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(Dis-)Engagement in Learning as a Reality of COVID-19 Pandemic: Lessons Learned

ALEKSANDRA HOLLINGSHEAD
KALLEY MALONE
ALLEN KITCHEL
University of Idaho
ahollingshead@uidaho.edu
kalleymalone@gmail.com
akitchel@uidaho.edu

The COVID-19 pandemic necessitated teachers and students to adopt and adapt to online learning (OL) in a matter of days. The unfortunate school closure situation placed researchers in a remarkable position. This survey-based descriptive study investigated the experiences of teachers in the United States, including an analysis that factors in teachers' existing knowledge of Universal Design for Learning (UDL). Specifically, this study focused on student and teachers (dis-) engagement in learning during the pandemic teaching by examining teachers' instructional challenges and teachers' observations of student barriers to learning, and changes that occurred within these areas between spring 2020 and fall 2020. The findings, combining descriptive quantitative and qualitative data, present similarities and differences in teachers' and students' observed experiences depending on the level of training in Universal Design for Learning prior to the pandemic. The discussion offers implications for future areas of research in engaging OL.

Keywords: engagement, instructional challenges, online learning, UDL

(DIS-)ENGAGEMENT IN LEARNING AS A REALITY OF COVID-19 PANDEMIC: LESSONS LEARNED

The COVID-19 pandemic changed the world in countless ways. Following the guidance from the World Health Organization (WHO, 2020), and the Center for Disease Control and Prevention (CDC, 2019), the shift from face-to-face learning to online learning (OL) occurred in Spring 2020 in a matter of days, creating chaos and (dis-)engagement. The United Nations Educational, Scientific and Cultural Organization (UNESCO) estimates that over 60% of students across the world had their education disrupted. Research demonstrates that making too large of a shift in a system has a significant potential for failure (Osmond–Johnson & Campbell, 2018), yet teachers, students, and family members across the globe were tasked with transforming educational practices almost overnight. This manuscript presents findings from the examination of the experiences of teachers in the United States during pandemic teaching, factoring in teachers' pre-existing familiarity with Universal Design for Learning (UDL). Specifically, we focused on student and teachers (dis-)engagement in learning.

Engagement in Learning

Engagement in learning has long been determined to be a critical predictor of students' academic and post-school success (Brophy & Good, 1986). Scholars in education examined engagement in learning from multiple perspectives over time. For example, Skinner and Belmont (1993) explored the impact of learning contexts on student engagement, while Newmann (1992) addressed the connection between quality of instruction and student cognitive functioning, and Finn and Rock (1997) studied the relationship between student disengagement and dropout rates. All in all, among researchers focused on engagement there is an agreement that engagement is a complex construct consisting of at least three aspects: behavioral (physical), cognitive, and emotional (Finn & Zimmer, 2012; Fredricks et al., 2004; Hollingshead et al., 2017). Teachers' close and intentional attention to each of the three components of engagement is paramount for students' learning outcomes (Finn & Zimmer, 2012; Fredericks et al., 2004; Hollingshead et al., 2018; Skinner & Pitzer, 2012) regardless of the mode of instructional delivery (i.e., face-to-face or online). In the following sections, we first briefly describe the status of online learning (OL) in the U.S. and use Universal Design for Learning (UDL) (Rose & Meyer, 2000) as the framework in which we examine student engagement and the perspectives and observations of teachers.

Online Learning

Initially, online learning (OL) existed primarily at the post-secondary level (Lorenzo & Moore, 2002). The K-12 implementation relied on principles of teaching and learning for adults and the higher education student level (Rice & Dawley, 2009). As OL classes and schools continue to evolve, more students are opting for remote learning in addition to or as a replacement for traditional face-to-face schools (Kelley et al. 2020). According to The National Center for Education Statistics for the year 2017-18, 19,000 schools across the nation offered at least one completely online course. That totals about 21% of public schools and 13% private schools. Of those schools, 11% were elementary, 10.5% were middle schools, 54% were high schools, and the remaining consisted of schools with some or all grades combined. Total enrollment of students according to the US census bureau in 2018 was 58.9 million.

The beginning of the 21st century has seen a continued and growing implementation of OL through all grade levels and at an incredible pace (Liu & Cavanaugh, 2011). Nearly every state offers OL (virtual schools, virtual charters, blended learning) and many states have policies supporting educational choice (Rice & Dawley, 2009). Five states require high school students to take an online course to graduate. However, a review of literature by Arnesen et al. (2019) illustrates that while the body of research for OL is large, the focus on K-12 is much narrower. Over fourteen years ago, Cavanaugh et al. (2004) argued that there were still a lot of unanswered questions about practices in K-12 online learning, and what should be done differently for these two groups of learners. In 2011, Barbour examined a group of articles from an online learning journal and found that only 24 of 262 articles related to K-12. These sentiments were echoed by Kim (2020), explaining that opportunities to explore how to effectively teach young children in the OL environment have previously been lagging.

Although the research is limited for K-12 OL despite its increasing prevalence, many studies offer consistent conclusions about student success and teacher characteristics. Successful OL characteristics for students include engagement/motivation, accountability, time spent in the learning management system (LMS) and seeing relevance in their education (Curtis & Werth, 2015). Communication with the teacher and school, and parent involvement are also tied to success. A leading barrier for students in OL has been lack of motivation and engagement (Curtis & Werth, 2015).

Due to the relative novelty of K-12 OL, research has just begun to examine the role of the teacher in the online environment (Hawkins et al., 2012; Farmer & West, 2019). Literature points to several barriers teachers face in the OL environment: (a) teaching in an online environment requires

a different skill set from face-to-face teaching (DiPietro et al., 2008); (b) good face-to-face teaching strategies do not necessarily translate to the online environment (DiPietro et al., 2008; Farmer & West, 2019); (c) there is a difference between face-to-face and OL in content, pacing, pedagogy, and communication (Davis & Rose, 2007); (d) classroom management is a big component in OL (DiPietro et al., 2008; Farmer & West, 2019); and finally (e) structural barriers such as lack of access to technology and reliable internet for students and teachers in as many as 25% of households (Hawkins et al., 2012; Kelley et al., 2020).

The literature on delivering online content to K-12 students has demonstrated that: (a) there is no established "best practice" or structural guidelines; (b) there is a lack of professional development (PD) on OL, and (c) there are no pre-service standards for teachers in regard to OL (Arnesen et al., 2019; Di Pietro, 2008; Farmer & West, 2019; Liu & Cavanaugh, 2011; Pulham & Graham, 2012; Rice & Dawley, 2009;). As demand for OL has increased, the field's understanding of best practice and implementation inevitably has been lagging (Pulham & Graham, 2018). A report from 2016 on teacher education programs demonstrated that of the responding 363 universities, only 4.1% offered field experiences in OL environments or similar requirements, and only 8.7% of the universities without such requirements indicated that would in fact be a meaningful addition (Archambault et al., 2016). Despite rapidly rising enrollment in OL, there has been visible resistance to online teaching. This resistance has led to delay in establishing evidence-based practices for engagement and teacher know-how.

Universal Design for Learning and OL

Universal Design for Learning (UDL) is an instructional design framework intended on removing unnecessary barriers to learning, while promoting instruction that embodies multiple means of student engagement, multiple means of representation of information, and multiple means of action and expression of learning (Meyer et al., 2014; Rose & Meyer, 2000). Intentionally designing instruction for students using a proactive approach to addressing barriers is a need when teaching in the online environment. It is especially salient that there is a growth in numbers of students with disabilities entering OL environments at a higher rate than other students (Molnar et al., 2015). Educators need to learn new skills to design Universal Design for Learning (UDL)-based instruction in the online environment. Recognition of these factors could lead school systems to broadly implement UDL framework in the OL environment with the assistance of technology tools and resources.

Hollingshead and Carr-Chellman (2019) examined the principles of UDL in relation to designing engaging online learning environments and experiences. Specifically, they utilized the conceptual framework of multi-component construct of engagement (i.e., behavioral, cognitive, and emotional) to identify possible barriers to learning in OL and propose practical strategies to design engaging OL aligned with UDL principles. Hollingshead and Carr-Chellman argued, "the learning environment can be alienating if not thoughtfully designed" (p. 1).

Similarly, Hollingshead (2018, 2021) addressed the connection between engaging OL instruction and the UDL framework. The overarching conclusion was that the key to student engagement (understood as a rich and multi-component construct) is intentional and systematic design of instruction as well as the learning environment in OL, following the principles of UDL. The author concluded, "in an online environment, student engagement may be challenging to achieve. Both synchronous and asynchronous instruction needs to be thoughtfully designed to engage students at a meaningful level" (p. 517).

As a direct opposite of thoughtful, systematic, or intentional, the COVID-19 pandemic necessitated teachers and students to adopt and adapt to OL in a matter of days. The unfortunate school closure situation in spring 2020 placed researchers in a remarkable position to study the lived experiences of educators during this time. Some of the already published research examined impact on families (e.g., Achterberg et al., 2021; Davis et al., 2021; Neece et al., 2020), others explored the experiences of teachers (e.g., Mueller et al., 2020; Pressley, 2021; Tremmel et al., 2020), while another group of authors focused on struggles of students with disabilities (e.g., Darville, 2021; White et al., 2021). The purpose of this study was to examine experiences of general and special education teachers in the United States (primarily in the Northwest) during the COVID-19 pandemic, with a comparison between spring and fall of 2020. Specifically, we focused on student engagement in learning and teachers' engagement and (dis-)engagement during the pandemic teaching.

METHODOLOGY

To provide a conceptual and theoretical framework for this study, we approached the data with the lens of UDL (Rose & Meyer, 2000). We wondered how the level of familiarity and the degree of implementation of UDL in daily instruction might influence teachers' experiences during the COVID-19 pandemic. Utilizing a UDL lens as a framework for examining teachers' experience, this study specifically sought to address the following research questions:

1. What were the primary instructional challenges for teachers during the early and mid-stages of the COVID-19 pandemic, and how do they compare?
2. What were the primary barriers to online learning for students as observed by teachers during the early and mid-stages of the COVID-19 pandemic, and how do they compare?
3. Based on their experience with teaching during the COVID-19 pandemic, what future assistance needs have the teachers identified in the areas of effective online pedagogy, course organization, and student engagement?

This descriptive study is an extension of the study conducted by Cannon et al. (under review) that focused on the educational experiences of career and technical education (CTE) teachers during the spring of 2020 school semester. This extension of the Cannon et al. study was designed to investigate the educational experiences of general and special education teachers and compare between spring and fall 2020 semesters. A modified version of the Cannon et al. survey instrument was used for data collection. The modified instrument included an additional section that addressed educational experiences in the fall of 2020, in addition to the already existing spring section. Survey methods followed the suggestions of Dillman et al. (2014) and were used to collect both quantitative and qualitative data from general and special education teachers in the United States (primarily the Northwest region). The study's design protocol was reviewed by the Institutional Review Board of the authors' institution and was certified as Exempt.

Instrument

The 48-item survey instrument utilized for data collection in this study was adapted from the Cannon et al., (under review) study. The original instrument was created by a panel of experts composed of CTE educators and scholars, based on available literature. After the initial development, the instrument was piloted for usability and clarity and revised based on responses from CTE teachers. For purposes of the current study, the original instrument items were edited to remove references to CTE-specific topics and replaced with language focused on UDL and students with disabilities. The final instrument was composed of the four main sections of (a) demographic and background characteristics, (b) instructional challenges, (c) teacher's observations of barriers to learning for students, (d) and instructional assistance needs.

Two approaches to data collection were taken. For both the instructional challenges and teacher's observations of barriers to learning for students' sections, survey participants were presented with 13 predetermined items

and asked to rank them in order of the significance of the challenge or student barrier. For the instructional assistance needs section, participants were presented with 27 predetermined, based on the literature, instructional related items across the categories of pedagogy, organization, and assessment, as well as an open-ended response option. Each of the items were then scored on a 4-point response scale (0 = No assistance needed; 1= Slight assistance needed; 2 = Some assistance needed; 3 = Significant assistance needed).

Procedures

Pilot study

In order to assess the usability, clarity and content validity of the survey instrument, a pilot study was conducted with six special education teachers. These six participants were recruited from personal contacts and asked to consider the content of the questions and a general flow and length of the survey. Upon completion of the pilot survey, the participants indicated they had no areas of concern with the usability, clarity or content of the survey. They did provide several editorial suggestions that were then used to inform the development of the final survey instrument.

Participants and Data Collection

Solicitation of teachers to participate in the study occurred across three recruitment phases. In the first phase, a flier with recruitment information and a link to the survey via Qualtrics was posted on educational organizations' social media sites Facebook™ and Twitter™. This social media recruitment campaign resulted in 16 usable responses after three weeks from the posting. A second phase was implemented to further increase the number of responses. In the second phase, contact information for principals and special education directors in the researchers' state were collected. An email invitation was sent to these contacts with a request to forward the survey link to all teachers these principals and special education directors oversaw. An additional 154 responses were collected through the second phase of data collection. The final phase of the recruitment process focused on superintendents of school districts in states in the northwest region of the United States and resulted in another 391 usable survey responses. For this final phase, once a complete list of superintendents for Idaho, Washington, Oregon, Montana, Wyoming, Alaska, Utah, and Nevada was created, we then followed the suggestions of Dillman et al. (2014) to improve the number of responses. The initial email inviting the superintendents to share the survey link with all of their teachers was sent out, followed by a second invitation three days later, a third invitation reminder 10 days after the initial email, and a fourth invitation reminder a month later. Overall, across the three phases of data collection, 561 teachers submitted usable survey responses.

Data Analysis

The data collection process resulted in two sets of descriptive data that were used for analysis and interpretation. One set being the quantitative data provided from the rankings and assistance needs rating, and the other set being qualitative data provided through the open-ended questions.

Quantitative analysis

Quantitative analysis of the data employed descriptive statistics to describe demographic characteristics and background information of the participants and to address the study's research questions. The research questions addressed three areas of interest that were investigated, those being (a) teacher's ranking of their instructional challenges, (b) teachers' ranking of their perceptions of students' barriers to learning, and (c) teacher assistance needs based on their experiences during the initial and early stages of the COVID-19 pandemic. The analysis of the data involved the comparison of the findings from spring of 2020 to that of fall of 2020, and between the groups of respondents based on UDL familiarity.

The overall ranking of teacher's instructional challenges and teachers' perceptions of students' barriers to learning was determined by a count of the number of times the item was ranked first by individual's completing the survey. The ranking of assistance needs was determined by the mean value of the rated items, with the highest rated item being ranked first, followed by subsequently lower scores. The data was grouped across three levels of teacher's UDL knowledge, as well as by spring and fall semesters. Analysis was then conducted to determine the extent of similarity or differences that exist between groups.

Qualitative analysis

The qualitative data came from five open-ended questions. One of the questions asked the teachers to describe their experiences during spring 2020 in one sentence, another one in a similar manner focused on fall 2020. A third open-ended question addressed teachers' efforts during summer 2020 to prepare for fall instruction. The other two questions focused on future professional development needs and perceived impacts on students with disabilities.

We analyzed the qualitative data, combining both inductive and deductive strategies and following the steps of a basic thematic analysis (Hatch, 2002). First, two authors read the transcripts obtained from Qualtrics in their entirety and, independent from one another, identified code words for each of the questions. Then we shared our code words during a Zoom™

video conference with one another and discussed each question until we came to a consensus on codes. In a subsequent Zoom™ video conference, we coded 30% of each question simultaneously to ensure the reliability in understanding the codes. After 30% of each document was coded together, we split the five documents and coded the remaining 70% of each subset of data independently. The final phase of data analysis involved organizing the coded documents by sub-themes and identifying quotes to be used in this research report. Based on the standards set by Brantlinger et al. (2005), we took the following measures to ensure the trustworthiness: (a) triangulation of the findings against quantitative results, (b) engagement of two coders, (c) establishment reliability of coding through constant comparison of 30% of the data, and (d) reflection on our positionality as special educators concerned about the quality of education provided to students with disabilities during the pandemic.

Limitations

Authors noted a few limitations with this survey-based descriptive study. First, the participant recruitment strategies, namely sending the survey link to the district superintendents, resulted in less than desired number of respondents. Had the survey been sent directly to the teachers, the number of respondents could have been higher. This limitation was caused by the security protocols enforced in many districts where teacher's contact information is protected. Second, although a pilot study was conducted to refine the questions, we did not analyze the data from the pilot. This omission led to some issues with the final data set: missing questions about racial and ethnic identity or inclusion of an option "other" in the questions. Finally, the nature of descriptive studies does not allow for any claims of generalizability of the findings. This descriptive study relies on the model of proximal similarity (Polit & Beck, 2010) in claiming the representativeness of the sample and generalizability of the findings.

FINDINGS

The findings from the study address both the quantitative data and the qualitative data collected through the survey questionnaire. More specifically, the presentation of the findings includes a description of the demographic characteristics of the study's participants (n = 561), as well as a description of the findings related to each of the study's research questions.

Sample Demographics

The participants of the study were primarily (91%) from the northwestern portion of the US: Washington (*n* = 170), Idaho (*n* = 157), Utah (*n* = 70), Wyoming (*n* = 44), Montana (*n* = 37) and Oregon (*n* = 33). The remaining 40 participants were from a variety of states, with the largest groupings being from California (*n* = 13), Alaska (*n* = 12) and Arizona (*n* = 11).

Of the 561 respondents, 78% identified as female (*n* = 439), 20% identified as male (*n* = 113), and nine respondents chose to not report their gender identity. The age groupings of participants were approximately equally dispersed, with 32% of participants being in the span of 45-54 years of age (n = 178), 26% indicating 35-44 years of age (*n* = 146), 23% indicating over the age of 55 (*n* = 128), and 16% indicating 25-34 years of age (*n*= 91). The group representing the ages of 18-25 years of age was smaller (*n* = 12) than the other age groups. In terms of the teaching experience of participants, 1% indicated less than a year of experience, 17% under five years, 22% between five and 10, 32% between 10.5-20 years, and 29% over 20 years.

The level at which respondents taught varied, and in many cases, teachers reported teaching at multiple levels. The levels considered were elementary level (40%), middle school level (19%), high school level (20%), or a mix (21%). Participants also reported being from various sizes of communities. Fifty-two percent were from rural communities of less than 2,500, 27% were from urban communities that ranged in size from 2,500 – 49,999, and 20% were from urban communities of 50,000 or larger.

Instructional Challenges for Teachers

Instructional challenges were analyzed across all respondents (*n* = 561) included within the sample for spring and fall. The top three ranked challenges for each term included (a) inexperience teaching online, (b) engaging students as remote learners and (c) students not being adequately available/responsive. Some changes were observed between semesters. For example, in spring, “inexperience teaching online” was the most top ranked instructional challenge, not surprisingly, this dropped in ranking to the second ranked instructional challenge for the fall term, presumably as teachers gained experience. Table 1 details the ranking of the instructional challenges for the spring and fall terms. Note that duplicate values within a column indicate a tie for that ranking.

Table 1
Instructional Challenges for Teachers (*n* = 561) Compared between Spring and Fall

Instructional Challenge	Sp20 Rank	F20 Rank
Inexperience teaching online.	1	2
Engaging students as remote learners.	2	2
Student availability/ responsiveness.	2	1
Delivering course content in a meaningful and impactful way.	4	4
Balancing teaching with additional family responsibilities	5	6
Access to reliable internet connection, software, and equipment.	6	7
Replicating classroom or lab environment online.	7	5
Using educational technologies (i.e., Zoom, RN, others)	8	12
Student discomfort or lack of familiarity with required technology.	9	11
Curriculum or activities that haven't translated well to a remote environment.	10	9
Assessing student learning.	11	8
Discomfort or lack of familiarity with required technology.	12	13
Using best practices in online instruction.	13	9

Teacher instructional challenges were also analyzed by the level of knowledge teachers reported about UDL. Teachers reported the extent of their UDL knowledge as one of three categories, (a) zero to little knowledge (n = 344), (b) moderate knowledge (n = 95), and (c) strong knowledge (n = 102). Regardless of the teachers' UDL knowledge, the top ranked instructional challenges were similar to what was found across all participants, with some differences in certain situations. For example, all UDL categories showed engaging students as remote learners as either the top or second ranked instructional challenge for spring 2020. However, for fall 2020 this challenge dropped to the 7th ranked item for teachers who reported having strong knowledge about UDL, while the other two UDL groups showed little change. Table 2 provides instructional challenges' rankings by the UDL group.

Table 2

Instructional Challenges Across All UDL Categories

Instructional Challenge	Sp20 UDL E1 Rank	Sp20 UDL E2 Rank	Sp20 UDL E3 Rank	F20 UDL E1 Rank	F20 UDL E2 Rank	F20 EUDL 3 Rank
Inexperience teaching online.	1	1	2	2	2	3
Access to reliable internet connection, software, and equipment.	5	6	7	6	7	8
Replicating classroom or lab environment online.	7	8	5	5	5	4
Using educational technologies (i.e., Zoom, RN, others)	8	6	7	10	11	11
Delivering course content in a meaningful and impactful way.	4	4	4	4	4	5
Assessing student learning.	10	12	7	8	13	7
Engaging students as remote learners.	2	2	3	3	1	1
Using best practices in online instruction.	13	13	11	9	8	11
Student discomfort or lack of familiarity with required technology.	8	9	7	11	9	10
Discomfort or lack of familiarity with required technology.	12	9	7	13	12	11
Curriculum or activities that haven't translated well to a remote environment.	10	9	11	11	9	8
Student availability / responsiveness	3	4	1	1	5	2
Balancing teaching with additional family responsibilities.	6	2	6	6	2	6

Note: Rankings determined by the total count of the number of times the item was ranked as the #1 challenge by participants. Duplicate values within a column indicate items tied for that rank. Table includes records with complete spring (n = 541) and fall (n = 561) instructional challenges. Teachers reporting zero UDL experience = UDL E1, moderate UDL experience = UDL E2, and strong experience with UDL= UDL E3.

Qualitative Findings

Due to a sheer number of respondents in the survey, it is beyond the scope of this manuscript to share qualitative results in depth. Below we provide summaries of our qualitative analysis findings related to teachers' experiences during pandemic teaching.

Spring Experiences. In the qualitative portion of the data, we identified six themes across responses regarding spring 2020 teaching: (a) increased workload, (b) students' lack of motivation and engagement, (c) ineffective leadership, (d) challenging but rewarding, (e) feeling ineffective, helpless, and depressed, and (f) stressful and exhausting. When the switch to OL occurred in early spring 2020, many teachers were not equipped professionally or emotionally. One respondent reported "the district gave us two paid days to get up to speed, which was totally crazy." While many teachers reported "doing the best I could with what I had," the toll that spring 2020 took on many could be described as extreme on many aspects. Teachers report that spring 2020 was "exhausting," "frustrating," "stressful." Trying to teach in a completely novel manner was summarized by one respondent as: "It was like changing tires on a moving vehicle while blindfolded."

Some of the frustration stemmed from "ineffective leadership." Teachers were asked to go "above and beyond each day," with "no guidance." One participant described it as: "It was like a newly born fawn in the spring trying out the new legs, stumbling, fumbling then being led to a field to fend for myself while mom (admin) took off." Students and families had no experience or expectations either, which was an additional source of stress, "kids didn't care, parents didn't care," "students checked out once schools were closed." One respondent explained: "There were many frustrating aspects to teaching virtually including missing my students and feeling unable to help them, but the most difficult for me was feeling like I was doing the best I could with very few resources and the general public making statements that their educators were failing them."

Teachers described not just the physically stressful and exhausting aspect, but also the emotional toll produced by the school closure. This period was for some "a nightmare and one of the most anxiety-filled experiences of my life." Teachers found it "disheartening not to have face to face contact with students." Somebody reflected: "It was full of disappointment. Lack of attendance, lack of contact, knowing my students were in unhealthy home situations and nobody was checking on them. Heartbreaking and frustrating." Feelings of being overwhelmed were described by one respondent as: "My experience of teaching during the COVID-19 pandemic in the spring of 2020 could be likened to being thrown into a lake and almost drowning."

Despite challenges, rewards were found by some through the struggle, mainly due to the changed nature of relationships: "Teaching in the spring was challenging and rewarding, through online activities and connectivity

I was able to learn more about my students as a whole being not just a student." Other people commented: "It was a steep learning curve but has leveled off and continues to be a rewarding experience," and "stressful but I learned so many new things. I learned to innovate and enjoy the ride."

Fall Experiences. In the analysis of qualitative data referring to fall 2020 teaching, we identified six themes: (a) better prepared, (b) hybrid model caused double work, (c) stressful and unrealistic, (d) students lacking motivation and engagement, (e) struggle with teaching online, and (f) back to normal.

Overall, the respondents reflected that fall was better, with responses varying from being better marginally to "1000 times better, still not great, but passable." One person reflected, "after getting ourselves together, the fall was much smoother because of the preparation and experience we had." Somebody else shared: "A positivity existed because I knew I would have "failures" in what I was doing, but I also knew that everyone else was going to have issues, so I was able to relax and try to create a new normal."

Hybrid learning introduced new challenges in the fall of 2020. Teachers had students in class face-to-face and students online at the same time. Hybrid to some was "double the prep" and "Insane, the amount of things I need to get done and accomplish doubled from previous years." One respondent shared: "Teaching in the fall of 2020 was incredibly challenging with higher expectations on teachers and long, long days preparing for instruction, only to spend the entire teaching day talking to myself and trying to encourage students to engage in their learning."

To describe how stressful teaching during fall 2020 was, one person wrote: "If I had another option, I would've taken it. Teachers were left in the dark by their district to fend for themselves among one more thing after the other, surviving off of student smiles, immense amount of caffeine, and a very large therapy bill feeling inadequate, hyped on adrenaline, and longing for what once was."

Students' lack of motivation was still a resounding theme in responses about the fall experiences. Teachers reflected: "Teaching during COVID-19 in the fall of 2020 has been more difficult, because many students that are not in-person lack the motivation necessary to complete assignments and continue learning," and "My experience has been that I need to communicate with parents 1000% of the time to let them know when their kids are sleeping or tuning out during class," and "most were still checked out from school."

Some responses indicated that things were back to normal, which they described as "happy," "rejuvenating," and "thankful"; others mentioned that although students were in the buildings, "restrictions put in place has made things difficult." One person reflected: "Our school has had in-person

classrooms from the beginning of the 2020-2021 school year. We have put in place social distancing, face mask, and sanitizing protocols to reduce the chances of spread. We all find the masks uncomfortable, but are grateful to be at school together."

Student Barriers to Learning as Observed by Teachers

The same two barriers were identified for each term, those being m*otivation to guide & manage their own learning (i.e., engagement)* and s*tudents' access to reliable internet connection.* Some differences were reported with subsequent item rankings. Whereas lack of experience with remote learning was the third ranked barrier for students for spring 2020, for fall 2020 it was perceived as less of a barrier and dropped to 5th in the rankings. Interestingly, and as one may predict, *mental health and well-being/social isolation* rose in the rankings as time went by and for fall 2020 this student barrier was perceived as the 3rd ranked. One of the most dramatic differences between terms was the ranking of the student barrier of *health/sickness COVID-19 related*. For spring 2020 this challenge was ranked twelfth. Concerns about this seemed to grow as time went on and for fall 2020 the challenge was perceived as the 7th ranked student barrier to learning. Table 3 provides a complete listing of the observed student barriers for each term.

Table 3

Student Barriers Compared Between Spring 2020 and Fall 2020

Student Learning Barrier	Sp20 Rank	F20 Rank
Motivation to guide & manage their own learning	1	1
Students' access to reliable internet connection.	2	2
Lack of experience with remote learning	3	4
Mental health and well-being/social isolation	4	3
Family commitments	5	6
Students' access to technology equipment	6	6
Food or housing insecurity	7	9
Work obligations	8	5
Students' access to software.	9	9
Lack of access to assistive technologies	10	12
Financial barriers	11	13
Health/sickness COVID-19 related	11	6
Health/sickness non-COVID-19 related	13	9

Qualitative Findings

The open-ended question specifically targeted teachers' observations of barriers experienced by students with disabilities (SWD) during the pandemic teaching. Within this data set, we identified six themes: (a) SWD are most impacted and must be in person; (b) parents need support, (c) SWD struggled more, inequality; (d) lack of IEP compliance; (e) everybody suffered; and (f) teachers need more training.

Responses were quite varied and overall, the identified barriers impacted not only students with disabilities, but all students, teachers, and parents. According to our respondents, students with disabilities were most significantly impacted by this event. One person reflected: "This is a very sad year for SWD. The impact has been significant." It was challenging to meet SWD needs for many reasons: "The system failed SWD. Services cannot be provided in a virtual model with successful outcomes." The low quality of services and inequity that comes with OL was a common theme in the responses. The desire and need for teacher support were evident across the respondents. One participant commented: "I think it is terrifying how much none of the educators I know understand about making online lessons available and accessible to." Many SWD need support beyond academics, including behavior supports, or physical, occupational, and speech therapy. One person shared: "Online is not conducive to learning for students with disabilities without extreme parental support and guidance which is often lacking." One-on-one and intensive support given in school was often impossible at home. Many respondents acknowledged a need for flexibility for these students to be in-person, get more family support, and give better tools to general education teachers to assist SWD to maintain engagement in learning.

Future Assistance Needs

Assistance topics were analyzed by assistance topic groupings, as well as by the UDL group with which teachers identified. The assistance topic groupings were considered as three categories, with category 1 being Course Organization, category 2 being Effective Online Pedagogy, and category 3 being Online Assessment of Learning. The UDL groupings were the same as identified previously in this paper.

The need for assistance was ranked on a four-point response scale from 0 – 4 (i.e., 0 = no assistance needed; 1 = slight assistance needed; 2 = some assistance needed, and 3 = significant assistance needed). Across all assistance topics teachers indicated a need for training as it relates to student interactions. The top three reported assistance needs were facilitating peer interactions using different educational technologies (M = 1.77, n = 394), facilitating dynamic discussions using different educational technologies (M = 1.75, n = 383) and creating collaborative learning experiences (M = 1.74, n = 403). Table 4 provides a listing of the top 12 assistance topics scores and identifies the category for which they are associated.

Table 4
Top 12 Future Assistance Needs

Cat.	Assistance Topics	ALL #1st	*n* (All)	*M* (All)	*sd* (All)
2	Facilitating peer interactions using different educational technologies	92	394	1.77	0.9
2	Facilitating dynamic discussions using different educational technologies	84	383	1.75	0.9
2	Creating collaborative learning experiences	73	403	1.74	0.8
2	Designing meaningful learning assignments and projects	71	384	1.67	0.9
2	Developing learning outcomes suitable for online learning environments	60	398	1.65	0.8
1	Organizing my course in an intuitive way	56	403	1.64	0.8
2	Understanding participation in an online class from a student perspective	61	389	1.61	0.8
1	Designing equity-minded courses	46	386	1.56	0.8
1	Incorporating appropriate accommodations for students with disabilities	72	395	1.55	1.0
1	Using menus, folders, modules and other organizing structures to support online learning	64	381	1.54	0.9
1	Enhancing course site appearance and accessibility	53	373	1.53	0.9
2	Using lectures effectively in online formats	60	378	1.50	0.9

The analysis of the assistance needs compared by UDL grouping indicates a number of differences between groups. For the assistance needs items scored, the largest discrepancy across UDL groups were for *using lectures effectively in online formats* (difference = 0.32), *understanding participation in an online class from a student perspective* (difference = 0.39), *incorporating appropriate accommodations for students with disabilities* (difference = 0.28) *and constructing exam or quizzes online* (difference = 0.32). Table 5 shows the top 12 items (note 13 listed due to a tie for 12th) where difference scores were largest by assistance needs across UDL groups.

Table 5

Largest 12 Difference Scores for Future Assistance Needs Across UDL Experience Groups

Cat.	Assistance Topics	UDL E3	UDL E2	UDL E1	Diff
2	Using lectures effectively in online formats	1.28	1.61	1.59	*0.32
2	Understanding participation in an online class from a student perspective	1.53	1.82	1.61	*0.29
1	Incorporating appropriate accommodations for students with disabilities	1.34	1.53	1.62	*0.28
3	Constructing exam or quizzes online	1.24	1.39	1.52	0.28
2	Being able to identify struggling learners	0.97	1.11	1.24	0.27
3	Designing non-exam assessment strategies	1.21	1.41	1.40	0.20
2	Facilitating dynamic discussions using different educational technologies	1.67	1.86	1.75	0.19
2	Using scaffolding strategies	1.32	1.50	1.46	0.18
2	Creating collaborative learning experiences	1.77	1.84	1.68	0.16
1	Enhancing course site appearance and accessibility	1.43	1.58	1.56	0.16
3	Creating rubrics to assess student performance	1.24	1.39	1.35	0.15
2	Designing meaningful learning assignments and projects	1.62	1.76	1.68	0.14
3	Understanding how to use assessment data to inform instruction	1.09	1.02	1.15	0.14

Note. Teachers reporting zero UDL experience = UDL E1, moderate UDL experience = UDL E2, and strong experience with UDL= UDL E3.

* Indicates a statistical difference found between groups ($p < .05$)

In order to further investigate group differences, a one-way between subjects analysis of variance (ANOVA) procedure was conducted to determine whether statistically significant differences existed between the UDL groups based on their assistance needs. As noted in Table 4, significant differences were found between UDL groups for three of the assistance needs; *using lectures effectively in online formats* [$F(2, 359) = 5.0$, $p = .007$], *understanding participation in an online class from a student perspective* [$F(2, 371) = 3.6$, $p = .028$], and incorporating appropriate accommodations for *students with disabilities* [$F(2, 376) = 3.6$, $p = .028$]. Also notable is the near significant finding for *being able to identify struggling learners* [$F(2, 334) = 2.9$, $p = .059$].

The data was found to meet the assumption of homogeneity of variances for each of the significant findings, therefore, a post hoc analysis of the ANOVA significant findings was conducted using the Tukey HSD test. For *using lectures effectively in online formats* a significant difference was found between UDL E1 ($M = 1.59$, $SD = .90$) and UDL E3 ($M = 1.22$,

SD = .96), as well as between UDL E2 (*M* = 1.61, SD = .93) and UDL E3 (*M* = 1.22, SD= .96). For *understanding participation in an online class from a student perspective* a significant difference was found between UDL E2 (*M* = 1.85, SD= .80) and UDL E3 (*M* = 1.49, *SD* = .93). And finally, for *incorporating appropriate accommodations for students with disabilities* a significant difference was found between UDL E1 (*M* = 1.64, *SD* = .94) and UDL E3 (*M* = 1.31, *SD* = .97).

Qualitative Findings

To triangulate these quantitative findings regarding teachers' assistance needs, we analyzed two open-ended questions. One question examined teachers' preparation over summer 2020, and the other asked for teachers' needs for professional development.

Teachers' Preparation Efforts During Summer 2020. One of the open-ended questions examined teachers' preparation efforts during summer 2020, following their experiences of a sudden switch to OL, and in anticipation of fall teaching. In the data set, we identified four themes: (a) no special preparation, (b) intensive preparation tied to district/state training, (c) self-care or working on one's own wellbeing, and (d) working independently on what teachers felt was needed to be prepared. Responses regarding the efforts in the summer to prepare for fall 2020 ranged from zero to maximum intense effort all summer. While some teachers did not know what to prepare for, and others prepared as normal, it seems the majority of teachers took time to learn and prepare independently online throughout the summer. Educators watched instructional YouTube videos, set up LMS, converted curriculum, and participated in various webinars and courses. Some thought, "the pandemic would have passed." This meant that for many, they entered the fall unprepared because districts and states played the waiting game to see what would happen. The people in the intensive training theme reported attending organized state and other classes, professional developments and conferences. The sentiment of this theme can be summarized by the following quote: "Countless hours of PD on my own time and dime. Organizing my classroom in case of return but arranging my online resources for virtual learning. I didn't know what it would actually look like and didn't know what I would need exactly so I over prepared and it still wasn't enough."

While most participants report doing at least some online searching, a smaller portion of respondents' report not preparing in the summer because they "needed a break" to take care of themselves and their families. Teachers shared in their responses that they "needed summer vacation. We don't get paid to work in the summer."

Professional Development Needs. A follow-up question to the one asking to measure assistance needs, inquired about specific topics for future professional development. We identified four common themes: (a) supports for students with disabilities, (b) training for parents, (c) technology training, and (d) strategies for effective and differentiated instruction. One respondent has inadvertently summarized these themes:

> "Teachers need support in every area-they need support with parent and student communication, changing/adapting content, online classroom management, ALL of the tech tools used in virtual/distance learning and they need admin/instructional coaches to check in frequently to HELP them! Teachers are under an extreme amount of stress and there is not enough time in the day for us to accomplish what is on our plates and we need help!"

DISCUSSION

This survey-based descriptive study examined the lived experiences of general and special education teachers during the COVID-19 pandemic located in the western portion of the U.S., primarily in the Northwest, and as such extends the previous research examining teachers' experiences during the pandemic (e.g., Mueller et al., 2020; Pressley, 2021; Tremmel et al., 2020). The findings focused on teachers' instructional challenges and barriers to student learning, as observed by the teachers, and compared these between early and mid-pandemic teaching (i.e., spring and fall of 2020). However, we wanted to go beyond mere description of these challenges and barriers by analyzing the data based on teachers' prior familiarity with UDL (Rose & Meyer, 2000) and adding to the literature on engagement in learning by offering suggestions for improving future practice. Thus, our third research question centered on teachers' assistance needs for further professional development.

Across quantitative and qualitative data, our findings related to teachers' instructional challenges and students' barriers to learning are consistent with previous research findings. DiPietro et al. (2008) argued that teaching online is a major pedagogical shift for teachers and requires a different skill set than face-to-face teaching. Our descriptive statistical analysis indicated that inexperience teaching online was the leading instructional challenge to teachers in spring 2020. Qualitative analysis extended this finding by adding the emotional context- teachers' instructional challenges led them to feeling ineffective, depressed, and helpless. Moreover, teachers struggled with

ineffective district-level leadership and reported feeling unsupported while balancing increased workload. Consequently, in the open-ended question about preparations taken on during summer 2020, many teachers reported on spending countless hours online in self-training in learning management systems, online teaching strategies, and as a result, statistical analysis of data regarding fall 2020, showed a drop of "inexperience teaching online" from first to third leading instructional challenge. Importantly, DiPietro et al. (2008), Pulham and Graham (2018), and Rice and Dawley (2009) argued for improvements in teacher preparation in online teaching strategies almost a decade ago. Yet, COVID-19 pandemic teaching exposed that little progress has occurred in this area despite a dire need for teachers' further development in online teaching and pedagogy.

In addition to a specialized skill set required for effective online teaching, researchers pointed out the importance of OL-specific classroom management skills, especially as they relate to supporting student engagement and motivation (DiPietro et al., 2008; Farmer & West, 2019; Liu & Cavanaugh, 2011). Not surprisingly, "engaging students as remote learners," and "students' lack of responsiveness and availability," were ranked among the top three instructional challenges by our respondents, consistently for both spring and fall of 2020. These challenges emerge equally represented as the top three, regardless of the teacher's knowledge of and experience with UDL. There was little variance in our findings between the groups of respondents when organized by familiarity with UDL. While adapting the survey questions to include the ones referring to knowledge of UDL, we were curious to see how such preparation to intentionally design flexible learning environments and experiences might impact the perception of teachers' instructional challenges. According to the descriptive statistical analysis of the survey data, in the light of a global crisis like a pandemic, such differences in preparation did not make much difference in how challenging this experience was.

Previous literature focused on OL pointed to motivation, relevance, accountability, and time spent in the LMS as best predictors of students' success as remote learners (Curtis & Werth, 2015). In addition, Kelley et al. (2020) emphasized the importance of structural factors like access to reliable internet and technology. Our findings confirmed previous research. For both, spring and fall of 2020, teachers reported on "motivation to manage their own learning" as well as "access to reliable internet" as the top two leading barriers to students' learning. Interestingly, for many students, the learning context differed between early and mid-pandemic. In spring 2020, most schools shut down and all learning occurred remotely. In fall, students experienced a wide range of learning contexts, from full remote, to hybrid,

to back in person learning. Yet, regardless of the learning context, the two leading barriers to learning, as perceived by the teachers, had remained the same. The differences between spring and fall became more prominent later in the list of potential barriers to student learning. Namely, for spring 2020, the third leading barrier was "lack of experience in OL," but this factor dropped to a fifth position in reports about the fall, presumably, as the students gained the experience and/or returned to in-person learning. For fall 2020, the third leading barrier to learning was students' mental health. Also note-worthy is the fact that health issues related to COVID-19 rose up to a seventh position among the barriers in the fall, while it was ranked as the second to last barrier in spring.

In addition to confirming the current literature findings regarding student barriers to learning, this study expands the literature by reporting on data focused on students with disabilities. As gleaned from open-ended responses provided by this sample of general and special education teachers, students with disabilities were most impacted by pandemic teaching. In addition to the barriers to learning experiences by all students, an abrupt switch to online learning highlighted the amount of support parents and guardians needed at home to facilitate learning of their students with disabilities. For this student population the structural barriers were not only with access to reliable internet and technology (Kelley et al., 2020). SWD barriers to learning included teachers' lack of preparation to provide quality engaging remote instruction, and lack of IEP compliance. All in all, every student was impacted by pandemic teaching but, according to the qualitative data from this survey, students with disabilities experienced some of these barriers disproportionally more.

IMPLICATIONS FOR FUTURE AND CONCLUSION

We draw the recommendations for future research and practice directly from the findings regarding teachers' assistance needs. Overall, the top areas of further future development for the teachers in our sample were related to creating engaging online learning environments and utilizing the educational technology to support student interactions. More professional development is needed in effective online pedagogies to support student participation and engagement. Interestingly, there was a significant statistical difference found in the assistance needs between UDL familiarity groups. The finding provides an indication that educators with less UDL knowledge and experience have more of a need for training or supports for best practices in online information presentation than educators with more UDL knowledge. In addition, the findings suggest that teacher's UDL knowledge is positively associated with student engagement and the ability to facilitate accommodations for students with disabilities.

Future research should further explore the differences in effective online versus face-to-face teaching strategies to support student active participation and engagement. This implication ties into the concept of multi-component engagement in learning, consisting of behavioral/ physical, cognitive, and emotional components (Fredricks et al., 2004; Hollingshead et al., 2017). In an online environment, the teacher is limited to relying on cognitive and emotional aspects of student engagement and thus intentional, effective teaching strategies are needed.

Future research could further examine the impact of teacher's knowledge and skills in UDL-based instructional design on their teaching challenges. The data in this study points to large discrepancies in teachers' challenges and consequently needs for more training in the areas of designing online instruction, specifically using lectures effectively, structuring online engagement, and incorporating accommodations in OL. Teachers who had stronger knowledge and preparation in UDL indicated less need for future assistance in these areas.

To conclude, student engagement in learning is a complex construct that becomes further complicated by the method of instructional delivery. Although nobody wishes to go through the challenges of pandemic teaching ever again (though at the time of the submission of this manuscript, this situation is not exactly over), this study as well as others (e.g., Mueller et al., 2020; Pressley, 2021; Tremmel et al., 2020) demonstrated teachers' continued struggle to engage students in learning and provide effective online learning experience. Both the pre-service and in-service teachers must be well-trained to provide high quality, engaging OL. The field of education needs policies and changes of practice to ensure that any future emergencies are met with more preparation, stronger leadership support, and do not result in feelings of (dis-)engagement, despair, failure, helplessness among students and educators. Let the lessons learned during COVID-19 pandemic point to positive change in our education system where all teachers feel engaged, prepared, and supported, and all students are engaged in learning to make meaningful learning progress despite the instructional delivery model.

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