THE USE OF MOBILE DEVICES IN UNIVERSITY DIGITAL DISTANCE LEARNING: ITS EFFECT ON THE PERCEIVED LEARNING OUTCOMES

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ABSTRACT

The survey on the use of mobile devices in university digital distance learning is conducted to assess the perceived value of online learning outcomes and the use of mobile devices for specific online learning course related activities. A total of 323 valid and unduplicated responses from students who have completed at least one online course at a Midwestern university in the U.S. were used. The majority (62%) of distance learners believe that the quality of online classes is equal to that of face-to-face classes. Further they agreed or strongly agreed with the notion that online students learned as much from the online class as they might have from face-to-face classes.

Keywords: Mobile device usage, digital distance learning, e-learning, mobile learning.

INTRODUCTION

A series of recent surveys reported that online students have extensively used mobile devices [1-3] when doing various on-line, course related activities. These activities include accessing course readings, lecture files, learning management systems (LMS), communicating with professors and fellow students, finishing assignments, and conducting research assignments. The use of mobile devices for learning is common among university students, and the use of these devices provides nearly seamless continuity of formal learning for the increasingly mobile learner [4].

Prior surveys provided online college students comprehensive data on demands and preferences [1], using mobile devices for online education [2, 3], general use of mobile devices including the duration (number of years) of mobile devices use, the number and types of mobile devices, the proportion of students using mobile devices for course work activities [5].

We present a survey of college students' use of cell phone/smart phone in distance learning courses. The survey is conducted with the following two objectives: The perceived value of online learning outcomes and the use of mobile devices (a phone/tablet but not a laptop) for specific online learning course related activities. The contribution of our research is that although there are numerous prior surveys and empirical research on the use of mobile devices, the research on the perceived learning outcomes are limited. A small number of research such as [1] briefly discussed the value of online learning in comparison with face-to-face class learning. Our research uses multi-dimensional indicators of perceived learning outcomes that better reflect students perception of the value of digital distance learning.

The following sections present survey instrument and sample. We then present the study findings. The final section describes conclusion and discussions.

SURVEY INSTRUMENT AND SAMPLE

The survey questionnaire was in part adapted from the commonly administered IDEA (Individual Development & Educational Assessment) student rating systems developed by Kansas State University, and it was selected from previous studies [6, 7]. The survey questionnaire (Appendix A) is part of a comprehensive study [8]. We collected the e-mail addresses of 3,285 students from the student data files

archived with every online course delivered through the online program of a university in the Midwestern United States. The Institutional Review Boards (IRB) determined that the proposed research presents minimal risk and falls into Category 2 of research that is eligible for exemption from IRB approval. The survey questions were created using SurveyMonkey. The survey URL and instructions were sent to all of the online students' e-mail addresses. A total of 323 valid, unduplicated responses were received from the students. Online Analytical Processing technique is employed to answer multi-dimensional analytical queries for reporting.

FINDINGS

Perceived Learning outcomes

The perceived value of online learning outcomes are measured by four different indicators.

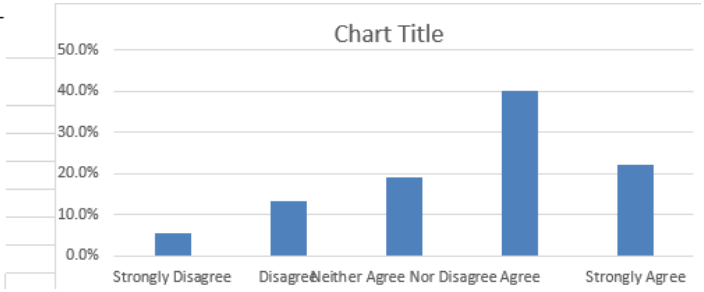
Is the quality of online classes on par with face-to-face classes?

The first indicator question asks students whether the quality of online classes is equal to that of face-to-face classes. 62% of students surveyed either agreed or strongly agreed, while 19% of them disagreed or strongly disagreed.

Figure 1: The quality of online classes.

The academic quality of this online class is on par with face-to-face classes I've Taken.

Answer Options	Response Percent	Response Count
Strongly Disagree	5.6%	18
Disagree	13.3%	43
Neither Agree Nor Disagree	19.2%	62
Agree	39.9%	129
Strongly Agree	22.0%	71
Grand Total	100%	323



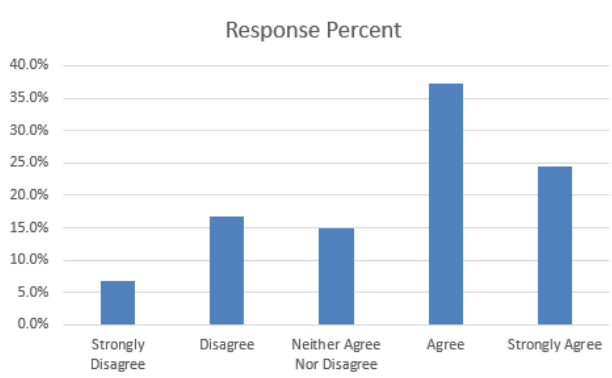
Have I learned as much from online classes as I might have from face-to-face classes?

The second indicator question asks students whether the online students have learned as much from the online class as they might have from face-to-face classes. 61.7% of students surveyed either agreed or strongly agreed, while 23.5% of them disagreed or strongly disagreed.

Figure 2: The amount of knowledge gained from online classes (equal).

I have learned as much from this online class as I might have fr

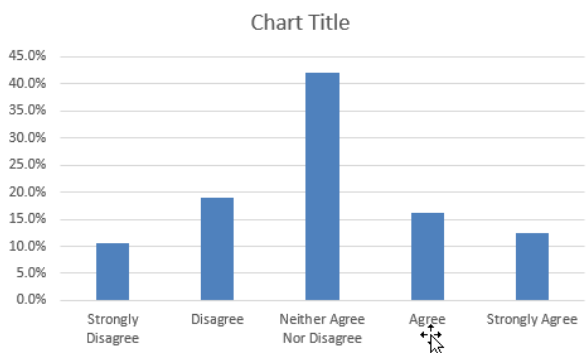
Answer Options	Response Percent	Response Count
Strongly Disagree	6.8%	22
Disagree	16.7%	54
Neither Agree Nor Disagree	14.9%	48
Agree	37.2%	120
Strongly Agree	24.5%	79
Grand Total	100%	323



Have I learned more in online classes than in face-to-face classes?
The third indicator question asks students whether the students learned more in online classes than in face-to-face classes. 28.5% of students surveyed either agreed or strongly agreed, while 29.4% of them disagreed or strongly disagreed.

Figure 3: The amount of knowledge gained from online classes (greater).

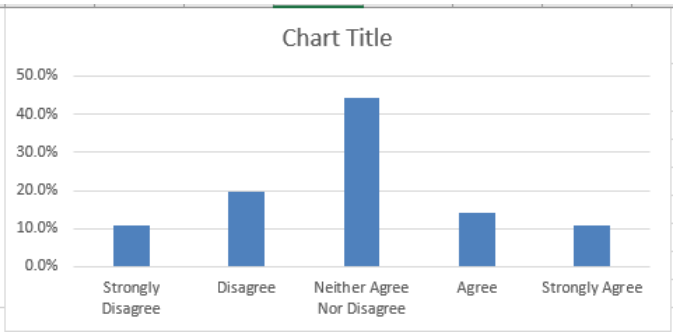
I learn more in online classes than in face-to-face clas		
Answer Options	**Response Percent**	**Response Count**
Strongly Disagree	10.5%	34
Disagree	18.9%	61
Neither Agree Nor Disagree	42.1%	136
Agree	16.1%	52
Strongly Agree	12.4%	40
Grand Total	100%	323



Is the quality of the online learning experience better?
The fourth indicator question asks students whether the quality of the learning experience in online classes is better than in face-to-face classes. 25% of students surveyed either agreed or strongly agreed, while 30.6% of them disagreed or strongly disagreed.

Figure 4: The quality of the online learning experience.

The quality of the learning experience in online classes is better than in face-to -face classes.		
Answer Options	**Response Percent**	**Response Count**
Strongly Disagree	10.8%	35
Disagree	19.8%	64
Neither Agree Nor Disagree	44.3%	143
Agree	14.2%	46
Strongly Agree	10.8%	35
Grand Total	100%	323

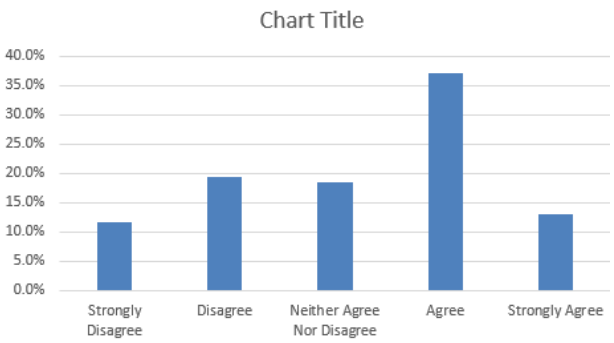


The use of mobile devices (a phone/tablet but not a laptop) for online learning course related activities
This construct (the use of mobile devices) is measured by the four indicators.

Using mobile devices to ask questions and answer the questions
The first indicator question is: "I frequently use mobile devices to ask questions and answer the questions posted on the learning management system such as Moodle by other students or the instructor in the online course I am taking."
50.2% of students surveyed either agreed or strongly agreed, while 31.3% of them disagreed or strongly disagreed.

Figure 5: Mobile devices for questioning and answering.

I frequently use mobile devices to ask questions and answer the questions posted on the learning management system such as Moodle by other stude or the instructor in the online/blended course I am taking.		
Answer Options	**Response Percent**	**Response Count**
Strongly Disagree	11.8%	38
Disagree	19.5%	63
Neither Agree Nor Disagree	18.6%	60
Agree	37.2%	120
Strongly Agree	13.0%	42
Grand Total	100%	323



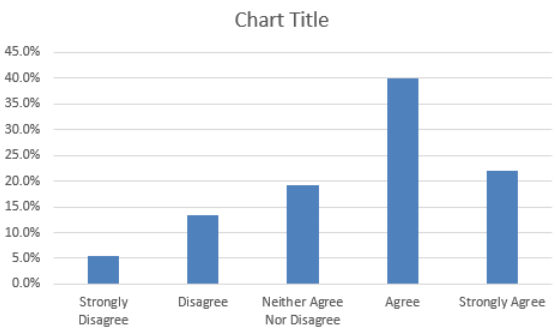
Using mobile devices to monitor the progress

The second indicator question is: "I frequently use mobile devices to check my progress in the online course I am taking."

61.9% of students surveyed either agreed or strongly agreed, while 18.9% of them disagreed or strongly disagreed.

Figure 6: Mobile devices for monitoring the progress.

I frequently use mobile devices to check my progress in the online course I am taking.		
Answer Options	**Response Percent**	**Response Count**
Strongly Disagree	5.6%	18
Disagree	13.3%	43
Neither Agree Nor Disagree	19.2%	62
Agree	39.9%	129
Strongly Agree	22.0%	71
Grand Total	100%	323



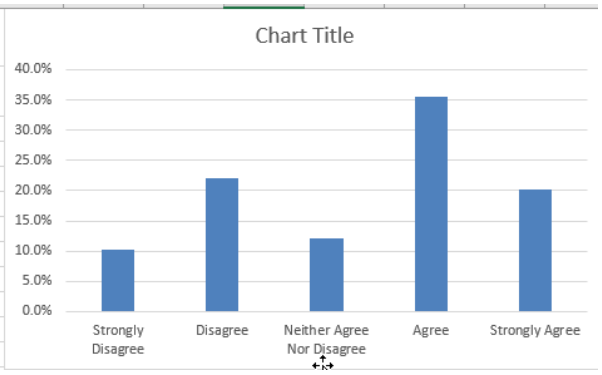
Using mobile devices to access the course contents

The third indicator question is: "I frequently use mobile devices to access the course contents in the online course I am taking."

55.7% of students surveyed either agreed or strongly agreed, while 32.2% of them disagreed or strongly disagreed.

Figure 7: Mobile devices for accessing the course contents.

I frequently use mobile devices to access the course contents (power point files, assignment files, course announcements, etc.) in the online course I am taking.		
Answer Options	**Response Percent**	**Response Count**
Strongly Disagree	10.2%	33
Disagree	22.0%	71
Neither Agree Nor Disagree	12.1%	39
Agree	35.6%	115
Strongly Agree	20.1%	65
Grand Total	100%	323



Using mobile devices to communicate with students and the instructor

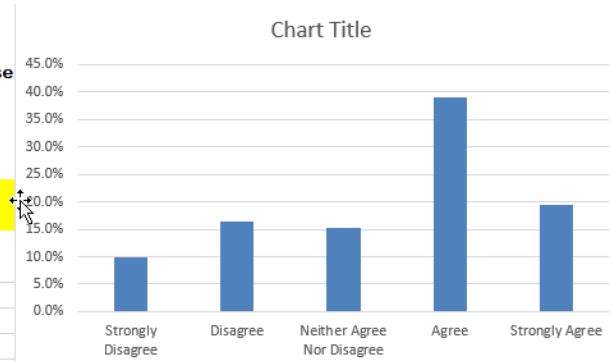
The fourth indicator question is: "I frequently use mobile devices to communicate with other students and/or the instructor in the online course I am taking."

58.5% of students surveyed either agreed or strongly agreed, while 26.3% of them disagreed or strongly disagreed.

Figure 8: Mobile devices for communicating.

I frequently use mobile devices to communicate with other students and/or the instructor in the online course I am taking.

Answer Options	Response Percent	Response Count
Strongly Disagree	9.9%	32
Disagree	16.4%	53
Neither Agree Nor Disagree	15.2%	49
Agree	39.0%	126
Strongly Agree	19.5%	63
Grand Total	100%	323



CONCLUSION AND DISCUSSIONS

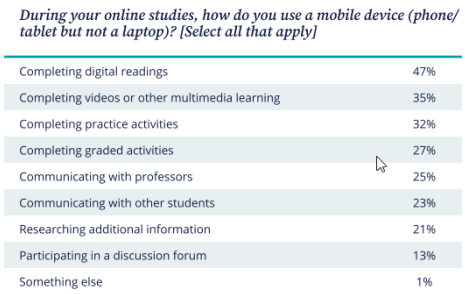
We present findings of a survey from students who have completed at least one online course using cell phones and desktop computers at a Midwestern university in the USA on the perceived learning outcomes and how mobile devices for course -related activities in the learning process. The critical contributions of this research is the assessment of mobile learners' perceived learning outcomes based on multi-attributes/multi-dimensionality: Quality of online classes, amount of knowledge gained, quality of online learning experiences.

As Fig. 9 shows, a previous survey [1] compared online learning experience with classroom experiences using a single dimension of learning outcome. On the other hand, our survey illustrated four dimenalities of students' learning outcomes. The majority (62%) of distance learners using mobile devices believe that the quality of online classes is equal to that of face-to-face classes. Further they (61.7% of survey participants) agreed or strongly agreed with the notion that online students learned as much from the online class as they might have from face-to-face classes. The first two indicators strongly affirm that digital distance learning with the use of mobile devices in the learning process becomes an effective mode of instructional delivery, despite many huddles such as time and space constraints to overcome.

Two other remaining dimensions of learning outcomes suggest that digital distance learning with the use of mobile devices, at this moment, does *neither* deliver the better quality of the online learning experience *nor* deliver the greater amount of knowledge. It is not impossible to make that happen. It is of course entirely possible to achieve both objectives in the future, with the successful management of critical success factors of both e-learning [6, 7] and mobile learning systems [9, 10].

The other area we surveyed is the use of mobile devices in the learning process including asking questions and answering them the questions, monitoring the progress, accessing the course contents, and communicating with students and the instructor. Comparing the results of our survey (Figures 5 through 8) and a previous survey (Figure 9), there are some similarities and differences. We will not discuss them further here. The important points are all distance learners are using mobile devices in the learning process to plan, organize, monitor, and control the cognitive learning process.

Figure 8: Using mobile devices during online studies {Source: [1, p.31]}



During your online studies, how do you use a mobile device (phone/ tablet but not a laptop)? [Select all that apply]

Completing digital readings	47%
Completing videos or other multimedia learning	35%
Completing practice activities	32%
Completing graded activities	27%
Communicating with professors	25%
Communicating with other students	23%
Researching additional information	21%
Participating in a discussion forum	13%
Something else	1%

APPENDIX: STUDENT CHARACTERISTICS

	Sample	Proportion (%)
Age		
< 20	78	24.15
21-30	130	40.25
31-40	48	14.86
41-50	45	13.93
51-60	20	6.19
>61	2	0.62
Total	323	100.00
Gender		
Male	111	34.37
Female	212	65.63
Total	323	100.00
Year in School		
Freshman	17	5.26
Sophomore	54	16.72
Junior	64	19.81
Senior	112	34.67
Graduate	76	23.53
Total	323	100.00

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