A STUDY OF UNIVERSITY STUDENT CHANGING ATTITUDES TOWARD ONLINE LEARNING: AN ANALYSIS OF FACE-TO-FACE, HYBRID AND ONLINE DELIVERY METHODS OVER TIME

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ABSTRACT

The online delivery method of instruction is well entrenched in educational intuitions. However, many questions remain concerning the feasibility and reliability of online learning over time, particularly in relation to courses in Computer Information Systems. The purpose of this research is to study students' perceptions of online learning as compared to those of face-to-face and hybrid learning formats at different periods of time. Research was initially performed in 2009/10 and re-conducted in 2016/17. This paper reviews the changes in attitudes and perceived effectiveness of the varied modes of course delivery over this seven-year period. The results show that attitudes toward online learning have significantly changed; whereas, attitudes toward other forms of delivery remain relatively unchanged.

Keywords: Online Education, Higher Education, Computer Information Systems, Perceived Learning, e-Learning

INTRODUCTION

It has been slightly over a decade since the authors of this paper began delivering Computer Information Systems (CIS) courses in the online format at their respective universities. At first, selected courses were taught, with no standards specifying the required elements of an online course shell. Instructors engaged in a trial-and-error approach of designing course content. This was the case for several years, until university administrators decided to incorporate the online delivery format as a critical component of their long-term strategy. The goal was twofold: to offer education to students at a price, which was less expensive than conventional face-to-face education and to reach a prospective student population, who were unable to attend face-to-face classes due to location, work schedule, etc. This resulted in the creation of an academic division responsible for supporting the success of online students and the offering of complete degrees in the online delivery format in CIS and other disciplines. This also led to the creation of an Instructional Design Team to assist faculty with designing course content to maximize engagement and effectiveness in the online medium by providing resources and training.

Not only at the authors' universities, but throughout higher education, online learning has emerged as a fundamental influence in educational delivery systems. The Babson Survey Research Group has been tracking online education for more than a decade with data collected from more than 2,800 colleges and universities and eleven reports to date (Allen & Seaman, 2015). It found that institutions are incorporating online classes in their long-term strategies significantly more today than they did in 2002, when the first survey began. The number of students enrolled in online courses has increased from about 1.6 million in 2002 to 5.8 million in 2014 (Allen & Seaman, 2015).

For the institution, online education can be cost-effective and provide growth opportunities (Bristow, Shepherd, Humpreys, & Ziebell, 2011). Administration may begin to see online courses as more cost-effective than face-to-face courses, since they are not required to provide physical space for the course on campus. However, the preference of course delivery mode by the administration may not align with the preference of student learning. Consequently, developers of online courses and programs need more understanding of how students perceive online learning.

The purpose of this research is to collect insights into students' perceptions of online learning, as compared to the traditional face-to-face and the hybrid learning formats. The results could raise important considerations about using

online course delivery. More specifically the research reviews attitudes toward effectiveness based on our two studies performed seven years apart. The first study was originally performed in 2009/10 and the second re-conducted in 2016/17. Our research questions focus on changes in attitudes and perceived effectiveness of the varied modes of course delivery over this seven-year period.

RQ1. What is student's perceived effectiveness of face-to-face instruction and has it changed significantly from 2009/10 to 2016/17?

RQ2. What is student's perceived effectiveness of hybrid instruction and has it changed significantly from 2009/10 to 2016/17?

RQ3. What is student's perceived effectiveness of online instruction and has it changed significantly from 2009/10 to 2016/17?

RQ4. Are there still significant differences in perceived effectiveness in class delivery methods in 2016/17?

RQ5. Is face-to-face instruction still the preferred choice of instruction and has this preference changed from 2009/10 to 2016/17?

DEFINITION OF TERMS

An online course is defined as one in which 100% of the content is delivered online, with no face-to-face meetings. The definition of a face-to-face course is one in which 100% of the delivery of the content is in the classroom. A hybrid course is partially delivered online and partially delivered in the classroom (i.e., between 30% and 80% of the course content is delivered online). For this study, the classification for courses that incorporate Web-based supplements, such as videos, threaded discussions, online-based assignments and so forth are face-to-face courses with online components or supplements.

LITERATURE REVIEW

The U.S. Department of Education conducted a comprehensive 12-year study utilizing meta-analysis and found that a blend of online and face-to-face instruction has been more effective than other forms of instruction, which provides a rationale for the effort required to design and implement blended (i.e., hybrid) approaches (Means, Toyama, Murphy, Bakia, & Jones, 2010). Despite what appears to be strong support for online learning, studies in this meta-analysis do not demonstrate that online learning is superior as a medium. Additionally, Karambelas (2013) reports that the results of a national research study indicate that 78% of more than 1,000 students surveyed still believe it is easier to learn in a classroom.

Further research shows that academically stronger students tend to be attracted to and prefer face-to-face classes; whereas, weaker students tend to be attracted to and prefer online classes because students perceived online classes to be easier (Driscoll, Jicha, Hunt, Tichavsky, & Thompson, 2012). This research also found that the overall GPA of online students is lower.

Vidanagama (2016) applied the Technology Acceptance Model to investigate the acceptance of the e-learning approach among undergraduate students enrolled in computer-related degrees. It shows that technological adequacy and ease of use affect the student perceptions of online courses. Students in computing degrees are more satisfied with online learning when the technological environment (Learning Management System, software used in courses, etc.) performs effectively and is easy to use. An inference from this study is that, students in computing programs of study are more critical as compared to students in other degree programs, of the technological environment involved in online course delivery. This finding creates an additional challenge for educators who teach computer-related subjects in an online or a partially-online (hybrid) format.

Hannay and Newvine (2006) examined why students chose distance education and student perceptions of the quality and difficulty of those courses as compared to courses taught face-to-face. The authors found that students preferred the distance education format because it permitted them to balance their other commitments. The survey respondents also perceived that they achieved higher quality educational outcomes in the distance-learning environment

Paechter and Maier (2010) conducted a survey of students on their experiences attending an e-learning course, on their perceived achievements and on their preferences for online or face-to-face learning components. The authors found that students valued the online format for providing a clear and coherent structure of the learning material, in supporting self-regulated learning and in distributing information. The students preferred the face-to-face format for communication purposes in which a shared understanding is necessary or in which interpersonal relations are to be established. Furthermore, in relation to their learning achievements, students prefer face-to-face learning when conceptual knowledge in the subject matter or skills in the application of one's knowledge are to be acquired. However, students advocate online learning when skills in self-regulated learning are to be acquired.

Kemp and Grieve (2014) sought to compare undergraduates' preference for and academic performance on, class material and assessment presented online versus face-to-face. Students completed a class discussion and written exercises and a written test on two academic topics in which the activities for one topic were conducted online and the other face-to-face. The authors concluded that online and face-to-face activities could lead to similar levels of academic performance. However, students preferred to complete written activities online and engage in discussion in-person or face-to-face.

Glover and Lewis (2012) explored the preferences of college students taking online versus face-to-face courses. Results indicate that: students who have already taken numerous online courses tend to prefer online courses and desire more online offerings; online courses are not considered appropriate for all subject areas or students. Additionally, although the quality of online courses is questionable, online courses are considered either more difficult or equivalent in difficulty to face-to-face courses.

Ilgaz and Gülbahar (2015) developed a research model that involved "e-Readiness" and "e-Satisfaction" in an attempt to comprehensively measure students' readiness *before* taking online courses and students' resulting satisfaction *after* an online learning experience. They found that students begin online classes with specific expectations and therefore, meeting or not meeting these expectations directly impact students' satisfaction levels. Students expect to have an effective learning experience that emulates the physical classroom by "…interacting with the instructors and other participants" (p. 183). After the online learning experience, students are most satisfied with online classes, if their expectations regarding "instructional content, communication and usability and teaching process" were met by their online learning experience (p. 183).

Tucker (2012) examined the social and interactive element related to online courses and found that discussion boards are meaningless because student responses were generally brief and did not add anything to the topic. Tucker (2012) also found Chat sessions to be useless because students that type slow ended up going silent in the sessions, or reported feeling left out of the conversation. When comparing discussion boards with face-to-face class discussions, face-to-face class discussions promoted student retention and learners perceived the instructor as prompting an atmosphere of community (Tucker, 2012). Similarly, Sebastianelli and Tamimi (2011) found that discussion boards, as an effort to socialize online coursework, offer very little value to online courses.

Dobbs, Waid, and del Carmen (2009) measured students' perceptions of online course experiences and reported that more students regarded face-to-face courses to be easier than online courses. Student views concerning online courses varied greatly between those who had never taken an online course and those who had taken online courses. Those students with no online course experience felt that the instructor would have low expectations; however, students who had taken at least one online course believed that high expectations were common with instructors. The study also found that the acceptance of online education increased as the number of online courses taken increased.

Additionally, Cole, Shelley, and Swartz (2014) conducted a three-year study to determine how satisfied students were with both online and partially online (i.e., hybrid) courses. They found that students were moderately satisfied with online courses and were slightly more satisfied with hybrid/partially-online courses.

In conclusion, the literature shows that academically stronger students prefer face-to-face classes and academically weaker students prefer online classes, while it shows mixed results as to the effectiveness of online course delivery. This study attempts to reach a current consensus from a student's perspective on the effectiveness of online instruction versus hybrid and face-to-face instruction. It also re-examines the preference of face-to-face instruction among students.

RESEARCH METHODOLOGY

The researchers surveyed CIS students across three universities and used a Web-based survey created in QuestionPro that consisted of 34 closed-ended questions. Only students enrolled in CIS courses completed the survey regardless of their academic major. In addition to questions concerning student demographics and learning styles, the survey contained the following eleven CIS-related course categories: 1) Software Development/Programming, 2) Network Administration/Security, 3) Web Development, 4) Multimedia/ Graphics, 5) Office/Productivity Software, 6) IT Project Management, 7) Systems Analysis and Design, 8) Certification Courses (e.g., A+, N+), 9) Operating Systems, 10) Database Management Systems and 11) Data Analytics (i.e., Data Warehousing, Data Mining).

The three universities involved in this survey consisted of a private university, a state-owned university and a state-related university. The state-related university receives funding from the state; however, this funding is only a small portion of total revenue as opposed to a state-owned university, which receives more of its funding from the state. The private university does not receive any state funding. The students surveyed at the state-owned and the state-related universities only included those seeking a bachelor's degree; whereas, the students surveyed at the private university included those seeking bachelor's, master's and doctoral degrees. The authors sought to survey respondents from different types of universities because these universities provide a diverse, socio-economic mixture of participants and potentially different demographics. According to Norvilitis, Merwin, Osberg, Roehling, Young, and Kamas (2006), many demographic differences exist between state and private university students including debt to income ratio and a significant disparity in race.

Administration of the survey spanned three semesters; spring 2017, fall 2017 and spring 2018. 419 students answered all questions. The actual number of responses to each question varied by question. The respondents used *QuestionPro* survey software to submit their results directly into an electronic database for analysis. To address the research questions, statistical frequencies and statistical tests were conducted in Statistical Package for the Social Sciences (SPSS 22.0) statistical software. These results were compared to results from the same survey administered at two universities (the private university and the state-owned university) in 2009/10. A convenience sample of students in instructors' classes in the universities were used for both surveys. Constructs and variables were developed by the authors' and pre-testing was undertaken at one of the host universities to validate questions. Prior research has found that there were no significant differences between the types of universities, thus we are confident in the comparability of our results (Kovacs, Davis, Scarpino, & Kovalchick, 2010).

The comparing of two different samples over time to measure attitude change is well established in the literature. Blanchflower and Oswald (2004) studied various measures of well-being and happiness over multiple time periods using different samples of the population. Huh and Vogt (2008) used two different samples to track attitudes toward tourism in Alaska. Meuleman, Davidov and Billiet (2009) studied changing attitudes toward immigration using different samples from country populations over different time periods.

RESULTS

Demographics
Undergraduate students made up the majority of the survey respondents at 86% and due to the inherent gender bias in CIS programs, the ratio of male to female students was fairly high in that 70% were male, 29% were female and 1% identified as other. Sixty-eight percent of the survey respondents were between 18 and 30 years of age and 32% were over 30.

Research Questions

RQ1. What is student's perceived effectiveness of face-to-face instruction and has it changed significantly from 2009/10 to 2016/17?

Effectiveness of face-to-face instruction is over five on a six-point scale, which equates to slightly better than effective. Compared to the first study in 2009/10 (Kovacs et al., 2010) there was a minor increase in perceived effectiveness over the past 7 years from 5.04 to 5.17. However, this difference was not significant (p=.32). Therefore, effectiveness of face-to-face instruction showed no significant change from 2009/10 to 2016/17.

Table1. Group Statistics

		N	Mean	Std. Deviation	Std. Error Mean
Effectiveness	2009/10	190	5.04	.94	.068
Face-to-face	2016/17	76	5.17	.99	.113

Table 2. Independent Samples Test

		Levene's Test		t-test for Equality of Means						95% C.I. of Difference	
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference		Lower	Upper
Eff. F2F	Equal assumed	.128	.72	-.996	264	.32	-.129	.130		-.38	.126
	Equal not			-.977	132.8	.33	-.129	.132		-.39	.132

RQ2. What is student's perceived effectiveness of hybrid instruction and has it changed significantly from 2009/10 to 2016/17?

Effectiveness of hybrid instruction is between 4 and 5 on a six-point scale which equates to between somewhat effective and effective. There was a minor increase in perceived effectiveness over the past 7 years from 4.48 to 4.58. However, this difference was not significant (p=.504). Therefore, effectiveness of hybrid instruction showed no significant change from 2009/10 to 2016/17.

Table 3. Group Statistics

		N	Mean	Std. Deviation	Std. Error Mean
Effectiveness Hybrid	2009/10	190	4.48	1.08	.078
	2016/17	76	4.58	1.16	.133

Table 4. Independent Samples Test

		Levene's Test		t-test for Equality of Means					95% C.I. of Difference	
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Eff. F2F	Equal assumed	.107	.744	-.699	264	.504	-.100	.149	-.394	.194
	Equal not			-.649	129.7	.518	-.100	.154	-.405	.205

RQ3. What is student's perceived effectiveness of online instruction and has it changed significantly from 2009/10 to 2016/17?

Effectiveness of online instruction is now over 4 on a six-point scale which equates to slightly better than somewhat effective. There was a major increase in perceived effectiveness over the past 7 years from 3.11 to 4.28. This difference was highly significant at $p<.001$. Therefore, **effectiveness of online instruction showed a highly significant change** from 2009/10 to 2016/17.

Table 5. Group Statistics

		N	Mean	Std. Deviation	Std. Error Mean
Effectiveness Online	2009/10	190	3.11	1.368	.099
	2016/17	76	4.28	1.184	.136

Table 6. Independent Samples Test

		Levene's		t-test for Equality of Means					95% C. I. of Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
EFF. Online	Equal assumed	1.605	.206	-6.543	264	**.000**	-1.171	.179	-1.523	-.819
	Equal not			-6.960	158.544	.000	-1.171	.168	-1.503	-.839

RQ4. Are there still significant differences in perceived effectiveness in class delivery methods in 2016/17?

The results below show that hybrid effectiveness is now only perceived as slightly higher than online effectiveness. In fact, in the 2016/2017, results there is little difference and the difference is only significant if a relaxed p value of .10 is used.

Table 7. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	EFFHYB	4.5789	76	1.15774	.13280
	EFFONL	4.2763	76	1.18433	.13585

Table 8. Paired Samples Test

		Paired Differences							
					95% C. I. of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	EFFHYB – EFFONL	.303	1.452	.167	-.029	.634	1.817	75	.073

However, there is still a significant difference between online and face-to-face effectiveness. Average face-to-face effectiveness is 5.17 versus that of 4.28 for online effectiveness. This is a highly significant difference at $p < .001$.

Table 9. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 2	EFFF2F	5.17	76	.985	.113
	EFFONL	4.28	76	1.184	.136

Table 10. Paired Samples Test

		Paired Differences							
				Std. Error Mean	95% C. I. of the Difference				Sig. (2-tailed)
		Mean	Std. Deviation		Lower	Upper	t	df	
Pair 2	EFFF2F - EFFONL	.898	1.537	.17630	.544	1.246	5.075	75	.000

RQ5. Is face-to-face instruction still the choice method of instruction versus online and has this preference changed from 2009/10 to 2016/17?

The results show that only 38% of the time would students prefer online versus face-to-face in 2009/10. However, over the seven years, the choice of online instruction has risen to 43%. Although this difference was not deemed statistically significant, it is an area that deserves further study. Perhaps a higher sample size would confirm a significant difference. It is suggested that students still prefer face-to-face instruction; although, online instruction is gradually closing the gap.

Table 11. Group Statistics

		N	Mean	Std. Deviation	Std. Error Mean
ChooseOnline	2019/10	245	.38	.487	.031
	2016/17	146	.43	.497	.041

Table 12. Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% C. I. of the Difference Lower	Upper
ChooseOnline	Equal assumd	2.922	.088	-.932	389	.352	-.048	.051	-.149	.053
	Equal not			-.927	300.17	.355	-.048	.052	-.149	.054

CONCLUSIONS

This research study attempted to determine whether attitudes toward online higher education course delivery have significantly changed over the past seven years. To explore this question, we asked the following research questions.

RQ1. What is student's perceived effectiveness of face-to-face instruction and has it changed significantly from 2009/10 to 2016/17?

RQ2. What is student's perceived effectiveness of hybrid instruction and has it changed significantly from 2009/10 to 2016/17?

RQ3. What is student's perceived effectiveness of online instruction and has it changed significantly from 2009/10 to 2016/17?

RQ4. Are there still significant differences in perceived effectiveness in class delivery methods in 2016/17?

RQ5. Is face-to-face instruction still the preferred choice of instruction and has this preference changed from 2009/10 to 2016/17?

The authors' conclusion based on the surveys is that perceived effectiveness of online instruction showed a highly significant positive change from 2009/10 to 2016/17. On a six point scale, effectiveness of online instruction when taking a CIS course is now over 4, which equates to slightly better than somewhat effective. Additionally, in the previous study, only 38% of the time would students prefer online instruction versus face-to-face instruction. However, in the 2016/17 study, the choice of online instruction has risen to 43%.

One reason for this change may be due to the instructor's maturity of use with the online learning format. In the previous study, there were little or no standards specifying the required elements of the online course shell design. However, the creation of an academic division, which is responsible for online education, at the author's universities, resulted in the formation of Instructional Design Teams to assist faculty with designing course content to maximize engagement and effectiveness as well as providing resources and training. Since CIS courses involve content that is technically oriented, students taking these courses may be more satisfied with the online format when the virtual learning environment and course management system is well designed and structured.

Another reason may center on student familiarity with the online learning format. As with the Glover and Lewis (2012) study, the results indicate that: students who have already taken a number of online courses tend to prefer online courses and desire more online offerings. At all of the author's universities, students are now cognizant of a standard

format of the online shell and the learning management system. Students also realize that the coverage of material and the level of difficulty will be the same, regardless of learning format, and they must independently adjust their time and efforts, accordingly.

The results of this study suggest that efforts to improve online delivery with CIS courses have been successful and students are more receptive to this method of learning. When compared to the controls of hybrid and face-to-face instruction, there was no such increase in effectiveness. Designing and delivering CIS courses in the online format, in higher education, is clearly gaining in strength, importance and, most importantly, in effectiveness.

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APPEXDIX

RELEVANT SURVEY QUESTIONS

1) If given a choice to take the same course in an ONLINE format or an ONGROUND format, would you select the ONLINE format?
   ☐ Yes
   ☐ No

8) Do you perceive the OVERALL effectiveness of courses that are offered <u>COMPLETELY</u> online as . . .
   ☐ Very effective
   ☐ Effective
   ☐ Somewhat effective
   ☐ Somewhat ineffective
   ☐ Ineffective
   ☐ Very ineffective

9) Do you perceive the OVERALL effectiveness of courses that are offered PARTIALLY online and PARTIALLY onground (i.e., Hydrid) as . . .

10) Do you perceive the OVERALL effectiveness of courses that are offered <u>ONGROUND</u> but have an <u>ONLINE SUPPLEMENT</u> (i.e., online materials provided on BlackBoard or on an instructor's website) as .