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Accessibility and Usability of Preferences in Blended Learning for Students with and without Disabilities in High School

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In this study, the researchers investigated accessibility and usability needs of students enrolled in blended courses in high school. Needs addressed were: course preference or course satisfaction, accessibility of support systems, and help-seeking behaviors. Students enrolled in a twelfth-grade blended course in a high school in the southwestern United States were surveyed. Students with disabilities and without disabilities reported neutral ratings related to the accessibility of support systems (i.e. course navigation, course layout, and accessibility) and help-seeking behaviors. However, students reported that blended courses were not a preferred means of instruction. More research is needed to determine the underlying reasons that respondents reported negative opinions about taking a blended learning course, because the negative opinions were not related to primary study aspects. Future research should investigate why students with disabilities were reporting negative opinions about the blended course, the students' preferences for various asynchronous and synchronous interactions, and areas of professional development for K-12 instructors.

Keywords: blended learning, students with disabilities, secondary education, accessibility, student preferences

To keep up with the increase of technological advances in society, methods for instructional delivery in educational environments must change as well. Starting as early as elementary school and up through post-secondary school settings, distance education options have increased over the last few years overall (Watson & Kaloman, 2005; Porter, Graham, Spring, & Welch, 2014).

The blended learning environment was designed to incorporate both asynchronous (where learners engage with materials on their own) and synchronous e-learning (where learners meet virtually, but at the same time (iNACOL, 2011). Horn and Staker (2014) defined blended learning as:

> a formal education program in which a student learns (1) at least in part through online learning, with some element of student control over time, place, path, and/or pace; (2) at least in part in a supervised brick-and-mortar location away from home; (3) and the modalities along each student's learning path within a course or subject are connected to provide an integrated learning experience. (p. 34)

Picciano and Seaman (2009) noted that "online learning is meeting the specific needs of a range of students, from those who need extra help and credit recovery to those who want to take Advanced Placement and college-level courses" (p. 1). Supporting the previous statement, enrollment data provided by the National Center for Educational Statistics, which shows an increase in enrollment in distance courses across all grade levels from 317,070 in 2002 to 1,816,390 in 2010 (National Center for Education Statistics, 2014, Table 218.20).

These numbers represent an approximate 500% increase in distance enrollment over an eight-year period in K-12 education. Specifically at the high school level, in the 2001-2002 school year, 214,140 students were enrolled in a distance course compared to 1,348,920 in 2009-2010 (National Center for Education Statistics, 2014, Table 218.20). The high school enrollment numbers make up most of the enrollments for students in the K-12 setting, which raises concerns for students with disabilities at the high school level. Yet, researchers have found that in online courses, especially at the high school level, students with disabilities are enrolling in online courses at the same rate as their typically developing peers (Carnahan & Fulton, 2013; Watson, 2008; Woods, Maiden, & Brandes, 2011). Moreover, Cavanagh, Barbour and Clark (2009) have also found that, "the range of students enrolling in online learning opportunities is expanding (Barbour & Mulcahy, 2007; Cavanaugh, 2007). Yet, the ability of virtual schools to support a broad range of student abilities appears to be limited" (p.12).

In a study conducted by Pace and Mellard (2016) in the blended middle school setting, the researchers found that while "students with disabilities performed below the level of students without disabilities, the achievement gap did not increase between the test administrations" (p. 166). This result can be viewed as a positive indicator that blended learning environments are beginning to address the needs of students with disabilities, yet more research needs to be conducted to determine which specific aspects of the blended environment benefit students with disabilities the most.

While blended learning at the high school level is experiencing rapid growth, current literature on the topic of blended learning has not been fully explored in the areas of the accessibility and usability needs of students with disabilities. Particularly, we know little about whether what is available meets student needs and preferences. In this study, the researchers explored the accessibility and usability needs of students in terms of preference/satisfaction of; learner preference or learner satisfaction (i.e. preference for taking blended courses), course content accessibility (i.e. course navigation and course layout preferences), and help-seeking behaviors (i.e. understanding how to acquire help for course content) for students with disabilities enrolled in a blended course at the high school level. The research questions for this study to address the programmatic needs of students with disabilities in a blended course are:

1) What is the learner preference or learner satisfaction (i.e. preference for taking blended courses) for taking a high school blended learning course?
2) Which accessibility to support systems (i.e. course navigation, course layout, and accessibility) do students with disabilities in a high school blended learning environment prefer?
3) Can students identify help-seeking supports while taking a high school blended course?

REVIEW OF THE LITERATURE RELATED TO BLENDED LEARNING

Using Education Research Complete, ERIC, Academic Search Complete, and PsycInfo, a search of the literature for empirical work related to learner preference or learner satisfaction in the online environment, yielded no articles that were focused on 1) K-12 settings, 2) included data identifying the preferences of students with disabilities, and 3) described a blended setting using an online learning management system. Included in this review of the literature were studies that contain one or combinations of these three

criteria. The use of the term *online learning* often includes blended settings unless the authors specifically delineate the data to categorize between virtual (i.e. fully-online courses) and blended courses (i.e. part-time in a brick and mortar setting) the reported results may include information on both settings. Findings cannot be generalized to blended settings, but some conclusions can be drawn that may be insightful due to the similarities. Additionally, further research into the overall preferences of students with disabilities for the online learning format in general, and more specifically the blended learning format for students with disabilities, is needed.

Course Preference or Course Satisfaction

Searching the literature to locate studies related to learner preference or learner satisfaction in K-12 online settings, a study conducted by Harvey, Greer, Basham and Hu (2014) found that overall, middle and high school students (including some respondents with disabilities) reported having positive experiences when taking an online course (n=140). The participants were surveyed using a Likert scale to show preference for characteristics of online learning, student-to-student interactions (i.e. bullying), involvement in extracurricular activities, interaction, satisfaction and support from online teachers. However, 86.7% of their student sample reported that they were not receiving special education services while 14.3% reported they were. The researchers did not report whether students qualified for services and were not receiving them or if they truly did not have disabilities. For those students who reported receiving special education services, no information about the disability categories were provided. The researchers did not seek information about preferences for interaction, comparing experiences in the traditional classroom, and overall reactions to online learning were not aggregated and did not provide the perspectives of students with disabilities.

While other research targeting students with disabilities and learner preference or learner satisfaction in online learning environments has been conducted, the focus has primarily been on the post-secondary setting. Catalano (2014) implemented targeted accessibility features (i.e. links to free text-to-speech software, content availability in multiple formats, and the use of alt-tags, captions) in a library science course. She found that students preferred the added features, but requested more targeted features based on their specific needs (Catalano, 2014). Based on the findings, Catalano recommended that additional studies be completed with more students with a variety of needs to target the most requested strategies for implementation into online courses.

In another study, Mohr, Holtbrugge, and Berg (2012) conducted an international survey of university level business management students to understand the interaction between perceived learning styles with e-learning preferences. Although this study did not include information specific to students with disabilities, it is still important to our research question for the current study because the researchers concluded that "While the focus of this study has been on e-learning, research suggests that the overall learning outcomes of learners can best be achieved by using blended e-learning" (p. 319).

Similarly, Yang and Tsai (2008) examined learning preferences and beliefs about learning in a web-based context for the postsecondary level but discussed the need to continue to investigate learner preferences to "help to evaluate and predict the efficiency of web-based instructions, and furthermore, make comparisons between web-based and conventional situations" (p. 1301).

Zhu (2012) also concluded that overall students were satisfied with the online learning environment in terms of "their online performance and knowledge construction in online group discussions" as it pertains to cultural differences (p. 132). While no information about students with disabilities was included, Zhu (2012) recommends more research into the differences between groups of students and their preferences.

Accessibility of Support Systems

Research identifying the specific programmatic preferences in terms of accessibility and usability issues for students with disabilities is necessary due to the continued increasing enrollment rate of students with disabilities in blended learning settings. Greer, Rice, and Dykman (2014) conducted a systematic review of the literature from 2004 to 2014 about K-12 online learning and students with disabilities. The authors included all forms of online learning, including blended learning in the search terms used. Greer et al., found 15 empirical studies, which the authors concluded were too few given the prevalence of online learning options in K-12 and the number of students with disabilities that will have access to these environments. The authors recommended that future research is needed for blended learning for students with disabilities. Additionally, Greer, Rice, and Dykman recommend that more qualitative studies be conducted to understand how students with disabilities are experiencing online learning, including blended learning.

In terms of accessibility in online learning settings, to include blended and fully online settings, two articles were found in which researchers explored the needs of students with disabilities. Keeler and Horney (2007) conducted a survey of online courses offered at the secondary level by five online high schools. The researchers identified 38 design elements, falling into five categories "accessibility, Web design, technologies used, instructional strategies, and support systems" (p. 64). The researchers concluded that the courses surveyed did contain design elements that met the needs of students with disabilities. Keeler and Horney also stated that "course designers need to exploit the advantages offered by technologies to create courses accommodating either the widest possible range of students *or* specific targeted populations" (p. 73).

More recently, Massengale and Vasquez (2016) examined six post-secondary level courses for web accessibility using the WAVE toolbar. While the WAVE toolbar cannot determine true accessibility, the intent was to provide web designers with information about common accessibility issues ("WAVE Help," n.d.). In using WAVE toolbar to examine the web-based course content, Massengale and Vasquez identified a total of 13 challenges (i.e. issues with accessibility), with five of these challenges being considered high-frequency challenges. Considering these findings, Massengale and Vasquez recommended "surveying this student population to evaluate their perceptions and struggles when using Webcourses to access their course curriculum" (p.76). The findings of the above two studies show that there is support for students with disabilities needs in terms of accessibility of support systems (i.e. online content) of web-based content in online courses, but the authors' recommendations also call for more research into understanding how these accessibility issues affect the perceptions of students with disabilities when taking an online and/or blended course.

Help-Seeking Behaviors

Support for student learning is a key component in any environment, but especially in an online environment in which the student cannot immediately ask a teacher or instructor for assistance. Further, the skill of help-seeking in learning does not often come naturally and often is attached to a stigma. "Seeking help—from either formal or informal sources—is also affected by whether the need for help is associated with stigma or whether seeking help for the need is perceived as a sign of weakness or personal inadequacy" (Barker, 2007, p. 14). Catalano (2014) explains that to effectively

design instruction, a complete understanding of the barriers that a student may face in a blended course is critical.

One barrier students with disabilities may face is asking for help. If there is apprehension about help-seeking, students with disabilities may, in turn, report lower satisfaction in terms of accessibility and services if taking an online course. Roberts, Crittenden, and Crittenden (2011) compiled the perceived satisfaction in terms of accessibility compliance and services from students with disabilities in the university setting and reported, "that of the over 2300 responses received 46% of respondents believed their disability to inhibit success in online learning" (p. 20). However, researchers do not yet understand the reasons behind why students may not be accessing supports specifically designed for students with disabilities. Therefore, researchers should attempt to explore the possibility of a link between help-seeking behaviors and accessibility for students with disabilities at any level, but more so at the high school level. These findings support the need to further investigate the ability for students to self-advocate while in online course, as well as blended courses.

Further, lower performing students may also benefit from receiving additional supports. Cavanaugh, Barbour, and Clark (2009) recommended, "Research studies investigating the online learning experience for lower performing students will assist personnel to design appropriate supports as this particular population of students continues to grow within virtual schools" (p. 13), which could include teaching students to self-advocate for assistance.

In a study conducted by Trammell and Hathaway (2007) help-seeking pattern data was collected at a small liberal arts university to compare the rates at which students with disabilities were seeking help from instructors as compared to students without disabilities. Trammell and Hathaway noted that there are many factors which contribute to help-seeking behaviors in students with disabilities (i.e. self-identification, self-advocacy, awareness of rights, and motivation) in post-secondary settings. The researchers concluded that,

> "seeking help is not solely about meeting with professors outside of class. It includes utilizing many other resources; resources that students may or may not opt to utilize; and resources that may come after or in lieu of meeting with professors outside of class" (p. 10).

Trammell and Hathaway also concluded that students, both with disabilities and without disabilities, did not seek help during the study period from instructors. This finding is important to note, as this pattern for not

seeking help is an area to explore in the K-12 setting as well. In understanding that the online learning experiences of students in the K-12 setting will later affect the outcomes of higher education for these same learners (Burdette, Greer, & Woods, 2013), it is necessary to consider the help-seeking behaviors of students with disabilities in the K-12 blended setting.

Understanding students with disabilities' preferences for accessibility and usability (i.e. course preference or course satisfaction, accessibility of support systems, and help-seeking behaviors) in the blended setting is foundational for identifying strategies and evidence-based practices that can support all students.

METHODS

This study was conducted within a large school district in the Southwestern United States. The school district consisted of five high schools, eight middle schools, and 13 elementary schools. The school selected for this study was a convenience sample and was a high school with an enrollment of approximately 1,400 students. The school demographics included an enrollment of 738 (52.7%) males, 689 (49.2%) females, 14 (1%) African American, 314 (22.4%) Caucasian, 1087 (77.6%) Latino, and 704 (50.3%) economically disadvantaged, 1,204 (86%) general education, 196 (14%) special education, 125 (8.9%) gifted education, and 95 (6.7%) English Language Learners. The student participants in the study (N=43) included 22 (51.1%) males, 21 (48.9%) females, 26 (60.4%) general education, 17 (39.5%) special education, and 5 (11.6%) English Language Learners. Additionally, demographics were collected about the participants' grade, gender, area of disability, and even when this was the student's first online class (See Table 1). Prior to the research processes described herein, approval by an Institutional Review Board (IRB) was received.

Table 1
Participant Demographics for Students with Disabilities

Participant	Grade	Gender	Area of Disability	Online Class Experience
1	12	M	SLD- Math, Reading, Written Language	Yes
2	12	F	Orthopedic Impairment	Yes
3	12	M	OHI- ADHD	Yes
4	12	M	SPL- Language	Yes
5	12	M	SLD Math, Reading, Written Language	Yes
6	12	M	SLD Reading Written Language	Yes
7	12	M	SLD Reading Comp, Written Expression, Reading Fluency	Yes
8	12	M	SLD Math, Speech Language	No
9	12	M	SLD Reading	Yes
10	12	F	SLD Math, Reading	No
11	12	F	SLD Math	Yes
12	12	M	SLD Math	No
13	12	M	SLD Reading, Written Language	Yes
14	12	M	SLD Math	Yes
15	12	M	SLD Math, Reading, Written Language	No
16	11	M	SLD Math	Yes

This study included four different instructors delivering the same content during four different sections of the blended course. Each instructor was provided with a course shell (i.e., the course layout and content organization) designed to be delivered fully online. The course was titled "Principles of Democracy" and was designed to meet the state graduation requirement for government/economics credit. Pursuant with state statute, the course was a requirement for graduation in the state. The course shell and content had been modified by a single instructor to align with the local district's curriculum map and textbook utilized by the district. The modified course shell was then provided to each individual instructor and each

instructor then had the ability to make changes to the course shell as desired. Finally, individual instructors had complete autonomy to implement supporting instruction at their discretion. The individual implementation regarding each blended course was as follows:

Instructor A - a special education teacher who delivered the course content in a traditional pull-out setting and used the online course content as a supplement to her direct instruction and group work activities. The class visited a computer lab every other class meeting to interact with the online course content, students would move independently through the online activities.

Instructor B - a special education instructor who used laptops in the classroom to deliver supplemental direct instruction while students were working together within the online course. Students moved through the online content along with the instructor.

Instructor C - a general education teacher who had a traditional classroom and access to a computer lab, alternated days in those locations, used a facilitator model when in the computer lab and direct instruction when in the classroom. Students moved through the online content independently.

Instructor D - a general education instructor situated in a computer lab setting who facilitated the students as they progressed independently through the course content within the learning management system. As noted in the descriptors, the type and level of direct instruction provided to the whole group varied by instructor (See Table 2).

Table 2

Instructor Facilitation Summary

Instructor	Description of Instruction Delivery
Instructor A	Direct Instruction with the online course content used as a supplement to instruction
Instructor B	Guided Practice in which the instructor utilizes the online course content for whole group instruction and the pace is determined by the slowest learner- all students remain on the same pace- not individualized
Instructor C	Facilitator model with one day in a computer lab and one day in a classroom
Instructor D	Facilitator model with supplemental direct instruction

Table 3
Overall Reliability: Cronbach's Alpha

Subscale	Cronbach's alpha	Number of Items
Domain 1	.608	4
Domain 2	.661	4
Domain 3	.785	5
Domain 4	.220	4
Domain 5	-.47	3
All Domains	.775	20

Table 4
Final Reliability: Cronbach's Analysis Excluding Question 10

Subscale	Cronbach's alpha	Number of Items
Domain 1	.608	4
Domain 2	.661	4
Domain 3	.785	5
Domain 4	.220	4
Domain 5	.337	2
All Domains	.809	19

Instrument

The Programmatic Needs Survey (PNS) administered in this research project was designed to be completed by students enrolled in a blended learning environment in the twelfth grade of school. The survey was developed by the researchers and validated by an expert in special education and an expert in online learning. The survey questions were edited, formatted and then distributed to students during the first nine weeks of the semester. Survey items were developed in consideration of specific asynchronous aspects of the blended course related to the students' interaction with the learning management system. The PNS contained 20 items, with each item designed to assess the overall needs of students in the specific areas of: 1) course navigation, 2) course layout, 3) course content accessibility, 4) learning preferences, and 5) help-seeking behaviors, as it related to the individual blended learning experience. Overall, the purpose of the PNS was to determine the specific accessibility and usability needs (i.e. course preference or

course satisfaction, accessibility of support systems, and help-seeking behaviors) of students enrolled in an online blending learning environment.

The survey items related to five specific areas: 1) course navigation (4 items), 2) course layout (4 items), 3) learning preferences (6 items), 4) accessibility (4 items), and 5) help-seeking behaviors (2 items). The survey was three pages in length and was double-spaced to provide students an area large enough to circle the preference of their choice. To assess the preferential accessibility and usability needs of students, a 5-point Likert scale was used. A Likert scale was most appropriate for this survey because it could provide question-by-question data comparisons and has been found to be useful in investigating participant preference (Clason & Dormody, 1994). Specifically, the score ranges were: 5=strongly agree, 4=agree 3= neutral, 2= disagree, 1= strongly disagree. The higher ratings demonstrated a preference for specific aspects of the blended course.

Procedures

After receiving IRB approval during the Fall 2017 semester, the target high school was contacted to ascertain interest in participation. A meeting was scheduled with the respective teachers assigned to blended learning courses during a regularly scheduled department meeting. Within the meeting the parameters of the study were discussed and initial teacher consent was obtained. During the meeting, teachers were given the opportunity to provide feedback on the survey and questions were answered about student accommodations as it related to the survey. After the initial introductory meeting, all teachers agreed to participate in the study.

Individual meetings with students in each classroom were scheduled to introduce the study and consent forms were provided to students enrolled in the blended courses for the Fall 2017 semester (N=141). Students were given 12 days to review the consent form with a parent/guardian and return it to their respective teacher. Student consent was difficult to obtain due to the short time frame to return the forms, the classes met only every other day, and the students had very little incentive to return the forms. However, from the 141 forms distributed, (n=43) were returned; therefore, establishing a return rate of 30%. Once consent was obtained, the PNS was administered in the regular classroom, face-to-face setting to all students who had consent to participant. The administration of the PNS took two days to meet with all the class sections. To facilitate honest responses from the students, the survey was anonymous and instructors of the courses were not able to view the instrument or the results until after the data had been coded and de-

identified. Administration of the PNS took place during regularly scheduled class time and required about 10-15 minutes to complete.

DESCRIPTIVE ANALYSIS AND RESULTS

To analyze the accessibility and usability needs (i.e. course preference or course satisfaction, accessibility of support systems, and help-seeking behaviors) of students in blended learning environments, means and standard deviations were calculated in consideration of two separate groups. Due to the small sample size (n=43), descriptive statistics were used to examine the data. The small sample size, and uneven distribution of the subgroups, could have led to instability within the results if more powerful statistics were used to analyze the data (Welkowitz, Cohen, & Lea, 2011). The groups were divided first by disability and non-disability, then further analyzed by domain (i.e., course navigation, course layout, learner preferences, accessibility, and help-seeking). Finally, the data were then analyzed by instructor and then further organized by instructor and domain.

First, the means and standard deviations were calculated question-by-question for students with disabilities versus students without disabilities (See Table 5). Overall, the means for students with disabilities for all questions ranged from 2.13 (*s*= 1.088) to 4.13 (*s*= 0.885). The means for students without disabilities for all questions ranged from 2.15 (*s*= 0.989) to 4.07 (*s*= 0.781). When viewed by both domain and disability versus non-disability, mean ranges were as follows, 1) *course navigation*, 3.50 (*s*= 0.894) to 4.00 (*s*= 0.894); 2) *course layout*, 3.44 (*s*= 0.964) to (*s*= 3.94); 3) *learner preferences*, 2.13 (*s*= 1.088) to 3.63 (*s*= 1.408); 4) *accessibility*, 2.50 (*s*= 2.50) to 3.94 (*s*= 1.181); 5) *help-seeking*, 3.38 (*s*= 1.088) to 4.13 (*s*= 0.885) (See Table 6).

Table 5
Descriptive Statistics by Question and Disability

	With Disability (n= 16)		Without Disability (n= 27)		Total n (n= 43)	
Question Number	Mean	*SD*	Mean	*SD*	Total Mean	*SD*
1	2.63	1.025	2.15	0.989	2.33	1.017
2	3.44	0.964	3.63	0.688	3.56	0.796
3	4.00	0.730	4.07	0.781	4.05	0.754
4	3.94	1.181	3.56	1.121	3.70	1.145
5	4.00	0.894	3.78	0.892	3.86	0.889
6	4.13	0.885	3.78	0.934	3.91	0.921
7	3.94	0.680	3.89	0.577	3.91	0.610
8	3.19	1.109	2.78	0.892	2.93	0.985
9	3.63	0.885	3.52	0.975	3.56	0.934
10	3.88	1.025	3.07	0.874	3.37	1.001
11	3.38	0.885	3.85	0.770	3.67	0.837
12	3.50	.894	3.89	0.641	3.74	0.759
13	2.13	1.088	2.37	0.967	2.28	1.008
14	3.81	0.834	3.74	0.764	3.77	0.782
15	3.38	1.204	3.48	0.753	3.44	0.934
16	3.38	1.088	3.56	0.974	3.49	1.009
17	2.50	0.730	2.26	0.712	2.35	.720
18	3.63	1.408	3.81	1.075	3.74	1.197
19	3.94	0.772	4.07	0.675	4.02	0.707
20	2.69	1.448	2.52	1.156	2.58	1.258

Note. The acronym *SD* is in place of Standard Deviation

Table 6
Descriptive Statistics for Disability v. Without Disability by Domain

	With Disability (n= 16)		Without Disability (n= 27)		Total n (n= 43)	
Domain	Mean	*SD*	Mean	*SD*	Total Mean	*SD*
Course Navigation (1)	4.00	0.730	4.07	0.781	4.05	0.754
	4.00	0.894	3.78	0.892	3.86	0.889
	3.50	0.894	3.89	0.641	3.74	0.759
	3.81	0.834	3.74	0.764	3.77	0.782
Course Layout (2)	3.44	0.964	3.63	0.688	3.56	0.796
	3.94	0.680	3.89	0.577	3.91	0.610
	3.38	0.885	3.85	0.770	3.67	0.837
	3.94	0.772	4.07	0.675	4.02	.707
	3.63	0.885	3.52	0.975	3.56	0.934
Learner Preferences (3)	2.63	1.025	2.15	0.989	2.33	1.017
	2.13	1.088	2.37	0.967	2.28	1.008
	3.38	1.204	3.48	0.753	3.44	0.934
	3.63	1.408	3.81	1.075	3.74	1.197
	2.69	1.448	2.52	1.156	2.58	1.258
Accessibility (4)	3.94	1.181	3.56	1.121	3.70	1.145
	3.19	1.109	2.78	0.892	2.93	0.985
	3.63	0.885	3.52	0.975	3.56	0.934
	2.50	0.730	2.26	0.712	2.35	.720
Help-seeking (5)	4.13	0.885	3.78	0.934	3.91	0.921
	3.38	1.088	3.56	0.974	3.49	1.009

Next, means were calculated for students, overall, by instructor (See Table 7). The means comparing student responses by instructor were also calculated question-by-question. For Instructor A, the means for all questions ranged from 2.63 (s= 1.302) to 4.63 (s= 0.518); Instructor B, the means for all questions ranged from 1.67 (s= 0.577) to 4.67 (s= 0.577); In-

structor C, the means for all questions ranged from 2.00 (*s*= 1.000) to 4.22 (*s*= 0.667); and Instructor D, the means for all questions ranged from 2.17 (*s*= 0.887) to 4.00 (*s*= 0.603) (See Table 7). The means and standard deviations were then further organized by the researchers by domain and the results of this analysis are available in Table 8.

Table 7
Descriptive Statistics by Teacher and Question

	Instructor A (n= 8)		Instructor B (n= 3)		Instructor C (n= 9)		Instructor D (n= 23)		Total n (n= 43)	
Question Number	M	*SD*	M	*SD*	M	*SD*	M	*SD*	M	*SD*
1	3.25	1.035	2.00	1.000	2.00	1.000	2.17	0.887	2.33	1.017
2	3.88	0.991	3.00	1.00	3.44	0.527	3.57	0.788	3.56	0.796
3	4.25	0.707	4.33	0.577	4.22	0.667	3.87	0.815	4.05	0.754
4	4.38	0.744	4.33	1.155	3.78	1.302	3.35	1.112	3.70	1.145
5	4.25	0.707	4.33	0.577	3.78	0.833	3.70	0.974	3.86	0.889
6	4.63	0.518	4.33	0.577	3.89	0.928	3.61	0.941	3.91	0.921
7	3.88	0.641	4.67	0.577	4.11	0.601	3.74	0.541	3.91	0.610
8	3.25	1.282	3.67	1.528	2.67	1.118	2.83	0.717	2.93	0.985
9	3.75	0.886	4.00	1.000	3.22	0.667	3.57	1.037	3.56	0.934
10	3.63	1.302	3.67	0.577	3.11	.601	3.35	1.071	3.37	1.001
11	3.50	0.756	3.33	1.155	3.56	0.882	3.83	0.834	3.67	0.837
12	3.38	1.061	4.33	0.577	3.89	0.782	3.74	0.619	3.74	0.759
13	2.63	1.302	1.67	0.577	2.33	0.866	2.22	0.998	2.28	1.008
14	4.13	0.641	4.00	1.000	4.00	0.707	3.52	0.790	3.77	0.782
15	3.75	1.035	3.57	1.528	3.56	0.726	3.26	0.915	3.44	0.934
16	3.38	1.188	4.00	1.000	3.67	0.707	3.39	1.076	3.49	1.009
17	2.63	0.744	2.00	0.000	2.11	0.601	2.39	0.783	2.35	0.720
18	3.25	1.488	4.67	0.577	4.11	0.928	3.65	1.191	3.74	1.197
19	3.88	0.835	4.67	0.577	4.00	0.866	4.00	0.603	4.02	0.707
20	3.00	1.512	2.67	2.082	2.44	0.882	2.48	1.238	2.58	1.258

Note. The letter *M* is in place of the word Mean. The letters *SD* are in place of standard deviation.

The internal reliability of the PNS was measured using Cronbach's alpha coefficient for each scale using SPSS version 24.0. All student responses to the 20 questions were inputted into SPSS with each response coded 5-1, with 5= strongly agree and 1=strongly disagree. The actual value of

Cronbach's alpha was 0.775 (See Table 3). A reliability coefficient of 0.70 or higher is considered acceptable (Nunnally, 1978). However, the researchers wanted a higher Cronbach's alpha for the reliability of the survey. Upon review of the SPSS output of the Likert questions, the researchers concluded that question 10 should be removed from the reliability analysis. Question 10 states, "I would like to be able to change some things in my online course." The content of Question 10 was not specific enough for this survey since the question is broad and includes the statement, "some things." After removal of Question 10, the new analysis measuring the Cronbach's alpha improved the reliability coefficient to 0.809 (See Tables 3 and 4).

DISCUSSION AND IMPLICATIONS

The researchers designed this study to explore the accessibility and usability needs (i.e. course preference or course satisfaction, accessibility of support systems, and help-seeking behaviors) for students with disabilities enrolled in a blended course at the high school level. Researchers reviewed the responses of the students for learner preferences who were taking a blended course, students reported an overall negative opinion about blended learning as an instructional delivery model. Additionally, students with disabilities reported a slightly more negative response than students without disabilities. This result contrasts other studies that have found student preference or satisfaction with online courses to be reported as slightly more positive (Catalano, 2014; Harvey et al., 2014; Mohr et al., 2012; Yang & Tsai, 2008; Zhu, 2012). The reasons for why the students reported negative opinions are unclear and should be further explored, but student responses clearly conveyed that blended learning was not a preferred method of instruction.

The results obtained by the researchers indicated that accessibility of support systems was not a concern for students receiving instruction in a blended learning environment, regardless of disability, non-disability, or instructor. This supports the finding of Keeler and Horney (2007) and Messignale and Vasquez (2016), both found that online course designs were meeting the needs of students with disabilities in terms of technology accessibility. Students from both groups reported similar opinions, which may indicate that previous concerns about technology accessibility in the course design is no longer an issue for any student, regardless of having a disability.

Finally, in terms of help-seeking behaviors the researchers found that students were comfortable with seeking online assistance and/or asking for

help. After initial analysis of the student PNS data, the research team determined that students with disabilities have similar opinions about the domain questions compared to their typically developing peers. In examining the overall analysis and domain-by-domain analysis the trends were comparable between the two groups (i.e., disability versus non-disability). This would also be supported by the work of Keeler and Horney (2007) and Messignale and Vasquez (2016) because students are reporting that they know how to access the support features within the online course component and from the blended classroom teacher.

However, the researchers found an inconsistency with the reported data when considering the context of the research questions. The students reported a negative preference for the blended course, even though the students also reported being able to access the course content and were comfortable with obtaining assistance when need. This inconsistency of students still not showing a preference for the blended course even though supports are present, should be explored further to better understand what specific aspects of the course that do not engage students.

Comparison of Students with Disabilities and Students without Disabilities

The survey contained five main categories related to the student experience in a blended learning environment (i.e., learning preferences, accessibility, course navigation, course layout, and help-seeking). When comparing students with disabilities and those without disabilities for the *learning preferences* domain, students reported a negative opinion of blended learning (See Table 6). Not taking disability classification into consideration, all students indicated the blended learning was *not* a preferred method of instruction (See Table 6). Further, when responses for students with disabilities and those without disabilities are closely compared, the researchers found that students with disabilities had a more negative opinion of blended learning than students without disabilities (See Table 6). This finding is startling because blended learning has been increasing in popularity as a method of instruction in the K-12 setting, not-to-mention students with disabilities have been enrolling in blended courses at a rate equal to their peers without disabilities. Additionally, the probability of a student receiving instruction in a blended setting is not only likely, but highly probable in this age of growing access to technology. Finally, if the trend of blended learning continues to be implemented at increasing rates, as has been the case in recent decades, the likelihood of a student receiving instruction in a blended learning envi-

ronment will no longer be optional, but an expected aspect of a traditional education in the K-12 setting.

The researchers anticipated negative results in consideration of questions pertaining to domains related to course accessibility to support systems (i.e., accessibility, course navigation, and course layout). However, the researchers found a neutral opinion for students as it related to *accessibility*, *course navigation*, and *course layout*, regardless of whether a student was identified as having a disability or not having a disability. Based on the results, the overall course design was not an issue which included layout and navigation features. Within the domains of *course navigation* and *course layout* students did not have strong opinions as to whether these domains affected their preference towards a blended environment. Therefore, specific areas of *accessibility*, *course navigation*, and *course layout*, investigated are not areas influencing student preference for blended learning environments. In consideration of blended course design and course accessibility to support systems the needs of students, elements of layout and navigation had been previously addressed; therefore, curriculum access is not an issue for students regarding blended instruction.

The results of each category will be discussed individually comparing results for students with disabilities and those without disabilities. Based on survey data, researchers found that in terms of *help-seeking* domain and comparing the responses of students with disabilities to students without disabilities responses were mostly neutral (See Table 4). Researchers discovered, through survey data, that students, regardless of the existence of a disability, have some understanding of blended learning and methods for acquiring assistance as needed and as it related to blended learning. The researchers further found that students know where and how additional help can be received. Also, students' responses revealed that students felt mostly comfortable with the structure of blended learning course content. The researchers contend, in conjunction with survey results, that student help-seeking may not be an area of concern.

Comparison of Overall Student Responses Comparing Instructors

The survey included five main categories related to the student experience in a blended learning environment (i.e., learning preferences, accessibility, course navigation, course layout, and help-seeking). The results of each category will be discussed individually comparing results for students across the unique blended learning formats, as related to the course instruc-

tor and individual learning facilitation style (i.e., Instructor A, Instructor B, Instructor C, and Instructor D) (See Table 2).

As echoed by the PNS results for students with disabilities versus students without disabilities, the *learner preferences* domain had a slightly overall negative rating when comparing the four instructors. Students enrolled in the course with Instructor B, C, or D reported a negative experience as related to the domain of *learning preferences*. Students who were enrolled with Instructor A responded neutrally to the *learning preferences* domain. Overall, all students indicated that they do not prefer blended learning as a method for instruction. Since Instructor A's students reported an overall neutral rating for the learning preference domain, this could possibly be attributed to the fact that Instructor A only used the online content as a resource. Therefore, Instructor A's use of the online content is a noticeable difference, as compared to the other three instructors.

Most impactful, overall, regardless of disability, non-disability, or instructor, students reported a negative opinion in the *learner preferences* domain as related to blended learning, which indicated that students do not prefer the blended learning to the traditional classroom. Student PNS data comparing *learning preferences* by instructor noted a preference for Instructor A. As discussed previously, Instructor A used the online content as a resource only which could be the reason why students rated the domain for learning preferences higher than other students. This variation in implementation styles across the instructors should be investigated further to understand the specific aspects of the instructor implementation that effected student perceived preference or non-preference for the blended environment.

When comparing students with disabilities versus students without disabilities as related to the domains concerning layout and course structure (i.e., Accessibility, Course Navigation, and Course Layout) the student responses were mostly neutral; further analysis of student survey results compared by instructor revealed contrasting results. Students indicated an overall neutral experience for *accessibility*. Students enrolled in Instructor C's course provided slightly negative responses. Yet, students enrolled with Instructor A, B, or D provided neutral ratings for *accessibility*. The slightly negative student survey results for Instructor C may be a function of the blended learning format adopted by Instructor C (See Table 8).

Additionally, the domain of *course navigation* received an overall neutral rating. For example, when parsed out, students provided positive surveys results for Instructors A, B, and C. Students enrolled with Instructor D reported a neutral opinion as related to *course navigation*. Finally, for the domain of *course layout*, students provided an overall positive rating.

Specifically, students enrolled in the course with Instructor B, C, or D all reported slightly positive experiences as related to *course layout*. Students enrolled in the course with Instructor A reported an overall neutral opinion of the *course layout*. In response to student survey results for domains related to *accessibility*, *course navigation*, and *course layout*, course layout and structure were not immediate concerns in terms of improving the blended learning method of instruction.

Table 8

Descriptive Statistics for Teachers by Domain

	Instructor A (n= 8)		Instructor B (n= 3)		Instructor C (n= 9)		Instructor D (n= 23)		Total n (n= 43)	
Course Navigation	M	SD	M	SD	M	SD	M	SD	M	SD
	4.25	0.707	4.33	0.577	4.22	0.667	3.87	0.815	4.05	0.754
	4.25	0.707	4.33	0.577	3.78	0.833	3.70	0.974	3.86	0.889
	3.38	1.061	4.33	0.577	3.89	0.782	3.74	0.619	3.74	0.759
	4.13	0.641	4.00	1.000	4.00	0.707	3.52	0.790	3.77	0.782
Course Layout	3.88	0.991	3.00	1.00	3.44	0.527	3.57	0.788	3.56	0.796
	3.88	0.641	4.67	0.577	4.11	0.601	3.74	0.541	3.91	0.610
	3.50	0.756	3.33	1.155	3.56	0.882	3.83	0.834	3.67	0.837
	3.88	0.835	4.67	0.577	4.00	0.866	4.00	0.603	4.02	0.707
Learner Preferences	3.25	1.035	2.00	1.000	2.00	1.000	2.17	0.887	2.33	1.017
	2.63	1.302	1.67	0.577	2.33	0.866	2.22	0.998	2.28	1.008
	3.75	1.035	3.57	1.528	3.56	0.726	3.26	0.915	3.44	0.934
	3.25	1.488	4.67	0.577	4.11	0.928	3.65	1.191	3.74	1.197
	3.00	1.512	2.67	2.082	2.44	0.882	2.48	1.238	2.58	1.258
Accessibility	4.38	0.744	4.33	1.155	3.78	1.302	3.35	1.112	3.70	1.145
	3.25	1.282	3.67	1.528	2.67	1.118	2.83	0.717	2.93	0.985
	3.75	0.886	4.00	1.000	3.22	0.667	3.57	1.037	3.56	0.934
	2.63	0.744	2.00	0.000	2.11	0.601	2.39	0.783	2.35	0.720
Help-seeking	4.63	0.518	4.33	0.577	3.89	0.928	3.61	0.941	3.91	0.921
	3.38	1.188	4.00	1.000	3.67	0.707	3.39	1.076	3.49	1.009

Based on the initial analysis of student PNS data as aggregated by the blended learning format of each respective teacher, the researchers found that the data indicated an overall slightly positive to neutral opinion in the area *help-seeking* (See Table 8). Students enrolled in Instructor A's or Instructor B's courses responded positively for individual confidence for *help-seeking*. The student survey results provided a neutral rating as related to *help-seeking* for Instructors C and D (See Table 8). Based on survey data, students understand where and how to access additional help and feel comfortable within the structure of blended learning course content. As reported by the students, student *help-seeking* in terms of knowing where to seek help may not be an area of concern when focused on the improvement of blending learning. However, due to the structure of the questions in this domain, the need to investigate if students are seeking help and in what ways students are seeking is important to consider.

Limitations

Even though the current study conducted adds to the consideration of accessibility and usability needs for students with disabilities in blended courses within a high school setting, there are still several limitations to consider. One limitation of this study was the use of convenience sampling from a local area high school which limited the variance of the student responses. The study conducted by the researchers could further be enhanced by distributing the survey to a greater number of schools and students at different grade levels. The small sample size of students limits the ability to determine effects within the data, therefore the use of a larger sample would allow for a more powerful statistical analysis. The small sample size also prevents the data from being generalized to other environments.

Some factors contributing to the small sample size were the targeted 12th grade population, difficulties in obtaining consent from parents and students, returning paperwork when classes only met every other day, and the short timeline for the study. The choice to survey 12th grade, senior level students may bias the results of the survey. While most students reported that this was not their first blended course, students at this level may be experiencing an overall indifference to the educational setting due to academic fatigue, change in learning style, and the increased demands of a blended learning environment.

Another limitation of the study was the researchers' effort to create a brief survey to support the needs of students with disabilities in terms of

written language. A longer survey may have provided more data, but the shorter survey allowed for completion in class time while applying various read-aloud accommodations for students with disabilities. The researchers also eliminated negatively worded survey questions to prevent confusion due to language processing needs for the students with disabilities. The reason to include negatively worded questions is to examine response bias (Nunnally, 1978). However, questions were worded in a reverse manner (e.g., "The text is too small." and "The text is too big."). Changes to the wording of the questions of the survey could further address this issue.

The use of descriptive statistics only, and not comparing the standard deviations of the data, further limits the ability to generalize the findings of this study. The unequal distribution between subgroups prevents a stable comparison and would reduce the effect of the data. Additionally, removing question 10 from the Cronbach's alpha analysis, the domain of *help-seeking* on the survey now contains two questions. An argument could be made that two questions in a domain may not adequately represent the student opinion of help-seeking, which would affect the internal validity of the instrument (Welkowitz, Cohen, & Lea, 2011). The other domains contained four to five questions. Moving forward the researchers would want to add at least two more questions that would measure students' opinion on help-seeking in a blended environment.

An additional limitation of the study was that open-ended questions and follow-up questions were not asked. The use of open-ended questions and/or follow-up questions would have allowed for some additional insight into the reasons behind the opinions expressed by the students. This limitation could also be addressed by administering the survey a second time later in the school year to determine whether changes in opinions have occurred. Also, follow-up interviews with respondents could offer additional, specific information about the accessibility and usability needs of students in blended courses.

Future Research

Further research is crucial to consider for online learning in the K-12 setting especially for students with disabilities. While the researchers reported that overall students indicated a negative preference for the blended learning environment, an area of future research could include more in-depth investigations into why students indicated this overall negative preference for the blended learning environment. Massengale and Vasquez (2016),

also recommend further investigations into student perceptions in the online learning environments, which can include blended learning environments. Understanding student preferences as an area of further research could improve the learning experiences for both students with and without disabilities in the blended learning environment.

The researchers in this study found that students with disabilities were reporting opinions that mirror their typically developing peers in all the areas surveyed, which may indicate that additional areas other than the ones that were surveyed could be studied in the future to further inform the accessibility and usability needs of students with disabilities in the blended setting. Conducting a more in-depth investigation into student opinions related to the synchronous (e.g., in-class instructional supporting strategies implemented by the instructor) components of the blended environment could be beneficial, because students did not report significantly different opinions across the different delivery methods.

Blended learning is multifaceted, using both synchronous and asynchronous components. The PNS only investigated a specific aspect of the asynchronous component; therefore, future research into the areas of the asynchronous content delivery and the synchronous content delivery would be advantageous because all areas of the blended learning environment would be investigated. Additionally, as the instructors are the ones delivering the content, preparing instructors to address the needs and related services of students with disabilities is important to consider. Focusing on the instructors in future research is critical because students with disabilities will continue to require appropriate accommodations and/or modifications in the blended setting as noted in their Individualized Education Program (IEP). Finally, further research is needed to investigate the professional development for teachers on the best practices for delivering content, both asynchronously and synchronously, as related to students with disabilities in the blended setting.

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