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Application of campus instructional support: two case studies

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Abstract

Purpose – The purpose of this paper is to demonstrate how instructional support is a critical tool to promote the use of technology in research and teaching. A Campus-Wide Collaborative Model of Technological Instructional Support (CCMTIS) is presented that incorporates: integration of technology across campus; technical assistance; allocation of funding for technical assistance; support of faculty teaching style; and teaching that enhances learning through the use of technology.
Design/methodology/approach – The approach presents two case studies, one a large state research university, and the other a small liberal arts college.
Findings – Four overlapping themes emerge across the two case studies that demonstrate how: technology can connect classroom learning to career considerations and opportunities; develop writing and communication skills; promote career development through access to job search skills; and encourage professional development among faculty and staff.
Research limitations/implications – The limitations are that only two specific campus environments are examined. That these are differing environments, however, have implications for the model's application to diverse campus settings.
Practical implications – A practical application is that the study demonstrates how the CCMTIS model can be applied to both classroom and campus. This has implications for other universities that may seek to replicate the model on their own campuses.
Social implications – The social implications indicate how learning occurs through an instructional support model that promotes collaboration. At the same time, ethical considerations related to instructional support are presented.
Originality/value – The manuscript reflects original work based on case studies that reflect the authors' experiences.

Keywords Innovation, Educational administration, Colleges

Paper type Case study

Introduction

Derived from the Greek word *tekhnologia*, that refers to "systematic treatment" (Oxford Living Dictionaries, 2017), technology can be a powerful force that supports liberal learning outcomes by encouraging active learning and offering the most vibrant vectors for delivering content not readily available in traditional classrooms. In addition to providing access to a vast amount of information, technological literacy is a fundamental component of liberal education in promoting effective critical thinking skills. Students can be engaged in a liberal arts curriculum outside of the classroom in new ways, using software packages and electronic materials that accompany textbooks, allowing for the practice of skills and immediate feedback outside of class that previously would occupy class time (Hung and Yuen, 2010). At the same time, research demonstrates that higher education institutions (HEIs) may be slow to adapt new e-Learning technologies (Singh and Hardaker, 2013). A review of the literature indicates only a few theoretical articles "adequately integrate multiple levels of analysis and explain adoption and diffusion of eLearning in terms of the interplay between structural influences and individual action" (Singh and Hardaker, 2013, p. 105). Singh and Hardaker (2013) found that the integration of both micro and macro perspectives is important for future research on e-Learning in HEIs.

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The purpose of this paper is to address the aforementioned gaps in the literature. To do so, the current paper presents a new model of instructional support that further supports technology as a critical tool in research and teaching (Hung and Yuen, 2010; Paulus *et al.*, 2012). Teachers are encouraged to take an eclectic view of their classrooms as educational environments, particularly given the array of learning styles, backgrounds, knowledge, and values brought by students (Lee and Tsai, 2010; Clauss-Ehlers *et al.*, 2013). Increasingly, faculty may be expected to incorporate "technological pedagogical content" in their courses to meet the needs of their students and further classroom learning (Shih and Chuang, 2013, p. 109).

The expectation that faculty and HEIs provide an integrated approach to e-Learning is evident in recent efforts to develop a measure that assesses student perceptions of the extent to which faculty have pedagogical content knowledge (Shih and Chuang, 2013); incorporate specific classroom technologies (Davies *et al.*, 2013); and conduct research to explore the use of technology in educational environments (Paulus *et al.*, 2012). Instructional support can be specifically geared toward helping instructors use technology in their research and teaching. It provides faculty with the necessary skills to incorporate appropriate technology in the classroom. Such use can expand the worlds of students and support their ownership of the learning process.

Given the positive outcomes derived from using instructional support for technology documented in the literature, the authors of the current paper argue for a Campus-Wide Collaborative Model of Technological Instructional Support (CCMTIS). This model seeks to further technology in teaching and research through collaboration with major campus-wide curricular initiatives and campus centers (Kopcha, 2010). This is in contrast to other models that view instructional support as a mechanism to promote specific instructional technology practices as ends in themselves. The proposed model is in keeping with the research findings that underscore the importance of conducting research that integrates both macro- and micro-level efforts to promote campus-wide technological instructional learning on campus (Graham *et al.*, 2013; Singh and Hardaker, 2013). The model is also a response to the often slow and very varied practice of technological adaptation in HEIs (Singh and Hardaker, 2013). This multifarious pace is notable given the many opportunities to support learning by providing technology in a range of settings and in response to the diverse technologies students bring to campus (Ellis *et al.*, 2013; Mayberry *et al.*, 2012). The elements of the CCMTIS include:

- technological instructional support is integrated across campus and university life to provide a range of support services;
- the integration of technological instructional support is encouraged through the provision of seminars, webinars, and technical assistance support so that campus constituencies are aware of how to access and implement technology in their work;
- funding is allocated for staffing to provide technical assistance support to campus constituencies;
- The possibility for silos is decreased through centralized efforts and technical support that have easy access for campus constituencies;
- technological instructional support respects the faculty member's teaching style, course content, and student learning; and
- technological instructional support is not a substitute for low-level teaching, rather its aim is to enhance the student's learning experience.

The literature discusses a range of technological instructional support strategies (Dexter *et al.*, 2012; Higgins *et al.*, 2004; Mehta, 2012; Salter *et al.*, 2004). Higgins *et al.* (2004) shared their process of integrating campus-wide blogging capability at the University of Maryland.

Salter *et al.* (2004) presented an instructional design model that aimed to help faculty develop and implement online courses to promote active learning and engagement at the University of Waterloo. Other contributions discussed implementing evaluation strategies to make determinations about the efficacy of technology use across campus (Bullock and Ory, 2000; Kelly, 2008).

Dexter *et al.* (2012) examined how technology, pedagogy, and content (TPACK) were integrated into teacher education programs via the Teacher Education Initiative. Focus group discussions centered upon three components: "establish a vision to set direction" (p. 257), "develop faculty members to accomplish the mission" (p. 258), and "redesigning the education school's support environment for TPACK" (p. 258). Needs for national-level support, resources, and college-level context were addressed for each level.

In another campus-wide initiative, Mehta (2012) shared how educational technologies were offered via a cloud system. As such, fewer resources were needed to maintain a technological infrastructure – leaving specialists more resources to support faculty use. Mehta's (2012) case study provided a description of the technological changes that occurred across the University of Massachusetts, Boston (UMass) under her leadership. Because newer systems were more complicated, the faculty had started to develop their own websites and resources apart from the university. What is remarkable about Mehta's (2012) case study is the rapidity in which technologically enhanced change occurred. In the five years following her responsibility for the educational technology department, a campus-wide infrastructure was created to provide technological instructional support.

Instructional designers supported faculty in their use of technology in teaching. This infrastructure included Wikispaces, blogs, iClickers, ITunes U, OpenCourseWare, and Classsroom Capture. Mehta's (2012) case study describes the merit of each tool. For instance, Wikispaces was used to organize library resources that faculty could subsequently integrate into coursework. The use of iTunes was responsive to the fact that many students had iPods that had a classroom capture system and a site that hosted recordings. This meant that lectures could be moved to iTunes U from the site that hosted recordings, with faculty permission.

Developed at MIT, OpenCourseWare provided a mechanism for faculty to make their courses more accessible to a broader audience. In this online platform, students were responsible for downloading course content. Mehta (2012) made the interesting point that, aside from being a teaching technology, OpenCourseWare was an excellent marketing tool for UMass. Finally, the campus integrated a Personal Response System (PRS) through the purchase of an iClicker system. PRS engaged students in coursework and helped faculty members assess the level of course learning. Mehta (2012) described the intention of moving from clickers to a system where students would provide clicker responses via their smartphones. This example demonstrates support for a CCMTIS model, achieved through an infrastructure that provided information and resources for technological instructional support across campus.

Technological instructional support that promotes liberal education

Technological resources enhance learning objectives and pedagogical practice through a variety of mechanisms. Emerging fields such as the digital humanities apply methods derived from computing to the traditional questions and objects of study in humanities disciplines in ways that include online preservation, digital mapping, data mining, geographic information systems, data visualization, and digital publishing. Each of these tools can be used to promote liberal learning outcomes. Moreover, fields such as digital humanities require multiple literacies whereby professionals must be fluent in understanding, analyzing, and communicating with respect to visual artifacts, material culture/objects, historical landscapes, and digital sources. Beyond offering new modes of

investigation, the presence of technology in the liberal arts classroom can be a natural facilitator of sound teaching practices across disciplines (Singh and Hardaker, 2013).

Mayberry *et al.* (2012), for instance, conducted research on how faculty member in-class use of the iTouch (i.e. a hand-held personal computer) influenced learning among students. In this study, faculty members from a range of disciplines (i.e. biology, calculus, algebra, political science, speech science, and studio art) chose how they wanted to integrate the iTouch into their classroom experiences. The faculty decided what iTouch applications they wanted to use as they developed learning activities (i.e. a camcorder, the ability to upload YouTube videos, e-mail, Google Docs, camera, Tumblr, and voice recorder). Students provided both qualitative and quantitative feedback about this learning experience.

The results indicated that most students found the use of iTouch learning activities to be a helpful addition to learning course material. Some students, however, felt more traditional methods of teaching were more beneficial for their learning. That most students felt the innovative use of technology aided them in learning course material – across of range of disciplines – implies support for a campus-wide instructional support framework. Also noteworthy in this study is that the faculty determined how they wanted to use the technology in their courses. This reflects the fifth point of the CCMTIS model, that technological instructional support respects the faculty member's teaching style, course content, and student learning. With appropriate levels of technological support, faculty in this study integrated the technology in ways that fit with their teaching styles and learning outcomes.

The combination of classes that provide online instruction along with classes that meet in person is known as blended or hybrid learning. Graham *et al.* (2013) define blended learning as "the combination of traditional face-to-face and technology mediated instruction" (p. 4). Graham *et al.* (2013) examined how HEIs integrate hybrid learning through research that interviewed HEI administrators on three private and three public campuses. The results led investigators to develop a framework that captured varying categories and stages of blended learning adoption among the six HEIs. Identified categories included strategy, structure, and support. The stages of institutional commitment to blended learning approaches were defined as: "Stage 1. Awareness/implementation"; "Stage 2. Adoption/early implementation;" and "Stage 3. Mature implementation/growth" (Graham *et al.*, 2013, p. 7).

In a related instructional model, the flipped classroom refers to teaching pedagogy where student in-class time is spent on higher-order thinking skills and critical application, with the faculty member present to provide support, while lower-level functions (e.g. memorization, note taking from the readings) are reserved for outside class time (See and Conry, 2014). As a result, course lectures might be delivered outside of class time via webcasts and reading assignments, while in-class time may involve applying key concepts, analyzing, and evaluating application capabilities during class time with the professor. While delivery of content outside the classroom was initially described in the flipped classroom model as involving some type of technology, See and Conry (2014) share that more current definitions do not necessarily include technology in the outside course component.

Davies *et al.* (2013) conducted research to examine whether a flipping-the-classroom approach promoted achievement and satisfaction among undergraduate students enrolled in an introductory class on spreadsheets. Their comparison of student experiences in traditional, flipped, and simulation-based classes indicated "how technology is integrated into a course makes a difference" (p. 576). Specifically, the students in the Excel spreadsheet simulation condition reported feeling they learned less from the course in comparison to the students in the flipped and traditional classroom conditions. The students in traditional and flipped classroom conditions were more likely to report that their classroom experience was valuable in comparison to students in the Excel simulation condition. Both groups were also more likely to indicate a willingness to recommend the course to another student in

comparison to students participating in the Excel simulation. Finally, the students in the flipped classroom demonstrated greater propensity for taking another information technology class in comparison to students in traditional classroom and simulation conditions. Davies *et al.* (2013) conclude that one reason the flipped classroom was just as effective as the traditional classroom (if not more so) was that it allowed students to learn at their own pace.

The online format of hybrid courses also provides an environment where faculty members can respond to each student's questions. Because questions and comments are posted, for instance, it is possible to read each inquiry and respond accordingly. This is not always true in the in-person classroom, where there might not be enough time to respond to all questions – or where students might restrict themselves from asking questions because of a perceived time limitation, or even if they feel intimidated doing so. An online forum can complement the in-class setting as it allows for a more in-depth discussion between faculty member and all students.

The aforementioned literature review illustrates how technology is an important tool in the hands of students, faculty, and administrators. Classroom discussion does not have to end because class time is over. Rather, the discussion can continue as long as needed because there is no course end time. e-Learning methodologies, such as the hybrid approach, gives students an opportunity to test out their own voices. In any given classroom setting, there may be some students who feel more comfortable responding to material than others. The hybrid approach intrinsically encourages both extraverted and introverted students to engage in the discussion. The student can then test out his/her voice when meeting with peers and the professor for in-class course components. The CCMTIS promotes active, engaged classrooms by the very act of re-defining how they are understood. Time and voice are not necessarily constrained in the way they might be in the in-person classroom. Because the parameters of time and voice are much more fluid online, the added flexibility can allow for a rich, varied discussion.

While beyond the scope and focus of this paper's application, specific mechanisms can promote learning in both large and small classroom settings (Hedgcock and Rouwenhorst, 2014; Oigara and Keengwe, 2013). Technology can promote active learning in large classrooms in myriad ways. Large lecture courses can be overwhelming for students who may understandably feel lost or intimidated to contribute. This experience is even more critical when one considers that large lecture courses might either deter students from their major field of interest because they are too overwhelming, or simply eliminate the student from the major if unable to keep up with the work. Smith-Osborne (2014) explored how clickers promoted learning outcomes in small social work classes among students. Subsample results indicated that clickers increased the level of engagement and promoted learning among students with disabilities or with limited English proficiency (Smith-Osborne, 2014). Engaged learning and peer mentoring can take place through programs like Moodle or BlackBoard that allow for online Q&A forums and blogs, ensuring that students are interacting around curricular content outside of the classroom (Brandl, 2005). This technology can also be used to deliver a curriculum when inclement weather causes frequent cancellations of face-to-face meetings.

Just-in-time-teaching (JiTT) is another technological instructional support mechanism responsive to specific student needs (Novak *et al.*, 1999). With JiTT, students respond to web-based activities as a part of their coursework, handing in assignments before the next class session. For example, puzzles are one JiTT strategy where students respond to a web-based activity focused on classroom content. Through the puzzle exercise, students have the opportunity to review and apply the material discussed in class. The instructor then reads responses and adjusts the content of the next class to meet what is reflected in the student's work. As such, the instructor makes changes just in time, or just prior, to the next class session.

Coursework is subsequently adjusted based on out of classroom assignments so that where students are at in the learning is reflected in the next class session (Formica *et al.*, 2010). Having students complete assignments before class and making changes just prior to the session to meet their needs, promotes an active, participatory learning community. This is in direct alignment with the research that indicates active class participation promotes learning (Liberatore, 2013).

Casestudies: implications of the CCMTIS approach within state universities and private liberal arts colleges

The following two case studies demonstrate how technological instructional support can facilitate learning at a large state research university and a liberal arts college. A comparison of the two case studies demonstrated significant overlapping themes, despite the variability in these two types of HEIs. Identifying commonalities in technological instructional support is not necessarily an approach presented in the current literature. Rather, existing case studies tend to highlight the importance of tailoring technologically based instructional support to the specific needs and culture of one's campus (Clauss-Ehlers and Pasquerella, 2014). However, identifying themes across diverse campus settings seems important given increasing partnerships between liberal arts colleges and research universities, an increasingly global learning environment, and the benefit of consistent technological instructional support should students enroll in different types of HEIs over the course of their academic careers.

Case study 1: a large state research university

Large state research universities present interesting instructional challenges. Faculty may be faced with large lecture courses and a focus on research production as part of promotion and tenure. With the generation of new knowledge a primary campus goal, students may lose the mentoring connections that might occur in a smaller campus setting.

The use of technology in instruction is one way to address the needs of the large research university without comprising student development and teaching. In one such endeavor, a seminar for first-year students was implemented across campus with the goal of providing a small classroom environment to promote student participation and engagement. A related goal was to encourage first-year students to connect with the faculty to develop an understanding of and interest in the research process.

In a seminar on resilience and relationships, students learned about the ability to overcome adversity in interpersonal relationships, college, and work (Clauss-Ehlers, 2008). Technological instructional support was central to course success. Students were organized into groups to collaborate on resilience intervention proposals to enhance peer interaction and learning. Proposals addressed an area of resilience identified by the student group. At the beginning of the project, students participated in a tutorial provided by the instructional design librarian. This session took place in a library classroom with each student using a computer to access library databases. Students learned how to conduct advanced searches for specific topics and access information that represented their resilience-related topics. Students subsequently employed multiple technologies to present their group at the end of the course.

In another classroom experience, technology promoted the advancement of counseling skills among counseling students/trainees. Students were assigned to dyads where they engaged in mock therapy sessions with one another (alternatively taking on the role of the mock client and mock clinician) throughout the semester. They recorded sessions with a personal device when in the clinical role, and after each class were instructed to play back mock sessions for self-assessment purposes. Listening to sessions was pivotal to the development of counseling skills. Setting appropriate parameters was also critical to the effectiveness of this instructional approach (see "Ethics" section below).

Case study 2: a small liberal arts college

There were a variety of ways that technology made the classroom more porous on the campus of a small liberal arts college. In 2014, the college launched an initiative to connect students' liberal arts education to their career aspirations. A central component of this initiative was the engagement of embedded practitioners in the classroom. Thus, in a team-taught course on International Relations and Latina/Latino/Latin American Studies and Spanish, two professors had students develop mock proposals to support non-profit advocacy work in Spanish-speaking countries using podcasts, websites, and other media. The students' final presentations were delivered to a panel of judges that included professors, college administrators, and members of the State Department, who joined the class through video-conferencing. Other professors have brought in performers from China virtually, opened classes to alumnae remotely using Adobe Connect, and engaged in cultural and language exchanges with students from a country speaking a target language. In each of these cases, students reported enhanced learning as a result of the inclusion of diverse perspectives in the classroom.

A campus center devoted to global initiatives promoted the use of in-class tele-collaborations as a tool for international education. In 2011, a campus project was launched to encourage video-conferencing in the classroom. Since then, a minimum of 45 faculty members participated in the initiative, often more than once and often in more than one course. The faculty used the video-conferencing option in class to have discussions with outside experts in their fields, with the author of a book they read in class, or with students at universities in other countries. Assessment done by the project director demonstrated that video-conferencing may be very useful for broadening students' understanding of different perspectives on international and global issues; raising awareness of how global issues play out in practice; deepening cross-cultural understanding; enhancing proficiency in languages other than English; as well as facilitating links between students' interests in the international dimensions of a subject matter and possible career paths (McLoughlin and Lee, 2010).

In 2003, the college began an initiative to offer professional development for faculty interested in text encoding, an exciting tool for digital humanities scholarship. As a research liberal arts college, the college sought to engage all students in research, not only those in the STEM disciplines. Text encoding was one mechanism for engaging humanities students in editorial practices, in encouraging textual analysis, and translating the history and culture of a print document into a digital format. For example, one English professor used this technology to have her students create a teaching edition of Melesina Chevenix Trench's poem "Laura's Dream, or the "Moonlanders." Following a discussion of the poem in class, the students were taught to use the technology and asked to work in groups to encode lines and stanzas, people and places (both real and imaginary), and three figurative tropes of their choosing (e.g. "affect," "spirituality," and "morbidity"). These tropes were color coded by students, so that at the end of the semester groups could compare their coding practices. By having students insert descriptive metadata into the text, the professor encouraged them to enter the material through group interpretation of "visualizations" and reflection on descriptive vocabularies (Singer, 2013). The result was an innovative approach to teaching "analogue" reading.

The engagement of technology in the classroom was also used to meet the college's commitment to provide access to academic excellence for talented students. For decades, the college played a leadership role in mathematics education through Summer Math for Teachers. The diminishing of state and local resources for teacher training left many school districts unable to fund their faculty to participate in this signature program. The program, which began in 1983, was offered online for the first time in 2009. Before going online, participants were limited to those who could attend the program in the state. Given the

exigencies of state and local funding for school districts, the program director sought to ensure continued access for teachers through the use of technology.

In 2014, the director of the program addressed the challenge of not wanting to lose the face-to-face interaction of the course by working with staff in library and information technologies to utilize Zoom technology to deliver the curriculum. There was a particular sense of urgency given the advent of the Common Core and a recognition that most of the teachers who would be delivering the curriculum had been trained using a different method. Zoom technology allowed for programs that combine those who are taking the class in person with those taking it online using a video call program aimed at creating a real-time classroom experience for all participants. The screen in the classroom showed the views seen by the online participants, which included different camera angles of the people in the classroom.

The Zoom account cost the college a total of $40, or $10 per meeting space, that brought together the global community. The launch of technology as an integral component of the Summer Math for Teacher Program brought 16 educators from Amsterdam to Zimbabwe who participated in the trial of a new blended model of the Developing Mathematical Ideas Institutes. Students on campus worked with students online using the video call program, resulting in a real-time classroom experience for all participants.

Ethical considerations in the use of technology

The proliferation of technology in the college and university classroom has created extraordinary opportunities for faculty to engage in new teaching pedagogies and for students to gain increased access to the classroom. Yet, globally, technological advancements often precede thoughtful reflection about the ethical, legal, and social implications of the use of technology (Floridi, 2015). When online courses first emerged, there were genuine concerns regarding whether institutions could guarantee that the students signed up for the courses were actually doing the work. There were also questions about whether the academic rigor and integrity of courses and programs could be preserved under this format. Regional accrediting bodies now ask institutions to address these issues in their self-studies.

Other concerns arose regarding the use of technology in the classroom that might lead to cyber bullying or the creation of a hostile learning environment through the downloading of racist, sexist, homophobic, or other offensive material. Since the learning community is not a geographical location or time, asynchronous e-mails and e-mails that cannot be monitored 24 hours a day may pose problems. Setting out guidelines and expectations, along with disclosing institutional policies, has become critical in the construction of the learning space where each individual student can thrive.

New ethical issues are arising related to the need to accommodate a diverse student population and comply with standards under the Americans with Disabilities Act. Not creating barriers in the classroom for students with documented disabilities is a federal mandate that can make it challenging to implement technologies without advance planning and coordination with a college's or universities disability services (Brooks, 2010).

Issues of confidentiality and privacy are important considerations in the use of technological support to promote teaching and research. Students may share personal information and experiences that they want to stay within the classroom context. Here discussion about the parameters of the classroom – both online and in-person – are critical. Students and the instructor can discuss the importance of confidentiality within the confines of the classroom. Given the highly personal nature of information some students share in courses, for instance, the instructor may share that taping of course content is limited to the didactic component of a course. If students want to record lectures for their own learning, classroom structure can be organized so that discussion comes after the didactic component. Instructors can signal students about the importance of turning off the technology during these moments.

Similarly, students learn that respecting the sharing of others' experience in the classroom means that students are not tweeting, or otherwise publicly sharing what they have learned about their classmates via the internet. At an even more micro level, students learn about the appropriate parameters of sharing feedback. For instance, after dyadic sessions, the instructor may ask students to reflect upon their experience. A key expectation here is that students can only publicly reflect upon their experience – whether it be as the mock client or counselor – rather than that of their partners. Partners can share should they so choose – but the decision about if, when, and how is left entirely up to them. A teachable moment here is to highlight the parallel process between respect for classroom parameters and client confidentiality in a therapeutic setting. Concepts of empathy and respect are relevant given the considerations of how one might feel if privacy is violated (Clauss-Ehlers and Pasquerella, 2014).

The handling of ethical issues can be modeled by the instructor in the way that technology is used to promote ethical practice. As mentioned earlier, in the counseling course, students engage in mock therapeutic dyads with one another throughout the semester. In the clinical role, students record their sessions and play them back to hear how they intervened, consider the strengths of their work with the client, and explore what they might have done differently. Students may ask the instructor if they can submit an electronic version of their recorded mock session via an online link or upload of session content. Integrating this request as a teachable moment, students learn the value of simply sharing recordings with the faculty member in person to further promote confidentiality. The faculty member can schedule individual meetings with students to jointly listen to student progress in professional development as a clinician (Clauss-Ehlers and Pasquerella, 2014). Such meetings provide students and faculty with opportunities for in the moment feedback on counseling skills. The identification of counseling strengths and areas of growth can lay the foundation for subsequent learning goals.

As technology allows educational institutions to engage students from around the world in a single classroom, colleges and universities are forced to grapple with the fact that some students will be subject to monitoring of activities. These same activities may be requirements of the class, posing new levels of risk management, given that students are residing in countries with differing perspectives on academic freedom and privacy in relation to national security.

Themes that support a CCMTIS across diverse institutions of higher education

Case study comparisons revealed several emerging themes that consider technology as a way to: connect classroom learning to career considerations and opportunities; develop writing and communication skills; promote career development through access to job search skills; and encourage professional development among campus faculty and staff.

Technology to connect classroom learning to career considerations and opportunities

The use of technology creates a permeable classroom that can provide connections with career considerations. Technology such as Skype and FaceTime can connect students and the classroom context with real-world experiences. Experts and practitioners can be invited to guest lecture through these mechanisms. This provides students with a range of professional models that they may emulate in their own professional identity development. Extending a technological invitation to experts may also provide some of the hands-on, real-world professional examples that are added to more conceptual and theoretical course components. An online search for journal articles from 2012 to 2017 in Google Scholar, using the search phrase "career development through eLearning," did not reveal literature in this area. Therefore, more research is needed that explores how e-Learning can foster career growth and opportunities.

The sharing of contact information via the permeable classroom can promote future mentoring and career opportunities. For instance, the aforementioned technology might forge student connections with invited experts. As such, students may follow up with the expert, seek out advice, and engage in networking around career and educational opportunities.

Technology to develop writing and communication skills

Technology can also promote writing and communication skills, both of which are key to the research process and liberal education. For instance, student proposal groups in the undergraduate seminar often used Google Docs to write group projects. Having a shared document allowed students to collaborate with one another without having to be in the same physical location. They were able to edit one another's work and had a fluidity of writing that connected each section of the assignment. Sharing each other's work through a mechanism like Google Docs provided students with an opportunity to learn about each other's writing styles, and in turn, reflect upon their own skills in this area. This aspect of the CCMTIS reflects the varied learning activities that incorporate the technology discussed in the Mayberry *et al.*'s (2012) study. Case examples mentioned in the current paper, along with Mayberry *et al.*'s (2012) faculty examples that integrate iTouch across various disciplines, "[provide] convincing evidence that the use of mobile devices in integrated and meaningful ways can increase students' enjoyment of and participation in active learning exercises" (Mayberry *et al.*, 2012, p. 214).

Technology to promote career development through access to job search skills

The infusion of technological instructional support via the CCMTIS can promote career development by building job search skills. Mechanisms like Skype can feature guest lecturers and professionals who can talk with students about the interview and job search process. Experts might be recent graduates from a particular program, and thus highly attune to the specific skill sets required by soon to be graduates as well as likely questions to be asked during a job interview. Experts, professionals, and recent graduates might engage with soon to be graduates through mock interviews where students can practice interview skills in a safe environment. This type of access via technology may be particularly helpful in providing students with a sense of encouragement as they prepare to graduate and begin a new life phase.

The provision of advice at a very practical level by someone who has recently gone through a job search process in a related field can be invaluable. Specific practical questions may include: Who should be listed as a reference? How many pages should comprise a resume? Is it important to stand out in the application pool? What are the primary online application sources for a particular field? Are there professional organizations that promote networking in a specific field? At what point before graduation should the job search process begin? How long does the job process generally take? Are there related jobs that might be of interest to graduates? Answers to these hands-on questions are not necessarily going to be included in a textbook. Technology provides a way to connect students with a network of support that can provide answers to career development questions. Despite this important possibility, it was interesting to note that, like the model's first component, there appeared to be limited literature with regard to how technology can promote job skills when a search was conducted on Google Scholar using the phrase, "eLearning and job search skills."

Technology to encourage professional development among campus faculty and staff

The CCMTIS is relevant to the ongoing professional development of faculty, administrators, and staff. Online courses for continuing education (CE) such as webinars are a useful tool to promote ongoing learning, and, for many professionals, may also be used for CE credits needed to meet state licensure requirements. In-person professional development programs with

related technological outreach can support faculty networking. Faculty might learn about professional opportunities through membership listservs in respective organizations. This, in turn, may promote student learning if faculty success and involvement promotes student access to opportunities such as research and editorial assistantships. Critical to supporting faculty professional development in e-Learning is a commitment to move away from efforts that are solely geared toward those who are already technically savvy. It is important that professional development activities address the needs of all faculties so that instructional practices can be adopted. This notion is reflected in current literature about individual micro-level factors that influence willingness to adopt e-Learning techniques. Singh and Hardaker (2013) state: "The argument is that currently eLearning is geared toward technically "literate" and innovative staff, and this strategy reduces the likelihood of mainstream faculty actually adopting instructional technology for their own teaching" (p. 105).

Conclusion: challenges and future directions for the CCMTIS approach

Going beyond a review of the literature, this paper presents a comprehensive model to integrate technology across campuses, provided two case illustrations, and identified overlapping themes that support technology as a learning tool. Technological and information literacy as a learning outcome has been incorporated into the goals of state research universities and liberal arts institutions across the country. To take advantage of rapidly changing technology and foster cross-campus collaboration, it is essential to create an infrastructure that supports innovation. The integration of technology in the future will have an impact on the campus experience, career launch of students, and ongoing professional development and networking across campus constituencies.

The CCMTIS presents a rationale for having an integrated, technological instructional support system embedded in campus life. The CCMTIS is relevant and applicable for state research universities and liberal arts college campuses. Resource allocation to such a model promotes adequate staffing of instructional approaches. It is suggested that much of this work involves training faculty and staff in the latest instructional approaches so that campus constituencies have the necessary skills to access technological resources.

With appropriate resources and staffing, it is thought that campuses can engage in pedagogical approaches that incorporate technology, extend learning beyond the campus to community and global partners, and decrease silos through access to constituencies across campus and beyond. At the foundation of the CCMTIS is ethical practice that respects the learning community and provides a model for professional practice. It is expected that both pedagogical practice and ethical considerations will continue to develop and transform in response to the integration of campus technological instructional support.

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