Becoming Inclusive Teacher Educators: Self-Study as a Professional Learning Tool

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This article describes a self-study inquiry project designed and conducted by a self-study group at a Faculty of Education in an Atlantic Canadian University. The seven-member group engaged in a collaborative self-study inquiry while adopting Universal Design for Learning (UDL) principles in their teacher education practices and documented their professional learning. This yearlong self-study inquiry project encompassed several data collection methods to examine inclusive practices of self-study group members, including personal reflections, minutes of weekly meetings, artifacts, and field notes. This article focuses on how UDL provided a means for three group members to critically examine their inclusive practices at the beginning, during, and following the collaborative self-study inquiry. Using a case study methodology, self-study cases of these three faculty members—Angela, Ryan, and Sarah (Pseudonyms)—were developed. The cases reported on the journey of these faculty members in improving their inclusive practice through their engagement in self-study.

INTRODUCTION

Inclusive education has been highlighted globally by multiple world organizations such as OECD (2003), UNESCO (2009), and WHO (2011). At its heart is the principle of equal access to education for all students, demanding support for meeting the diverse learning needs of all students in classrooms (UNESCO, 1994). This global trend has guided the need to develop teachers who are prepared to provide inclusive learning environments for all students. However, research shows that classroom teachers do not feel prepared to meet the varied learning needs of all students in the regular classroom.(Florian, 2010; Giampapa, 2010; Katz, 2015; Ko & Bswell, 2013). The challenge is rapidly increasing with changing demographics in classrooms that inherently involve dynamic changes in the learning needs of students. Such a lack of confidence and under-preparedness to address student diversity in the classroom has implications for the professional learning and practice of teachers around the topic of diversity and inclusion, emphasized in a recent report on the professional learning of teachers in Canada (Campbell, Osmond-Johnson, Faubert, Zeichner, & Hobbs-Johnson, 2017).

Canada promotes inclusivity as one of the aims of teacher education programs. However, teacher education programs "continue to face challenges in preparing teachers who feel confident in addressing issues of diversity and inclusivity in their classrooms" (DeLuca, 2012, p. 551). Preparing teachers who have the necessary knowledge and skills to address the diverse learning needs of all students, is a complex and multifaceted process. Such a process requires faculty members to not only teach within their areas of specializations (e.g., mathematics or science education) but also to look beyond their content areas and integrate bodies of knowledge to encourage teacher candidates to develop professional knowledge and pedagogical content knowledge as they relates to student diversity and inclusion.

Part of this challenge is the ambiguity, multiple meanings, and diverse theoretical perspectives (i.e., accessible instruction, differentiated instruction, and culturally relevant pedagogies) used to define diversity and explain inclusion in a classroom context (Trifonas, 2003). Some disagreement exists around inclusion: what inclusion is and is not and what inclusive communities look like (Nagata, 2005; Thomas & Vaughan, 2004). Smith, Polloway, Patton, and Dowdy (2006) defined inclusion in the context of special education, emphasizing that "students with disabilities should be included in all school programs and activities" (p. 5). According to Kurz and Paul (2005), inclusion is "restructuring education provision to promote belonging" (p. 19). Avramidis, Bayliss, and Burden (2000) define inclusion as "embrac[ing] the concept of diversity as a natural state of being human or in educational terms, of being a learner" (p. 278). Many of these definitions lack clarity and clear guidelines, which hinder the practical implementation of the idea of inclusion in classrooms (Trifonas, 2003).

Faculty members in faculties of education have a critical role in helping teacher students acquire a comprehensive understanding of diversity and inclusion and teaching instructional strategies in adopting inclusion and making learning accessible for all learners. Teacher educators engage in the complex and multifaceted task of helping student teachers learn to teach, which demands mastery and integration of various knowledge forms. To carry out this work, teacher educators need to possess personal, contextual, pedagogical, sociological, and social knowledge (Goodwin, 2012). The work of teacher educators is becoming more complex with the challenge of preparing teachers who can create accessible and equitable learning environments—for all children. Therefore, there is a need to examine teacher education practices to unpack the complex job of preparing teachers for inclusivity.

Borrowing the critical question raised by Loughran (2014), this self-study inquiry focuses on what it means to become an inclusive teacher educator while working with teacher students. The journey of professional development for three faculty members, as revealed by their experiences of working with teacher students and working together as a self-study group, is narrated, analyzed, and discussed. Recognizing the diverse learning needs of their teacher students and reflecting on their professional practice using the Universal Design of Learning (UDL) principles, faculty members deconstructed their efforts to act as inclusive educators. These faculty members selected and implemented UDL principles in their education courses to improve their inclusive practices and conducted a self-study inquiry to capture their journeys of becoming inclusive educators. The following questions guided this collaborative self-study inquiry:

1. **Which UDL principles are represented in our practices?**
2. **How did adopting these principles influence our inclusive practices?**

THEORETICAL FRAMEWORK

This study draws on two theoretical underpinnings (a) Universal Design for Learning (UDL), and (b) personal practical knowledge. Below are descriptions of these theoretical perspectives and their interpretation for the purposes of this self-study inquiry.

Universal Design for Learning (UDL)

The Center for Applied Special Technology (CAST), an educational research organization, introduced UDL almost three decades ago (CAST, 2018). However, the idea has been popularized in the mid-90s. UDL underpins the earlier notion of Universal Design (UD), developed in the late 1980s by Ron Mace, an architect, product designer, educator, and disability advocate from North Carolina State University who focused on designing products that could be used by everyone "regardless of their age, ability, or status in life" (The Centre for Universal Design, 2008). UD is grounded in a number of principles: (i) equity, (ii) flexibility, (iii) adjustability, (iv) perceptibility of information, and (v) simplicity of use.

UDL is subsequently introduced as a curriculum design framework that has its foundations in neuroscience, the learning sciences, and cognitive psychology. UDL "recognizes learner variability and is a blueprint for creating instructional goals, methods, materials, and assessments that work for everyone—not a single, one-size-fits-all solution but rather flexible approaches to teaching and learning" (CAST, 2018). It directs the instructional decision-making of teachers as it relates to inclusion and student diversity. Dalton (2020) further elaborated on UDL as a framework where there is no existence of a *standard learner*; rather, the *learner variation* is the standard, and where UDL principles focus on a broad range of learners (p. 3). According to Palley (2001): "The concept of UDL is the intersection where all of our best initiatives— integrated units, multi-sensory teaching, multiple intelligences, differentiated instruction, the use of computers in schools, performance-based assessment, and others—come together" (p. 7). Orkwis (1999) viewed UDL as a means for encouraging the:

> design of instructional materials and activities that allows learning goals to be attainable by individuals with wide differences in their abilities to see, hear, speak, move, read, write, understand English, attend, organize, engage, and remember without having to adapt the curriculum repeatedly to meet special needs. (p. 9).

UDL Principles

The purpose of UDL guidelines is to help customize instructions, supports, and challenges for diverse learners, as well as to help integrate suitable and modifiable tasks, scaffolds, and supports into the instructional setting from the very start, rather than as afterthoughts or add-ons (Lapinski, Gravel, & Rose, 2012). The goal here is not to make learning simpler; rather, learning should be challenging and packed with "desirable difficulties" (Bjork & Bjork, 2011). To engage all learners in meaningful ways, resourceful teachers use a variety of materials and learning experiences. There are three core principles of UDL that guide teachers' implementation of UDL (Rose & Meyer, 2002): a) Provide multiple means of engagement, b) Provide multiple means of representation; and, c) Provide multiple means of action and expression (see http://www.cast.org/our-work/about-udl.html#.XndS0_ZFyUk).

A fourth principle—multiple means of assessment—has been recently suggested by the Rhode Island UDL Workgroup members as a result of their research on implementing UDL modules, which reveals that the area of assessment demanded greater attention. They suggest that "this modification would assist in-service and preservice teachers who are charged with meeting state and local standards and accountability targets" (Brand, Favazza, & Dalton, 2012, p. 135). Each of the UDL principles is further broken down into three guidelines and several checkpoints to support the implementation of UDL principles—by teachers—as they plan curriculum, instruction, and assessment (CAST, 2018).

The first UDL principle, multiple means of engagement, aims at developing purposeful and motivated learners by stimulating interest and motivation for learning (CAST, 2018). Teachers can achieve this outcome by providing varied opportunities for (a) recruiting their interests (i.e., increasing choice, autonomy, relevance, value, authenticity, and decreasing threats and distractions), (b) sustaining efforts and persistence (i.e., increasing expectations, mastery orientated learning, and fostering collaboration), and (c) self-regulated learning (i.e., increasing expectations, facilitating coping skills, and developing self-assessment and reflections).

The second UDL principle, multiple means of representation, aims at developing resourceful and knowledgeable learners by presenting information and content in varied ways. Teachers can implement this principle through providing multiple options for (a) perception (i.e., offering diverse ways for displaying information and alternatives for auditory and visual information), (b) language and symbols (i.e., clarifying vocabulary supporting decoding the text, promoting understanding across languages, and illustration through multiple media), and (c) comprehension (i.e., activating background knowledge, highlighting big ideas and patterns, guiding information processing).

The third UDL principle, multiple means of action and expression, aims to develop strategic and goal-oriented learners by differentiating how students can express what they know by stimulating interest and motivation for learning (CAST, 2018). Teachers can achieve this principle through providing multiple options for (a) physical actions (i.e., varying methods for students' response and increasing use of technology), (b) expression and communication (e.g., using multiple media for communication, and support for practice and performance), and (c) executive functions (e.g., setting appropriate goals, and monitoring progress).

Overall, the UDL framework allows teachers to "acknowledge learner variability" and "offer more options and alternatives—varied pathways, tools, strategies, and scaffolds for reaching mastery" (Meyer, Rose, & Gordon, 2014, p. 7). This study used UDL to inform our understanding of inclusion and inclusive teacher education practices and implement UDL principles in our teacher education practices to promote inclusion in our respective courses.

Personal Practical Knowledge

Teachers possess a "personal knowledge base" (Hiebert et al., 2002, p. 3) of teaching which informs their practice and influences their actions in explicit pedagogical situations (Brown & McIntyre, 1993). The personal knowledge base of each teacher is transient,

subject to change, and situated in personal experiences inside and outside the classroom (Barnett & Hodson, 2001). It is also described using terms such as practical knowledge (Elbaz, 1981; 1983), personal knowledge (Lampert, 1985), experiential knowledge (Clandinin, 1985; 1988), and personal practical knowledge (Clandinin & Connelly, 1995; 1996).

Educating teachers is a role undertaken by faculty members who are experts in their fields and have experience of teaching their areas of specializations. While helping future teachers develop and articulate their professional knowledge, teacher educators accumulate a repertoire of instructional strategies. This type of professional knowledge is referred to as *intimate scholarship*, representing knowledge of becoming, particularly when the researcher is the one researched (Hamilton, 1995; Hamilton, Pinnegar & Davery, 2016). For teachers and teacher educators, coming to know is *practical* and grounded in the personal experience of teaching (Ross & Chan, 2016), therefore termed as *personal practical knowledge* (Pinnegar & Hamilton, 2012).

Teacher educators "embody personal practical knowledge as the foundation" in their work of preparing future teachers (Hamilton, Pinnegar & Davey, 2016, p. 19). While describing the process, Hamilton, Pinnegar and Davey (2016) noted that the personal practical knowledge of teacher educators emerges in their own experience as teacher educators while they "draw upon their previous experiences and current practices within the context of their teacher education programs" (p. 20). Using personal practical knowledge, Pinnegar and Hamilton (2012) investigated their teacher education practices and realized that their personal practical knowledge developed as a result of interactions. Personal practical knowledge accentuates the ways teacher educators operate by merging many kinds of knowledge, which guides their decisions and actions as practitioners (Pinnegar & Hamilton, 2009, p. 22). Self-study research may help teacher educators unpack their personal practical knowledge as it allows "collaborations involving conflicting, competing, and alternative accounts of experience" (Pinnegar & Hamilton, 2009, p. 22) as they relate to inclusive practices and UDL.

METHODOLOGY
Context of the Study
The self-study group consisted of seven faculty members, who established themselves as a community of learning in a faculty of education in an Atlantic Canadian University (Authors, 2020). The purpose of the self-study group was to invite all faculty members to join initial meetings to conceptualize and enact self-study inquiry with a focus on studying and improving teacher education practices. After a year of regular weekly meetings, typically attended by between eight to 20 faculty members, with some being occasional attendees, seven faculty members became an enduring group. Six females and one male comprise this group; three members are untenured, while four are tenured faculty members at varying stages of their academic careers. The seven group members come from diverse areas of teaching and research, such as science education, post-secondary education, educational technology, and special or inclusive education. This self-study group developed as a community of learning and it became a safe place for group members to share and enhance their teacher education practices in a non-judgmental environment. Since 2015, this group has been engaged in many groups and individual self-study projects.

The first shared group inquiry, reported in this article, emerged because of our common interest in inclusive education focused on Universal Design for Learning (UDL) and reports on how this framework could inform teacher education practice. Group members met every Friday for 60 to 80 minutes. The founder of the group (second author), the Teaching and Learning Chair in the Faculty of Education, facilitated the meetings with flexible agendas and action items to conceive and enact this shared self-study inquiry. All seven faculty members reflected on their practice using UDL as a framework, and implemented UDL principles in their practice. During weekly meetings, group members shared their thoughts and reactions to using UDL principles in their practices, and supported each other in examining their practices. Three faculty members' experiences are highlighted in this article, while other group members are in the process of reporting on their shared experiences elsewhere.

Research Approach and Methods
A self-study methodology was adopted, which was (i) self-initiated, (ii) aimed at improving practice, (iii) interactive in nature, (iv) included multiple qualitative methods, and (v) operated on the basis of trusted relations (LaBoskey, 2004; Vanassche, & Kelchtermans, 2015). Self-study is not defined by its methods but by the focus of the study (Ovens & Fletcher, 2014). Therefore, this self-study had a focus on inclusive teacher education practices, and a case study design (Merriam & Tisdell, 2015) was adopted to capture and frame the complexity of faculty members' learning about becoming inclusive educators in the natural context of the courses that they teach to prospective teachers. Following the case study methodology and an intense, holistic, descriptive, qualitative analysis of the "single unit or bounded system" with defined boundaries of a self-study group, a limit on three faculty members, and a time frame of one year to collect evidence of professional learning were employed (Merriam, 1998, p. 12). The flexible nature of case study methodology revealed "holistic and meaningful characteristics" of naturally-occurring events and behaviours while the authors examined their inclusive practices through the lens of UDL (Yin, 2009, p. 4) during their collaborative self-study inquiry project.

In this self-study inquiry, the experiences of these faculty members were examined to interpret their perceptions of the UDL principles and the potential of UDL as a tool to inform inclusive practices in post-secondary settings. Collaborative interactions, as suggested by LaBoskey (2004), were utilized throughout this collaborative self-study inquiry.

Data Collection
Several data collection methods and sources were adopted to examine inclusive practices of self-study group members, including:
1. Meeting Notes (MN): Over a one-year period, the group met weekly for 60-80 minutes to plan, share, and reflect. Meetings were audiotaped and transcribed. In addition, a research assistant took meeting notes covering the key ideas discussed at each meeting. These transcripts and meeting minutes became sources of data to corroborate findings and foster collaborative reflection during meetings.
2. Written personal reflections (PR): Group members wrote reflections to document their experiences implementing UDL principles in their teacher education

practices at the beginning and end of the self-study inquiry. Each reflection was 1000-1200 words and became a source of data for this self-study.

3. Artifacts (A): Each faculty member collected artifacts (e.g., lesson plans and classwork), which helped to corroborate findings.

4. Field Notes (FN): Each faculty member kept field notes while implementing UDL principles in their teaching, which also became a source to corroborate findings.

Data Analysis

All texts from the various data sources for each faculty member were compiled in one document, resulting in seven data sets. Three groups of data were reported in this article. To document professional learning and provide a narrative of becoming inclusive educator, cases vignettes for three group members were developed.

Using the idea of analytic memoing (Patton 2002) while working as a whole self-study group, a memo was created for each group member. This research tool enabled us to describe our inclusive practice and highlight our thoughts about using UDL principles in the context of specific courses taught. It revealed potential ways in which UDL principles and our personal beliefs about diversity interact while informing our inclusive practices. For example, while considering the choices of UDL principles selected by the faculty members, and while offering explanations, efforts were made to check whether these choices were supported by their' knowledge and were consistent with their beliefs about student diversity and inclusion. This checking was achieved in two steps. First, by documenting the participants' potential of inclusive practices (i.e., by considering the UDL principles that participants implemented in their past practice) at the beginning of the collaborative self-study inquiry. Second, by analyzing the participants' learning about inclusive practices by exploring changes that occurred in their inclusive practices (i.e., by considering the UDL principles that the participants implemented in their practice) as a result of their engagement in the collaborative self-study inquiry.

Using an explanation-building approach (Yin, 2009), a cross-case analysis was performed. This analysis began with our initial hypothesis about the popular UDL principles in post-secondary settings, which was gradually elaborated on after considering new data from each emerging case. The purpose, here, was to formulate an explanation that accommodated data from all cases. A cross-case analysis, in this case, allowed for an understanding of the extent and the ways in which faculty members extended their inclusive practices.

Ethical Consideration

In this self-study inquiry, the criterion developed by Feldman (2003) was utilized to achieve a quality project. For example, a clear and detailed description was provided for what was categorized as data, including data sources, collection methods, and how data were analyzed, including processes to reveal the construction of meaning. Also, triangulation was achieved by disclosing multiple representations emerging from varied data sources, including the one that supports or challenges one another. In addition, the changes self-study group members experienced were delineated in the form of claims regarding inclusive practices and pedagogies, including the evidence that supports these claims.

FINDINGS

We developed case vignettes of the professional learning of three faculty members from diverse backgrounds and areas of specialization, which focused on providing multiple means of (a) engagement, (b) representation, and (b) action and expression (three UDL principles) to make their course experiences accessible for all students. These case vignettes are presented in the following sections.

Inclusive Practices in Online Learning Environment: The Case of Angela

Angela is an Assistant Professor in the Faculty of Education and describes herself as a post-secondary and adult education educator. She offers courses in the area of post-secondary and adult education, and due to the nature of enrolment for working professionals in these courses, she offers her graduate courses in an online setting. Her main research interest is student transitions in post-secondary education and the extent to which organizational and information frameworks support movement among colleges, universities, and the labour market. Angela acknowledged her lack of information regarding the implementation of UDL in distance education and was particularly interested in exploring "how UDL supports and advances online learning environments" (MN, Feb 17, 2018). She also wanted to explore "the variations in usage and returns between face-to-face and online learning environments and the level of previous adaptation within graduate level courses" (PR, May 10, 2018). For the purposes of this self-study inquiry, Angela selected a graduate course on student affairs/services (ED 6841, *Student Development Theory, Services and Programs in Post-Secondary Education*) that was offered in winter 2018, and "monitored and introduced UDL principles" in her teaching practices (PR, May 10, 2018). The UDL principles that were concentrated in her practice included multiple means of actions and expression and multiple means of engagement (UDL Principles).

Reflecting on her practice, Angela realized that she provides options for action and expression using multiple media for communication (UDL Checkpoint 5.1). Angela stated, "I provide a variety of media formats and opportunities for expression via assignments within my online courses." She further elaborated:

> My weekly updates include a current media-related item, research article, project, news item, webinar opportunity, etc., for students to engage with related to the current topic that is being studied. Further, students are asked to employ various writing forms as this is of importance as an administrator and includes research papers, policy reports, book reviews, narratives, case studies, etc. The relevance is the "importance for all students to learn composition, not just writing, and to learn the optimal medium for any particular content of expression and audience. (PR, Nov 10, 2017)

Similarly, to engage her students in online learning environments, she recognized that she had been providing options for recruiting interest by optimizing individual choice and autonomy (UDL Checkpoint 7.1) and minimizing threats and distraction (UDL Checkpoint 7.3) for her students. Describing her strategy, she said that she always aims to ensure that the "optimal instructional environment offers options that, in their aggregate, reduce threats and negative distractions for everyone in the online environment" (PR, Feb 10, 2017). Angela usually achieved this by having "clear instructions, schedules, calendars, planners,

and examples" because "the predictability of activities and assignments is highly important given that adult learners wish to know how they will be using their past knowledge and integrating it into new learning in meaningful ways" (PR, Nov 10, 2017).

In identifying areas for enhancement in the above course, Angela wanted to continue providing multiple means of engagement (UDL Principle) by providing options for sustaining efforts and persistence (UDL Guidelines 8). To accomplish this purpose, she planned to "foster collaboration and community" (UDL Checkpoint 8.3) by improving "the level of collaboration among students for the purposes of sharing experiences and knowledge and contributing to assignments collectively" (PR, Feb 10, 2017). She also indicated that, to engage students from different time zones, she integrated "technology within the online courses to assist with this so that students from various time zones can participate is a challenge" (PR, Feb 10, 2017).

Angela also stated that it is her objective to improve the feedback given in her courses (UDL Guideline 8.4). She indicated that it is quite difficult to sustain engagement via constructive and critical feedback. In her words: "It is my hope to improve the timing, variety, and emphasis on feedback throughout my courses. Presenting feedback in multiple modalities and ensuring it is substantive and informative is of importance" (PR Nov 10, 2017).

Another area of improvement that Angela identified in her practice was her efforts to provide multiple means of representation (UDL Principle II) by maximizing transfer and generalization (UDL Checkpoint 3.4). She introduced "ThinkBlots exercises" in her online course, to "encourage experiential and problem-based learning." According to Angela, these exercises provided students with "applications for testing, virtual field trips, scavenger hunts, podcasts and videos, and recent articles, new releases, and media for exploration" with a purpose of "emphasiz[ing] reflection and application of the weekly modules/units' material." (PR, May 10, 2018). These exercises allowed her students to engage critically with that they were learning, and "respond by sharing and synthesizing their discoveries and thought processes in a succinct posting" (May 10, 2018).

Optimizing Students' Choice and Autonomy: Case of Ryan
Ryan is an assistant professor in the Faculty of Education and describes himself as an educational technology teacher educator. He teaches undergraduate and graduate students and his research focuses on designing and implementing effective technology integration in curriculum, teaching, and learning. One of the courses he teaches to student teachers is *Computer & Learning Resources for Primary/Elementary Teachers*. According to the course description, "it focuses on integrating computer software and other learning resources into primary/elementary school teaching." A course objective is that students integrate technology into the primary/elementary curriculum that they will teach after graduation. Ryan wants students to "acquire the knowledge and skills necessary to analyze learning contexts, choose the right technology accordingly, and integrate it in the curriculum so that their future students have deeper and meaningful learning experiences" (PR, May 10, 2018).

To be a more inclusive educator, reflection was the starting point for Ryan to find areas where he was succeeding and issues that needed improvement. In terms of many areas of his curriculum and practice, Ryan was already integrating UDL principles. For

example, he provides multiple means of representation through using "multimodal means of illustrations to present the content" (PR, Feb 17, 2017), and incorporates "graphics, sound, videos along with text to represent what students are going to learn."

On the other hand, Ryan thought he needed to improve his student teachers' engagement through optimizing choice and autonomy. He wondered how providing more choice and autonomy could be accomplished without jeopardizing the course objectives. The aforementioned objective of the course was inflexible; however, the methods to reach it could be negotiated in order to optimize individual choice and autonomy. Enhancing such a choice is one of the "checkpoints" in granting students better access, hence providing multiple means of engagement (see checkpoint 7 at http://udlguidelines.cast.org/1). According to CAST, "Offering learners choices can develop self-determination, pride in accomplishment, and increase the degree to which they feel connected to their learning" (CAST, 2019).

As a preparatory step, Ryan explained to his students what UDL is, his rationale for integrating it into his practice, what students should expect, and how his plan for UDL would be implemented in practice. He also informed them of his intention to invite a colleague—a critical friend—to attend class and observe him teach.

Optimizing student's choice and autonomy involved providing them with the knowledge and skills they needed to choose among "a pool of technologies available to them to integrate into the curriculum" (PR May 10, 2018). He further elaborated: "I would provide them with learning opportunities to examine the contextual considerations of a teaching context and choose the right technology through which to deliver the content." (PR, May 10, 2018).

Ryan redesigned the course to be more inclusive and integrate UDL consciously. This redesigning involved changing the syllabus to integrate more choices so that students could choose their assignments from available options. As previously stated, students were expected to integrate a number of technologies during their course. In redesigning the syllabus, Ryan changed the evaluation scheme to provide students with a choice of three technology integration assignments. By means of this change, he kept the main objective of the course intact while providing students with more individual choices and autonomy. He explained:

> They had the option to select the content and medium through which they wanted to present their assignment. This option not only serves pre-service teachers' interests regarding what technologies they are enthusiastic about integrating but also is well dependent on the capabilities of the technologies of their choice in delivering the content. More freedom to choose the content was also another strategy to pick their interests, as students were coming from different educational backgrounds.

Further elaborating on the benefits of implementing UDL principles, Ryan said, "After choosing the content and technology to deliver it, students had the choice to do their assignments individually or with a group" (PR, May 10, 2018). This option had the potential to accommodate those students who wanted to complete the assignments at their own pace while giving a choice to the ones who needed peer support. Reflecting on the impact of UDL on teacher students' learning, Ryan said: "Students['] feedback shows promising results as they believe choices provided favored them in a number of ways" (PR, May 10, 2018). Ryan's

students "enjoyed the assignment because there were options", and they thought that the "choice of the assignment was very manageable" (PR, May 10, 2018).

Maximizing Collaboration and Mastery Learning: The Case of Sarah

Sarah is an Assistant Professor in a Faculty Education and describes herself as a science teacher educator. She teaches undergraduate and graduate courses on science education; she has been involved in preparing K-12 science teachers and regularly offering science methods courses to pre-service teachers for more than a decade. Her research interests include studying and understanding the development of pedagogical content knowledge (PCK) of preservice and in-service science teachers. She also focuses on changing the science teaching beliefs of elementary teachers and the development of their science teaching identity. Sarah is a relatively new tenure-track faculty member; she has been a member of the self-study group since its establishment in 2015.

Reflecting on teacher education practices in the context of a science methods course, Sarah noted that she had already been using some UDL principles in her teacher education practice such as "providing multiple means of engagement" through creating "options that enhance relevance, value, and authenticity" (UDL Checkpoint 7.2) for her students. In her words:

> I try to offer relevance, value, and authenticity through a lesson study group project for my intermediate/secondary pre-service science teachers. They act as professional teachers, by developing science lessons using specific curriculum outcomes and then collaborating to improve these lessons. (PR, Feb 10, 2017)

She further described her strategy to provide opportunities for student teachers to "teach their lessons in a simulated environment … invite feedback from peers during debriefing meetings after teaching the lesson, and treat this feedback as data and research their lesson by analyzing the data" (PR, Nov 10, 2017). Sarah realized that she has also implemented the UDL principle by providing multiple means of engagement through optimizing options for student teachers to "develop self-assessment and reflections" (UDL Checkpoint 9.3) by including "reflective practices" in the above lesson study project with an objective "to allow students to reflect and self-assess their lesson study skills" (PR, Nov 10, 2017). Sarah realized that she also provides "options for perception" (UDL Guidelines) for increased access to the course materials for her students by providing various ways of customizing the display of information [UDL checkpoint 1.1]. She elaborated that in addition to hands-on learning experiences, she provided opportunities to "think, pair, share" and "mind-mapping the ideas." Similarly, in addition to the students' notes in class, she provided them with supplementary PowerPoint slides. In her words, "I always think it might be good for them to write their notes, but I just put my slides up in online course shell [Desire-2Learn], as I want them to engage in discussion and use critical thinking skills, rather than just writing notes." (MN, Feb 17, 2017)

Besides noting the areas of strength in her teaching that define her as an inclusive science teacher educator and identifying the UDL principles that are reflected in her practice, Sarah commented that "there were other aspects of UDL that needed more emphasis" in her practice (PR May 10, 2018). Therefore, she decided "to improve her student teachers' engagement" (UDL

Principle) through "fostering collaboration and community" (UDL Checkpoint 8.3), and "increasing mastery-oriented feedback" [UDL Checkpoint 8.4] (PR, May 10, 2018). She said:

> My intention is to improve collaboration among teacher students while they are engaged in lesson study projects and generally throughout the course. I am thinking of encouraging them to use Google Docs or other similar technologies available to collaborate in a professional manner. (PR, Nov 10, 2017)

To foster collaboration and community, Sarah introduced "two group projects" in addition to the "lesson study project" (PR, May 10, 2018). She encouraged teacher students to use "online, free platforms for group collaborations (e.g., Slake, Google Docs) and facilitated each online group to provide continuous, meaningful and timely feedback to her student teachers" (PR, May 10, 2018). Sarah also "implemented some content-based team building activities, along with a research-based online tool, Teamwork Skills Inventory, TSI (https://www.teamworkskillsinventory.org/) for self- and peer-evaluation of teamwork skills" (PR, May 10, 2018). To develop a sense of community, Sarah stated that she often sets up discussion forums at the beginning of the course, whereby she introduces herself and allows the students to introduce themselves. In her words, this procedure "helps in developing a community by understanding each other better, which later results in productive collaborations" (MN, Feb 17, 2017). As a result of this self-study inquiry, Sarah was able to better understand her inclusive teacher education practices and model inclusive practices through the use of UDL in her science methods course. She also noticed that her pre-service students "improved their professional collaborative skills and showed mastery learning in their final group submissions" (PR, May 10, 2018).

DISCUSSION

A cross-case analysis showed that Angela, Ryan and Sarah enhanced their inclusive practices and considered all three UDL principles (see Table 1 for a summary of UDL principles reflected in their practices). However, the UDL principle of *engagement* (providing multiple means of engagement) was the primary focus of their teaching practices. Both Angela and Sarah identified student engagement as one of their strengths in their selected courses, and they continued to improve student engagement, an important characteristic of inclusive practices. Ryan identified multiple means of representation and multiple means of action and expression (UDL Principles) as being represented in his current practices, while he planned and incorporated multiple means of engagement (UDL Principle) into his practice.

According to the Canadian Council on Living (2009), students who are excluded are usually disengaged, and vice versa. Student engagement is one predicting factor for success (Skinner et al., 2009). Highly engaged students complete school, get higher grades, and most often advance their education (Park, Holloway, Arendtsz, Bempechat, & Li, 2012). Research shows that as K-12 students move up from lower grades to higher ones, their level of engagement may decrease (Fredricks, Blumenfeld, & Paris, 2004; Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003). Therefore, in those higher grades, it is especially important to facilitate student engagement and develop pedagogies to create inclusive classrooms that will engage academically and socially diverse students. Students are engaged socially if they have a sense of belonging, if

Table 1. Summary of the UDL Principles Reflected in Practice					
Participant	UDL Principle		UDL Guideline		UDL Checkpoint
	Provide multiple means of …		Provide options for …		Providing/Using/optimizing/ …
Angela	Actions and Expression	5	Expressive Skills and Fluency	5.1	Use multiple media for communication
	Engagement	7	Recruiting Interest	7.1	Optimize individual choice and autonomy
				7.3	Minimize threats and distractions
	Engagement	8	Sustaining effort and persistence	8.3	Foster collaboration and community
	Engagement	8	Sustaining effort and persistence)	8.4	Increasing mastery-oriented Feedback
	Representation	3	Comprehension	3.4	Maximize transfer and generalization
Sarah	Engagement	7	Recruiting interest	7.2	Options that enhance relevance, value, and authenticity
	Engagement	9	Self-regulation	9.3	Develop self-assessment and reflection
	Engagement	8	Sustaining effort and persistence	8.3	Foster collaboration and community
	Engagement	8	Sustaining effort and persistence	8.4	Increase mastery-oriented feedback
Ryan	Representation	2	Language, mathematical expressions, and symbols	2.5	Illustrate through multiple media
	Expression and Communication	5	Expressive skills and fluency	5.1	Use multiple media for communication
	Engagement	7	Recruiting interest	7.1	Optimize individual choice and autonomy
	Engagement	9	Self-regulation	9.3	Develop self-assessment and reflection

they interact with peers, and if they get involved in social activities (Archambault, Janosz, Morizot, & Pagani, 2009). They are engaged academically when they participate in academic tasks and are cognitively invested in these tasks (Dunleavy & Milton, 2008; Willms et al., 2009).

Both Angela and Sarah implemented strategies to foster collaboration among students and developed a community of learning that fostered a sense of belonging. They aimed at engaging their students socially, so they felt included—and were included—in their learning experience. Similarly, in their quest to become more inclusive educators, Angela, Ryan, and Sarah focused on the academic engagement of their students. They implemented strategies to provide mastery-oriented feedback, develop reflections and self-assessment, optimize choice and autonomy, and enhance relevance and authenticity. These strategies can facilitate enhanced cognitive investment on the part of students; academic tasks support varied ability levels so that students do not give up on the selected tasks and continue their efforts to complete the task. This was what was observed and reported by these faculty members.

Angela and Ryan identified providing multiple means of action and expression (UDL Principle) as one of their strengths; they focused on expressive skills and fluency and used multiple media for communication (ULD checkpoint 5.1). They provided many and varied ways for their students to express what they know or learned in these courses through the course assignments. These strategies led to social and academic engagement of their students, as evident in faculty members' reflections.

Angela and Ryan continued providing multiple means of representing (UDL Principle) of the content to all students during this self-study inquiry. Ryan identified that this principle was reflected in his inclusive practices. He used multiple media to illustrate the language and mathematical expressions, and symbols. Similarly, Angela employed techniques for students to comprehend information to facilitate the transfer and generalization of information. The repertoire of their instructional strategies can support the academic engagement of students, where multiple means of representations can assist students' cognitive processes in understanding the academic task at hand and therefore fostering persistence in their effort to complete the assigned task.

CONCLUDING REMARKS
There has been a strong focus on preparing inclusive teachers for K-12 classrooms in recent research and related publications. However, less focus has been diverted to the inclusive practices of teacher educators and faculty members who play a critical role in preparing these teachers for complex, inclusive classrooms (Forlin, 2010; Gorski, 2016; Sathy & Hogan, 2019; Specht, et al., 2016; Walker, 2016;). This self-study inquiry project points to the need for self-realization and development of teacher educators and faculty members who play an important role in preparing future K-12 teachers and other educators. In this article, we reported three faculty members' journeys and their progression towards "becoming" inclusive educators as they engaged in a self-study inquiry. This collaborative self-study inquiry highlights the development of their personal practical knowledge related to inclusion and inclusive practices while they built upon their previous experiences and examined their current practices (Hamilton, Pinnegar, & Davey, 2016).

UDL provided a means for Angela, Ryan, and Sarah to critically examine their inclusive practices at the beginning of, during, and after their collaborative self-study inquiry. UDL served as an instructional tool to guide pedagogical decisions and enhance the inclusive practices of these faculty members. The study demonstrates how UDL can provide opportunities to reflect on inclusive practices and be adopted as a guide to enhance inclusive practice. Moreover, it encourages similar self-directed inquiries that support the learning of faculty members about inclusion and UDL. From a broader perspective, this inquiry highlights the value of self-study as a tool for improving inclusive practices by enabling faculty members to work collaboratively to improve future teachers' learning.

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