A Universal Design for Success: A Mixed-methods Case Study of a First-year BScN Course

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Cover Page Footnote

Postsecondary students increasingly have diverse backgrounds, abilities, and learning preferences. As admission numbers continue to rise (Statistics Canada, 2020), universities and colleges must function effectively with fewer resources, resulting in larger class sizes and more student diversity (Michalski et al., 2017). The increase in learner heterogeneity requires institutions and instructors to find novel ways to accommodate needs without compromising the quality of education. Despite efforts, the needs of many postsecondary learners are not sufficiently addressed through typical accommodation services (Burgstahler, 2020). It has been suggested that inclusively designed instructional practices and learning spaces can benefit all learners, not only those with documented disabilities (Center for Applied Special Technology [CAST], 2011; Meyer et al., 2014).

Inclusive Education

Inclusive education is defined as a "process of reaching out to all learners by addressing all forms of exclusion and marginalization; disparities; and inequalities in access, participation, and learning outcomes" (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2019, UNESCO's Response section). Students with disabilities at postsecondary institutions in Ontario encounter many of the same difficulties as students in primary and secondary education (Ontario Human Rights Commission [OHRC], 2005). In 2005, the *Accessibility for Ontarians with Disabilities Act, 2005* (AODA) was enacted. Its definition of disability includes any degree of impairment related to physical, mental, developmental, or learning dysfunction. Accessibility standards relevant to higher education were subsequently created (AODA). Institutions have developed strategies to meet these standards, including by improving the accessibility of learning spaces, using adaptive technologies, providing support services, having in-class support such as note-takers, and modifying evaluation methodologies (OHRC, 2005). To meet the AODA requirements, educators are expected to provide accommodations, up to the point of undue hardship.

Typically, students seeking accommodations require medical documentation, registration, and coordination with university Student Accessibility Services. Nursing graduates with disabilities have reported that they did not ask for academic accommodations during their education (Neal-Boylan & Miller, 2017). These students may fear that exposure of a disability makes them vulnerable to discrimination during school and ineligible to become registered nurses. While some faculty have expressed frustration that learners fail to disclose their specific learning needs (Ashcroft & Lutfiyya, 2013), others are not supportive (Olaussen et al., 2019).

Instructors often struggle to offer an inclusive learning environment. A traditional one-size-fits-all pedagogical approach that uses passive learning techniques may restrict learner information processing and performance expression (Meyer et al., 2014). Inclusive teaching practices require faculty to respect and value equity and fairness among students by considering learner differences as they develop curriculum, pedagogy, and assessment (OHRC, 2005). Universal Design for Learning (UDL) provides a theoretical and structural framework that guides organizations and instructors to proactively design flexible curricular options that reduce learning barriers for all students, not only those with documented disabilities (Meyer et al., 2014). Founded by Rose and Meyer in 1984, CAST (2011) has led efforts to create equitable access to education by developing UDL principles and applying them to educational software, technology, curriculum, and, most recently, postsecondary education.

Universal Design for Learning

UDL began as an advocacy effort targeted towards removing physical barriers in the built environment for people with physical disabilities (Center for Universal Design, 1997); as the idea spread, it was recognized that others could benefit from this concept (Meyer et al., 2014; Rose & Meyer, 2002). UDL extended the application of accessibility principles to the learning environment (CAST, 2011).

Based on the neurocognitive science of learning, three main principles compose the UDL framework: (a) multiple means of engagement, (b) multiple means of representation, and (c) multiple means of action and expression (CAST, 2011; Meyer, et al., 2014). Integrating multiple means of engagement requires strategies to promote learner motivation and perseverance. The use of multiple means of representation involves presenting information in a variety of ways, including text, graphics, audio, and video formats. Implementation of multiple means of action and expression allows students alternatives to articulate mastery of content—for example, oral presentations rather than written tests.

As an inclusive teaching strategy, UDL helps to lessen but not eliminate the need for formal accommodations (CAST, 2011; Meyer et al., 2014). UDL provides all students with equitable access to course material, allowing individuals to use their strengths while acknowledging that students may have different methods of learning. Flexible instruction and curriculum create significant advantages for all learners (Meyer et al., 2014).

Although UDL has existed for decades, it has been primarily used in K–12 education (Meyer et al., 2014; Tobin & Behling, 2018). The adoption of UDL in Canadian postsecondary institutions has been slow. Studies supporting the postsecondary use of UDL have focused primarily on the perspectives of students with disabilities and faculty or pre-service teachers (Schreffler et al., 2019; Seok et al., 2018). The impact of UDL on every student, not only those with documented disabilities, needs to be understood.

Purpose

The researchers recognized that UDL could guide instructors to design flexible and accessible learning environments and support inclusive practices in large in-person and place-based classes. The purpose of this study was to describe the extent to which a course, or case, designed using UDL principles provided an inclusive environment to a diverse learning population of first-year baccalaureate nursing students. The researchers, co-instructors of an in-person and place-based, 12-week, mandatory first-year nursing course at a Canadian university, applied principles of UDL as both a theoretical lens and an instructional framework to redesign the course. Key components of the course or case are described below.

Classroom Strategies

Several strategies were introduced to encourage active student participation. Before starting the semester, a video was posted on the course learning management system to introduce students to the instructors and highlight course expectations. In-person and place-based classes were structured to encourage engagement by integrating active learning exercises, discussion questions, video clips, and music with themes that aligned with course topics. In one form of active learning, students were asked to participate in an in-class activity and then use their personal computers to enter brief reflections as evidence of participation. Important concepts from the previous week were reviewed at the start of each class, which allowed students to ask questions.

A shuffle seating strategy was incorporated into weekly class times whereby the co-instructor who was not teaching would sit beside a different group of students in the classroom every week to create presence and encourage teacher–student communication. In-person and place-based classes were recorded and posted on the learning management system. Students were encouraged to engage with required readings by using a commercial adaptive quizzing program associated with the textbook. These quizzes were an opportunity for students to accumulate percentage points and gain experience taking multiple choice tests in a low-stakes environment, to help build confidence when they take their licensing exams after graduation.

Learning Management System

The learning management system played a key role in implementing UDL. Ally, an accessibility tool, was integrated into the learning management system to help instructors determine if teaching resources met accessibility standards. The tool allowed students to change the format of a document if needed (e.g., from text to audio). Before each class, the instructor posted PowerPoint slides, as well as graphic and text-based advanced organizers covering weekly objectives, topics, activities, and readings. Instructors published monthly schedules with important dates and created a forum dedicated to answering student questions about the course.

Seminar Sessions

Seminars were grouped into six two-hour time blocks in the second half of the course and focused on group work and communication skills. In the first hour of each seminar, students engaged in role-play exercises related to course content. Once activities were completed, students discussed their experiences with the group to enable all group members to learn from one another.

During the second seminar hour, students worked as a group on a final project. During this time, instructors would monitor group discussions and offer direction when needed. Each week, a different group member assumed a facilitation role. This allowed all students to build skills in group facilitation and contribute to the group task. Each week, facilitators submitted a brief report, summarizing the work of each group. Groups presented their projects in the last week of the semester in a format of their choosing. Presentations were evaluated by instructors and peers; this feedback replaced a final exam.

Assessment

Assessment was designed to allow for multiple means of engagement, representation, action, and expression of learning. Four different means of assessment were used: (a) participation (in-class activities, seminar group work, adaptive quizzing), (b) a scholarly paper reporting on the student's interview of a registered nurse, (c) an online formative review deployed on the learning management system, focusing on application of theory to practice, and (d) a final group project that included peer evaluation. The weighting of assessments was evenly distributed across categories and care was taken to minimize anxiety-producing language in the course (e.g., percentage points versus grades, formative review versus midterm exam, group final project versus group final assignment).

Students had the opportunity to earn bonus percentage points by attending a two-hour activity sponsored by the university's Indigenous cultural adviser. In addition to providing a valuable learning experience that aligned with the course content, students could acquire two additional percentage points toward their final course grade.

Flex Time

To accommodate multiple requests for assignment extension deadlines to assist students with various learning disabilities, instructors created flexible assignment due dates so that every student would have the opportunity for extended submission timelines, without the need to seek permission. For example, if the syllabus stated that an assignment was due on the 14th of the month, the due date would be the 21st. Instructors named this "Flex Time."

Methodology

A convergent mixed methods descriptive case study design was selected to gain an in-depth understanding of the *case*, the fall 2019 offering of a first-year undergraduate nursing course designed using UDL-based principles. A convergent design allows for the merger of qualitative and quantitative findings to achieve a more comprehensive understanding of the results, while also providing a source of validation for both forms of data (Creswell & Plano Clark, 2018). Grounded in constructivist philosophy, a case study design provides additional in-depth evidence of the case within its real-world context (Yin, 2018). The research team consisted of two co-instructors, a research assistant, and two student research representatives. The role of the student research representative was to encourage student participation in the study and to provide informal feedback to the team about student experiences with UDL strategies used in the course.

Data Collection

A purposive convenience sample was drawn from a class of 223 nursing students. Within this group, 17 students had formally requested academic accommodation through the university's Student Accessibility Services. The co-instructors posted a video, informing students about the study and inviting participation. The research assistant completed recruitment during the first in-person and place-based class after instructors left the room.

Instrument

The *Inclusive Teaching Strategies Inventory-Students* (ITSI-S) (Gawronski et al., 2016), a self-reporting survey, was used to measure student experiences of UDL and inclusivity. The ITSI-S consists of five demographic questions, followed by 80 items that are divided into three main sections: student beliefs about UDL and inclusivity, student experiences of instructor actions in the classroom, and student experiences in the classroom. Six subscales based on the primary tenets of UDL and inclusivity are used within student beliefs about UDL and inclusivity, and student experiences of instructor actions in the classroom segments, to measure the six constructs of accommodations, accessible course material, course modifications, inclusive lecture strategies, multiple means of presentation, and inclusive assessment. The ITSI-S is constructed so that student beliefs about UDL and inclusivity segment questions match student experiences of instructor actions in the classroom segment questions, capturing both instructor actions and student beliefs. In a previous study, overall internal consistency of the ITSI-S was reported to be good (Cronbach's $\alpha = 0.83$) (Gawronski et al., 2016).

Data Collection

Qualitative and quantitative data were collected at selected points in the semester. Qualitative data were collected to answer the following question: How do first-year BScN students describe the impact of a course designed by integrating UDL principles, which are inclusive of multiple means of representation, engagement, action, and expression, in supporting their learning? Data were obtained from an end-of-semester in-person and place-based student focus

group interview facilitated by the research assistant and guided by a set of eight open ended sub-questions targeted at answering the qualitative question. Focus group data were supplemented by research team meeting notes.

Quantitative data were collected to answer the following question: How do students rate the inclusiveness of a teaching and learning environment which extends varied learner access to knowledge in a first-year course designed by integrating UDL principles? Data emerged from two sources: the ITSI-S (Gawronski, et al., 2016) and document review of final course grades ($n = 206$). The ITSI-S survey was completed online by 44 ($n = 44$) students, but of these, only 32 ($n = 32$) participants (93% of whom were female and 7% of whom were male) answered all questions. Respondents were between the ages of 18 and 31 years old, with an average age of 21. Two reported that they were registered with Student Accessibility Services at the university.

Ethical Considerations

The study was approved by the university's research ethics board. Students were asked to give informed consent to one or all of the following: (a) making coursework available for analysis, (b) completing an online or in-person questionnaire, and (c) participating in an end-of-term focus group. To prevent any conflict between research and teaching roles, co-instructors did not have access to raw data, nor did they know the identity of participants. Survey responses were anonymous; researchers could not link participant identity with individual responses. The co-instructors received anonymized data only after the course was completed and grades had been posted.

Mixed Methods Data Analysis

To examine the extent of convergence and divergence between quantitative and qualitative findings, a convergent mixed methods analysis of the data collected was conducted. Qualitative and quantitative data were analyzed separately using MAXQDA software, which offers basic quantitative descriptive statistics and qualitative coding services, then merged to develop a comprehensive understanding of the case.

Qualitative focus group data were initially transcribed by the research assistant from an audio recording to maintain confidentiality and allow for an accurate transcription of the responses before providing this data to the researchers for analysis. A systematic analysis approach as outlined by Creswell and Plano Clark (2018) was used by researchers to review the content. Initially the data were independently read through by researchers to gain an overall sense of the information collected. Preliminary thoughts were written down in bullet point format by each researcher, before establishing codes of these themes, with related descriptions. After these preliminary codes were established and confirmed among researchers, key constructs were more formally organized according to the eight focus group questions posed. A codebook was established in the MAXQDA software with these initial codes. Subsequent groupings of the codes were developed and described based on identified themes or categories as indicated by counting the frequency of word or phrase occurrences. Interrelated categories or a smaller set of themes were established by conducting several iterations of this process until no new themes were identified (Creswell & Plano Clark, 2018).

Forty-four ITSI-S quantitative online survey questionnaires were submitted. Survey data were transferred from the Qualtrics database to an Excel spreadsheet by the research assistant. The information was checked by researchers for any data entry errors or missing item responses.

Twelve incomplete surveys were excluded from the final analysis. Data from the remaining 32 surveys were uploaded to MAXQDA, which allowed for the generation of descriptive statistics including the means (M) and standard deviations (SD) for each question, subcategory, and section of the tool, to allow for general comparison.

Researchers compared the two sources of data to identify related themes. Qualitative and quantitative data were prioritized equally. A joint display table was developed, and data were interpreted separately by each researcher before collaborative comparison, discussion, and resolution of differences in evidence.

Findings

The mean score of the three ITSI-S key tool segments (student beliefs about UDL and inclusivity; student experiences of instructor actions in the classroom; and in-class experience) was $M = 4.17$ on a 5-point Likert scale where 5 (*strongly agree or always*) is the most positive position and 1 (*strongly disagree* or *I don't know*) is the most negative response. Mean scores for all three segments fell primarily between the 4 (*agree* or *most of the time*) and 5 (*strongly agree* or *always*) ratings: student beliefs about UDL and inclusivity ($M = 3.98$, $SD = 0.88$), student experiences of instructor actions in the classroom ($M = 4.02$, $SD = 0.61$), and in-class experience ($M = 4.47$, $SD = 0.52$), respectively. The mean Likert scores for each of the six subscales obtained from both student beliefs about UDL and inclusivity and student experiences of instructor actions in the classroom sections of the ITSI-S tool were compared.

Data from the focus group were merged with student beliefs about UDL and inclusivity and student experiences of instructor actions in the classroom survey segments, using the six ITSI-S subcategories to organize data and demonstrate areas of convergence and divergence. Given that focus group data concentrated on students' overall experiences of UDL, and the ITSI-S was centred on the concept of inclusivity, focus group data are not an exact match with ITSI-S subscales. Because UDL principles are the conceptual foundation of the ITSI-S survey, however, investigators decided that this approach would best answer the research question.

Accommodation

The accommodation subscale included allowing the use of assistive technology in class or to complete tests, providing copies of notes/PowerPoints and videos of lectures, arranging for extended time on assignments/tests, and allowing flexible response options for students with documented disabilities. The rating of student experiences of instructor actions in the classroom ($M = 4.00$, $SD = 0.85$) was found to be minimally greater than the mean from the respondents' student beliefs about UDL and inclusivity ($M = 3.96$, $SD = 1.06$). Most students appreciated the universal availability of accommodations.

The focus group discussion yielded similar findings. One student stated, "Flex Time helped me schedule my week because I had other assignments due." Another stated, "Really liked technology aspect and adaptive testing which helped me study for midterm in this course and final exam in another course." A student reported that they "liked that adaptive tests were participation versus grades based; better for learning." However, several students identified the Flex Time for seminars as confusing; one student stated that "a lot of students forgot to submit things every week." Another student similarly commented, "It was almost like I had forgotten." One student suggested that "it would have been better to submit activity at the end of seminar."

Accessible Course Materials

In this study, the accessible course materials subscale referred to using an online learning management system, providing course notes/electronic versions of course material, and allowing student flexibility in determining assignment submission format. Most participants strongly believed (student beliefs about UDL and inclusivity $M = 4.13, SD = 1.00$) and agreed that instructor actions (student experiences of instructor actions in the classroom $M = 4.52, SD = 0.63$) supported provided accessible course material for students. Focus group data were consistent with these findings. One student stated that "lecture videos posted on learning management system made big difference," while another stated that they "really loved being creative with group project." Students also reported that having accessible course materials was a factor in lowering student stress. However, one student wished "the textbook was available in an e-version… so massive."

Course Modifications

The course modifications subscale captured participant perceptions of the instructor's flexibility in reducing course readings and allowing for the completion of extra credit when requested by students with documented disabilities and students without documented disabilities. Scores in both student beliefs about UDL and inclusivity ($M = 3.08, SD = 1.12$) and student experiences of instructor actions in the classroom ($M = 2.83, SD = 1.32$) indicated that instructors should increase accessibility by making course modifications (e.g., offering a reduced course reading load and allowing for extra credit). These means were the lowest of all six subcategories. Interestingly, qualitative and quantitative data appeared to diverge most significantly in this subcategory; for example, one student stated that they "liked the option for extra credit," and another stated that they "liked to do readings, appreciating option for additional participation marks." In the words of another, "Textbook readings and being further invested in (adaptive quizzes) gave me broader sense of knowledge and more competent; not just basic memorization; feel like fully learned." Conversely, one student described the textbook readings as "not being useful for anything besides the quizzes."

Inclusive Lecture Strategies

The inclusive lecture subscale comprised four questions related to the instructor's ability to provide an overview of course topics before class, clarify questions, summarize key points, and connect these points with course objectives during class. Student beliefs about UDL and inclusivity ($M = 4.37, SD = 1.01$) and student experiences of instructor actions in the classroom ($M = 4.32, SD = 0.84$) segment findings suggested that participants understood and recognized instructor attempts to enhance lecture inclusivity. Qualitative data from the focus group interview further support these findings, as demonstrated by statements like "lecture style approach very positive," "(the instructors) brought in some discussion but wasn't too extreme; always bringing it back to main point not like other course lectures." One student stated, "Even in class if you had questions, professors let you ask and discussed it, very open."

Inclusive Classroom

The inclusive classroom subscale included the use of technology to offer a variety of course material in different formats to supplement class lectures and course content. Questions also focused on capturing whether the instructor facilitated communication and engagement through a variety of small-group, peer-assisted, and hands-on activities. Most respondents agreed that the instructors offered an inclusive classroom environment (student beliefs about UDL and inclusivity,

$M = 4.14$, $SD = 0.97$; and student experiences of instructor actions in the classroom, $M = 4.22$, $SD = 0.61$). Focus group data converged with these quantitative findings—for example, "Recording lecture most helpful, if couldn't attend had option of watching video afterwards, even while studying for midterm could always go back and see what was missing in your notes by re-watching," and "It was great to get to meet, and work with people in class; did not have to struggle organizing meeting times."

Inclusive Assessment

This subscale included four questions specific to allowing students to demonstrate knowledge and skills in multiple ways and providing flexible assignment deadlines and response options for any student. Student beliefs about UDL and inclusivity ($M = 4.20$, $SD = 1.01$) and student experiences of instructor actions in the classroom means ($M = 4.30$, $SD = 0.72$) suggested that most students felt that learner assessment was inclusive of diverse needs. Qualitative data were converged with the quantitative results, as demonstrated by statements such as "[I] liked instead of an exam had group project because I'm not good at testing," and "flexibility of testing was most helpful as it hit everyone's strengths, allowed opportunity to succeed." The formative review was praised by students as "liked way it was set up," and "gave an opportunity to apply what we were learning." However, several students "had Wi-Fi and timing issues," and one further stated it was "great in theory; needs work on execution."

In-class Experience

The last 14 questions of the ITSI-S survey represent the in-class experience segment of the tool. The overall in-class experience mean ($M = 4.47$, $SD = 0.52$) indicated that respondents had these experiences most of the time in class. See Table 1 for a comparison of focus group data and in-class experience items.

Table 1

ITSI-S Experience in Classroom (EIC) Questions and Focus Group Comments

ITSI-S EIC Questions	Focus Group Interview Comments
The instructor presents information in multiple formats.	Integrated textbook readings into lecture materials.
Instructors' expectations are consistent with the learning objectives stated in the course syllabus.	Instructors always brought it back full circle to the main point, not like other classes. Good job keeping content from text and class related.
The course syllabus clearly describes the content and expectations of the course, specifically or in broad terms.	It was a very well-developed course content; appreciative that we were given a rubric beforehand… helpful to guide assignments.
I am able to grasp the key points from instructional videos for this class.	Lecture recordings posted on course website were the most helpful because if you were not able to attend class, you had the option of watching the video afterwards, even when studying.
I find that course materials are accessible, clearly organized, and easy to use.	Assignments were laid out very well. Flex Time for seminar work was not helpful as many people forgot to submit work weekly.

Students in this course are allowed to express their comprehension of material in ways besides traditional tests and exams.	Formative review had open-ended questions; gave an opportunity to answer based on learning; better than multiple choice 100%. Group project more applicable and manageable than final exam.
I receive prompt and instructive feedback on all assignments	Actually, let us work on our group projects in seminar.
In this course I feel interested and motivated to learn.	Like the scope of class and option for bonus credits. I actually get to meet people in my seminars and work with them. Only negative of not having a final was that I felt unmotivated to go; because testing was done, people did not feel like they had to go.
I feel challenged with meaningful assignments.	Group process was very applicable to our future nursing careers.
The instructor explains real-world importance of the topics covered in this course.	Formative review was fair and made sense in context of our learning; don't think test would have sufficed, this shows better comprehension of material; reflects realistic nursing situation. Great in theory, not necessarily great execution.
The instructor creates a class climate in which student diversity is respected.	The flexibility in testing hit everyone's strengths… It allowed the opportunity to succeed.
The instructor is highly approachable and available to students.	Very approachable and positive, so if you did have problems you could meet with them.
The instructor offers contact with students outside of class time in flexible formats.	Seminar size really good… opportunity to actually connect with professor; a lot of other courses seminar like torture, you can't talk to professor, you don't get that connection.
The course supplements lecture and reading assignments with visual aids.	Really like videos in lecture, broke it up; were super funny and relevant; really good at finding stuff that pulled things together.

Discussion

Inclusive and Flexible Course Design

Students reported positive teaching-learning experiences and attitudinal support for principles of UDL. Respondents described that co-instructors demonstrated the application of these principles. Consistent with the findings of Black and colleagues (2015), students appreciated equal opportunity to learn and express themselves in ways conducive to their learning preferences.

Assessment

Students expressed support for assessment strategies, particularly the variety of opportunities to achieve percentage points throughout the semester. These findings were comparable to previous studies that described student appreciation of incorporating multiple means

of action and expression into the course (Kumar & Wideman, 2014). Accommodation for extended test time, assignment deadlines, or alternative test locations were not used by any of the students registered through Student Accessibility Services.

The formative review was deployed online, and students accessed the test while sitting in the lecture theatre where the weekly class was held. Students required personal computers and headphones to listen to video questions. The structure and content were well-regarded by participants. There were challenges in the test-taking process. Students were unable to sit comfortably in the lecture theatre; writing areas were too small for students to use laptops with ease. Many of these challenges could be eliminated if students were able to take the formative review in a computer lab large enough to accommodate the entire class at one sitting. Unlike Kennette and Wilson (2019), researchers found no evidence that computer literacy was a significant issue in testing, although instructors noted that some students were better able to cope with technical challenges than others.

Social Presence and Engagement

Transition to higher education requires student engagement in conversations, practices, and communities that support success and foster their personal sense of agency, connectedness, and capacity (Hitch et al., 2019). Success in a new setting is impacted by a student's sense of belonging and engagement with others (Hitch et al., 2019). In this course offering, engagement among peers and with instructors was encouraged.

In a similar study of a postsecondary health science course, social presence was found to be an important contributor to course engagement (Kumar & Wideman, 2014). In this study, students commented favourably about student–instructor and student–student engagement, the latter facilitated in group seminars. Seminar group work and discussions fostered peer interaction and collaboration (Street et al., 2012). Despite this reported engagement, there was a decline in attendance in weeks 11 and 12 of the semester. Researchers speculated that absence of point-accumulating activities in those weeks contributed to this decline.

Organizational Support

UDL requires the presence of support from the institution (Black & Fraser, 2019; Kreider et al., 2018). Despite the availability of some technical support and best efforts by co-instructors, students experienced challenges during the formative review. Access to a computer lab large enough to hold the entire class would have eliminated both the need for students to use their own laptops and the problems associated with hundreds of students attempting to access the learning management system via Wi-Fi.

UDL does not eliminate some students' need for unique accommodation (CAST, 2011; Meyer et al., 2014). Co-instructors met with a Student Accessibility Services representative and with accommodated students to anticipate potential issues and understand individual students' learning needs. In this study, some students still asked Student Accessibility Services for note-taking assistance, but none of the 17 students who were registered with Student Accessibility Services asked for test-writing accommodation. It is possible that some accommodated students did not trust that their learning preferences would be taken fully into account in a UDL environment. It is not known if these students felt uncomfortable in identifying their needs to educators (Neal-Boylan & Miller, 2017) or if they were confident that universal accommodations would be sufficient.

Stress Reduction

In this study, student reports of stress reduction and increased confidence in their ability to succeed were consistent with other findings (Black et al., 2015; Kreider et al., 2018; Kumar & Wideman, 2014). Many students commented that flexible assignment due dates (Flex Time) contributed significantly to reduced stress. Similar to the findings of Kendall (2016) and Kumar and Wideman (2014), flexible due dates were a popular course feature. This may have been the result of inadvertent overlap of assignment deadlines with those in other courses, or students may have appreciated the flexibility regardless of context. While Flex Time was appreciated by most students, confusion over too many assignment deadlines arose as a result for others.

Student Success

Implementing principles of UDL is not intended to change educational standards but to ensure that all students can achieve those standards (Ferguson, 2019). A study by Dracup and colleagues (2016) indicated higher success rates and improvement among students in UDL designed courses. The average final grade for this course was 10% higher than in the previous year's offering. This was in part due to the need for grade adjustment because of technical faults in the formative review, but it is most likely explained by an increase in the weighting of participation marks and the use of a variety of strategies for student expression. An option for two bonus percentage points may also have contributed to this grade increase.

Research Team Perspectives

The co-instructors attempted to create a sense of social presence by being approachable and supportive of students' learning, and this was reflected in participant reports. In relation to the process of course management and instruction, it is important to note that preparing course content, learning resources, and assessments was more time-consuming than if the same course had been delivered without a UDL framework (Singleton et al., 2019). Neither co-instructor reported that this extra time was an unreasonable burden on overall workload.

Limitations

In relation to the quantitative component of this study, sample size was a primary limitation. The response rate to the ITSI-S survey was low (almost 20%); the end-of-semester timing may have discouraged student participation. Many (27%) participants who started the ITSI-S survey did not complete it; this may have been due to the survey length and repetitive nature of the questions. To determine the validity of qualitative data, credibility, transferability, dependability, and confirmability were assessed (Lincoln & Guba, 1985) using triangulation, prolonged engagement with participants, peer debriefing, and by reporting disconfirming evidence. The credibility of data from focus group participants, student research representatives, and subjective instructor experience was not affected by the principle of sample size limitations, but nonetheless any attempt at generalization of findings must be approached cautiously. This was a study of one course and two co-instructors within one institution, and results cannot be generalized to other students or other organizations.

In this study, the potential for direct comparison of qualitative and quantitative data is limited; while both types of data focus on principles of UDL, each approach emphasized different aspects of this framework. Sample sizes from data sources were not equal, and each source likely involved different groups of participants. This may have resulted in some inaccuracy in

representing the views of various subunits of the case. Additionally, smaller than anticipated sample sizes in quantitative data collection threatened study validity.

In this study design, individual student responses could not be linked to course grades. This would have added another dimension for analysis and made it possible for co-instructors to identify the views of various subgroups of participants—for example, those with documented disabilities.

It is also likely that in-person and place-based instructor-student and peer-to-peer interaction creates a different teaching-learning experience than blended or online approaches. Therefore, the results of this study are limited to an in-person and place-based postsecondary setting.

Conclusions

UDL is a promising flexible approach that can be used by nurse educators to embrace learner differences in large postsecondary in-person and place-based classes. Participants reported that they experienced the environment as being inclusive for all learners. Study results reinforced the importance of recognizing differences in learner needs, establishing flexibility in learning practices and assessments, and creating social presence of instructors and peers. Participants reported that UDL features contributed to decreasing their overall stress, increased their confidence, and supported subsequent success in completing the course. While a few challenges were experienced by students, many learning barriers were proactively eliminated by co-instructors using an inclusive UDL instructional framework. The finding of this study contributes to a growing body of knowledge related to UDL in postsecondary institutions. Continued research on UDL in postsecondary institutions is needed to compare the impact of UDL with traditional and online pedagogical methods, in relation to both the influence of institutional support for implementing UDL and the impact on students' long-term educational outcomes.

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