Professors' Attitudes and Perceptions about Technology Use in the Classroom

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Abstract

Since the 1970's the implementation of technology into instruction in K-12 schools and higher education has been an uneven process of acceptance and use despite the fact that digital literacy and computer skills are now an accepted requirement for anyone to participate in today's society. This uneven flow of adoption moves along a continuum that can be described by the Technology Acceptance/Use Continuum (Loague, 2003). This study aims to provide information regarding faculty technology acceptance and use for instruction at an HBCU. Preliminary data was collected from a questionnaire administered to 50 faculty members from two different colleges. Findings indicate an overall positive attitude toward using technology in instruction, and that the university and colleges do not provide enough tech support (both hardware and training). The types of technology being used most are the course management system, desktop applications, and presentation software. The data appears to indicate that the faculty as a whole is operating at the intermediate level or slightly below on the technology acceptance/use continuum.

Key words: technology use, higher education, college professor, technology acceptance

Today's K-12 schools and universities, teachers, faculty, and administrators are expected to meet accreditation standards in teaching and modeling appropriate digital skills. Students readily accept and use today's new technologies, but most administrators as well as teachers and faculty are struggling with the adoption of new technologies and the new concepts about teaching that it brings to school culture. This has been in effect since the 1970's. The implementation of technology into instruction has been a process of acceptance and ~~then~~ use based upon the perceived usefulness and ease of use. Some teachers, professors, schools, and universities have led the way integrating technology while others have moved slowly. It has not been an even process for individuals or institutions. A large number of research studies have examined a variety of interrelated reasons for the creeping rate of technological changes in education. The reasons include lack of technology education, attitudes toward technology, lack of technology training and support, lack of infrastructure, and lack of opportunities to observe technology-rich classrooms (Vannetta & Beyerbach, 2000; Fullan, 2012; Jones, 2017; Camilleri, 2017).

The adoption of technology for instruction and use in the classroom has been studied using several models, the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), Rogers' Theory of Diffusion of Innovations (DOI) (Rogers, 1983), and the Technology Acceptance Model (TAM) (Davis, 1989) and its derivatives, (Lai, 2017; Surendran, 2012). The Theory of Reasoned Action (TRA) states that a person's attitude toward a behavior, such as using computer technology, is determined by one's beliefs about the consequences of the behavior and the influence of external factors (colleagues, friends…etc.). Rogers' Theory of Diffusion of Innovations (DOT) explains how ideas and new technology are spread. The elements of diffusion are the innovation itself, the adopters, communication between adopters, time, and the influences of the social system. Rogers (1983) identified five stages of adoption, which are knowledge, persuasion, decision, implementation, and confirmation. Five adopter categories were also identified, innovators, early adopters, early majority, late majority, and laggards.

The Technology Acceptance Model (TAM) (Davis, 1989) is an extension of TRA replacing measures of attitude with those of technology measures-ease of use and usefulness. TAM has been used most often and verified by multiple studies examining technology use (Lai, 2017; Surendran, 2012; Wingo, Ivankova, Moss, 2017). Within the model technology acceptance is influenced by multiple factors, culture, culture and change, teacher perceptions, teaching style, and attitudes towards technology (Suredran, 2012; Afshari, Bakar, Luan, Bahaman, Samah, & Fooi, 2009).

As shown in Table 1 this uneven flow of technology adoption moves along a continuum that can be described by the Technology Acceptance/Use Continuum. It describes attitude, use, problem solving, and instruction for each of the three levels, low acceptance/use, intermediate acceptance/use, and high acceptance/use (Loague, 2003).

Table 1
Technology Acceptance/Use Continuum

Level	Attitude	Use	Problem Solving	Instruction
Low Acceptance/ Use	Unenthusiastic and skeptical about its benefits even when it is compatible with existing practices. Avoids or dismisses conversations about technology if possible.	Minimal to no personal use. Uses e-mail, word processing, and/or the Internet when required.	Prefers someone else to solve a problem instead of having someone show/explain how to solve it. Never uses or infrequently uses Help before asking someone else.	Does not incorporate technology into instruction or address it except for available Internet resources.
Intermediate Acceptance/ Use	Recognizes benefits that are compatible with existing practices Ease of use determines attitude on a day-to-day basis. Enters into conversations about technology.	Uses it for work and increasingly more personal business. Learns new applications as necessary.	Begins to use Help more often before asking someone else.	Beginning to think of ways to incorporate technology into instruction. Professor's use of technology is greater than students' use in the classroom.
High Acceptance/ Use	Very positive and embraces learning new technology. Encourages others by sharing information and resources and offering assistance. Initiates conversations about technology. Frustrated by lack of technology.	Uses it constantly and looks for new applications for work and personal use.	Persistent in attempting to solve problems on their own.	Incorporates technology into instruction whenever it is applicable. Student use of technology is greater than the professor's in the classroom.

The use of new technology for instruction tends to follow a general pattern. First, it is used personally in completing managerial tasks. Before the widespread use of electronic gradebooks

one of the first steps for a teacher was to begin using a spreadsheet application instead of the traditional paper gradebook and using word processing for lesson planning. As ease of use and comfort levels improved delivering instruction followed with faculty using presentation software, video, and Web sites (Ertmer & Ottenbreit-Leftwich, 2010). Finally, the technology was placed in the hands of students for learning. At this step Jonassen (1996) referred to the applications being used as knowledge construction tools or mind tools, i.e., concept mapping tools, data bases, spreadsheets, simulations, and visualization tools.

Today virtual and augmented reality, makerspaces, robotics, game-based learning and coding are added to this list as the skills required in the 21st century are not just those of the structured 20th century (Prenski, 2006; Lombardi 2007; Johnson, Adams Becker, Cummins, Estrada, Freeman, & Hall, 2016). Skills now include the ability to engage in independent critical thinking, problem solving at a high level, communicating, and collaborating using technology (Kivunga, 2014; Murphy, 2017), more commonly known as information and communication technology (ICT). These same skills are required by preservice teachers and need to be addressed in teacher education as well as how to infuse technology into instruction.

The old axiom, "teachers teach as they were taught" is also true when it comes to technology use. Studies have found that in teacher education programs technology usually receives little attention as a support of pedagogy (Chien, Chang, Yeh, & Wu, 2012). The findings of the study by Voogt & McKenney (2016), which included five teacher education institutes, suggested that teacher educators have difficulty using technology effectively in their own classes.

Across content areas studies of higher education faculty have highlighted factors that affect the adoption and use of technology for instruction (Myer & Xu, 2009). The Educause Center for Analysis and Research (ECAR) conducted faculty surveys in 2014, 2015, and 2017 examining how faculty use technology and how they think about technology as it relates to teaching, learning, and students (Dahlstrom & Brooks, 2014; Brooks, 2015; Pomerantz & Brooks, 2017). Overall faculty support new educational trends and believe that the use of technology aids learning, and that faculty are proficient in using current technologies. However, there are discrepancies between faculty perception of student use in the classroom and student perception.

Smaller studies have focused on individual universities and colleges, both primarily white institutions (PWI) and Historically Black Colleges and Universities (HBCU) (Joseph, 2008; Allen, 2012; Fathema, Shannon, & Ross, 2012). Most studies have overlapped in the areas examined with the major focus on access to computing resources, organizational support, device ownership, campus technology experiences, security training and practices, sources of technology support, classroom technology experiences, perspectives and preferences for teaching, and the barriers that inhibit integration.

The purpose of this study was to investigate professors' attitudes, perceptions, and use of technology in their classes at an HBCU in order to compare them to the 2017 ECAR findings in terms of the adoption and implementation of technology for teaching and learning. The Educause Center for Analysis and Research (ECAR) is the research division of Educause, a non-profit association comprised of academic, technology, and campus leaders whose goal is to advance higher education through the use of instructional technology. ECAR focuses on instructional technology use, trends, and emerging technologies.

Method

Participants

Upon approval from deans, researchers attended college meetings to explain the scope of the research and recruit participants from the College of Education and College of Liberal Arts and Social Sciences. Faculty members were presented with the informed consent and upon their agreement, they filled out the provided survey. A total of 47 full-time faculties, 22 females (46.81 %) and 24 males (53.19) volunteered to participate in this study. It was reported that out of 47 faculty members, 23 teach undergraduate level courses, 13 teach graduate level, and 13 teach both graduate and undergraduate level courses. One faculty member failed to respond to their level of teaching. No incentives were offered by the researchers to the participants.

Instrumentation

After a review of literature, a 42-item survey was constructed to capture faculty members' attitudes and perceptions about technology use in the classroom. Part A consisted of 25 Likert-type scale items related to instruction and learning, technical support, and online courses. Faculty members were instructed to respond to the items on a 5-point scale (1=*strongly disagree*, 5=*strongly agree*). Part B consisted of 18 items asking the percentages, in which a specific technology tool was used in the classroom. Percentages were listed as 0%, 25%, 50%, 75%, and 100%.

Participants also completed a demographic section that encompasses questions regarding gender, year of teaching, area of expertise, level of teaching, and devices they own such as desktop, laptop, smartphone, etc.

Results

Reliability Analysis

To assess internal consistency among all items, reliability analyses were conducted for each subscale (instruction and learning, online courses, and technical support) and an overall scale of faculty attitudes and perceptions about technology use on classroom. The items composing the subscales with poor correlation were eliminated from the scale. Accordingly, the instruction and learning subscale consisted of 5 items ($\alpha = .77$), technical support consisted of 6 items ($\alpha = .70$), and the online courses subscale consisted of 7 items ($\alpha = .78$). Cronbach's alpha coefficient for the overall scale was reported as .71, indicating acceptable internal consistency. Table 2 provides a summary of the reliability analyses.

Table 2
Summary of Reliability Coefficients

Subscale	Cronbach's
Instruction and Learning	.77
Technical Support	.70
Online Courses	.78

Instruction and Learning

Descriptive statistics was used to summarize participants' attitudes and perceptions about the impact of technology in instruction and learning. Results demonstrated in Table 3 suggest faculty in both colleges perceived use of technology in the classroom to have an impact on students' learning as well as student collaboration. Accordingly, they encourage the use of both laptops (M = 3.39, SD =1.40) and smartphones (M = 3.27, SD =1.38). According to faculty, teaching with technology requires more time than traditional methods.

Table 3
Professors' Perceptions of Technology Use for Instruction and Learning

Items	*M* (SD)
Faculty use of technology in a class has an impact on learning.	*4.5* (1.09)
Student use of technology in a class has an impact on learning.	*4.23* (1.19)
Technology increases student collaboration in a classroom.	*4.0* (1.09)
I encourage the use of smart phones in my class for instructional/learning purposes.	*3.27* (1.38)
I encourage the use of laptops in my class for instructional/learning purposes.	*3.39* (1.40)

Technical Support

With regard to technical support including hardware and software, results indicate that faculty tend to agree that both the university and colleges are providing support. Furthermore, faculty tend to agree that instructional technology workshops are provided slightly more by the university (M = 2.96, SD =1.25) as opposed to the colleges (M = 2.67, SD =1.28). When seeking help, faculty appear to use the IT help desk (M = 3.79, SD =1.16) first, followed by the colleges (M = 3.73, SD =1.12). The data shows that more faculty desire a technical support unit dedicated to the instructional use of technology (4.19). It also indicates that faculty view technology as an aid in professional collaboration. Table 4 demonstrates the means and standard deviations for professors' perceptions of technical support.

Table 4
Professors' Perceptions of Technical Support

Items	*M* (SD)
The University provides instructional technology workshops.	*2.96* (1.25)
The University provides hardware and software.	*2.8* (1.32)
My college provides instructional technology workshops.	*2.67* (1.28)
My college provides hardware and software.	*3.07* (1.37)
I seek technology help from other faculty members.	*3.73* (1.12)
I seek technology help from the Office of Technology Services.	*3.79* (1.16)

Online Courses

In the section related to online courses, the results indicate differences in faculty perceptions that learning outcomes are the same for online courses as they are for face-to-face courses (*M* = 2.78, SD =1.58) The same appears to be evident in the quality of online courses versus face-to face courses (*M* = 2.96, SD =1.41). A large number of faculty consider faculty-student interaction as important for an online course. The data indicates that slightly more faculty have taught online courses as opposed to taking an online course (*M* = 3.87, SD =1.62). There is a discrepancy in faculty perception that instructional models used in online classes are the same as those used in face-to-face classes (*M* = 2.73, SD =1.37). The means and standard deviations for professors' perceptions of online courses are provided in Table 5.

Table 5.
Professors' Perceptions of Online Courses

Items	*M* (SD)
Learning outcomes are the same in an online course as a face-to-face course.	*2.78* (1.58)
The quality of an online course is the same as a face-to-face course.	*2.96* (1.41)
Faculty-student interaction is very important in an online course.	*3.87* (1.62)
I have taken online courses.	*3.06* (1.98)
I have taught online courses.	*3.36* (1.99)
I would like to teach an online course.	*3.35* (1.38)
Instructional models used in online courses are the same as those used in face-to-face courses.	*2.73* (1.37)

Professors' Preference of Technology Use

The statistical analysis results indicated that the mostly used technology tool by faculty in both colleges was Blackboard (76.63 %); Desktop Applications such as word processing, spreadsheets, and database (75.56 %); Presentation Software such as PowerPoint, Prezi, and Keynote (67.22 %); Collaboration Tools such as Google Docs and Collaborate on Blackboard (62.22 %); and Internet Websites (61.93 %). Game devices (5.63 %), clickers (11.25 %), educational games (15 %), clickers (11.25%), and LiveText (19.51 %) were the least preferred technology tools.

Discussion

ECAR's series of surveys provided comprehensive analysis of technology trends, issues, use in the classroom, support, etc., related to instructional technology. They addressed in great depth IT use and trends across their sequence of studies. This study was more cursory and exploratory, the findings indicating that the university is not out of step with other schools and that the faculty as a whole is operating at the intermediate level or slightly below on the technology acceptance/use continuum.

The types of technology being used at this university align with those discussed in the ECAR studies. The top eight being, the course management system, desktop apps, presentation apps, Websites, collaboration tools, videos, online tutorials, and recorded lectures. In the ECAR 2017 faculty study most of these are listed by the faculty as ones they say they would be more effective using for instruction if they had better skills. In alignment with this thought the faculty in this study stated a desire for a technical support unit dedicated to instructional use.

Common issues found in the ECAR studies and in this study are faculty differences about cell phone use as a learning tool and the use of gaming in instruction. Another common issue is the increased amount of preparation time required when incorporating technology.

Similar threads also exist in the areas of IT support and training. ECARs' 2017 Faculty survey also found that faculty seek help first from the IT help desk, followed by themselves, online searches, and then colleagues. In this study, faculty also sought help from IT first and then colleagues.

This university's faculty perception of the use of technology aligns with the perceptions of faculty on a national and international level. Faculty agree that the use of technology in the classroom supports learning, but greater support for integrating technology into instruction is needed. The data from this study will be used to support the need for more assistance in learning new technologies and integrating them into the classroom. Further research could attempt to recruit more professors from other colleges and investigate differences across colleges.

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