task should not be centered on the technology but rather on how to demonstrate new understandings.

CONCLUSION

This article synthesized qualitative findings from a case study that included instructors and students at two postsecondary institutions offering online courses in their Bachelor of Education degree pathways. Data were collected through an online survey, semistructured interviews, and course documents to explore how group work in online courses can be designed to build the essential professional collaboration skills required in the teaching profession. The results from this research identified four design considerations for

online group work: (1) clearly articulate the purpose of group work, (2) provide learner support through teaching presence, (3) be intentional in how groups are established, and (4) leverage digital tools for collaboration. This study addresses a gap in research pertaining to designing group work in online contexts, however, further investigation of the design, benefits, challenges, implications, and implementation of online group work in educational settings is needed. This research adds to the existing literature about online group work in higher education and is relevant to current conversations on teaching and learning in digital environments.

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