Smartphone and Curriculum Opportunities for College Faculty

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ABSTRACT

The ever-increasing popularity of the smartphone continues to impact many professions. Physicians use the device for medication dosing, professional drivers use the GPS application, mariners use the navigation maps, builders use materials-estimator applications, property appraisers use the camera capability, and students use the device to search and consume large amounts of information. College educators have an opportunity to harness their student's multi-tasking capabilities by integrating smartphone technology into their curriculum. This opportunity also inspires educator's concerns for the wellness-impact to students who overuse their smartphones. For faculty who explore this technology integration, options exist to enhance their lesson plans' presentation, application, and evaluation components. Finally, student's perspectives of smart phone use within the educational environment remains positive and are inspiring institutions to explore new options to exploit the technology. One study cited that almost seventy percent of the students surveyed indicated that there is a direct correlation between their academic success and the educational use of their smartphones. Smartphone technology possesses the capabilities of information search, video and audio recording, instant communication, and a variety of applications which, if properly exploited, can serve to enhance the teaching/learning environment both inside and outside the college classroom.

Colleges are continuously challenged to sustain their effectiveness relevant to their students' expectations. Principle among students expectations are the institutions' capability to provide authentic teaching/learning environments through the use of current information delivery systems. Today's students are considered "digital natives," who possess the ability and desire to consume large amounts of information through uninterrupted connectedness with their personal digital devices. As the point of instructional delivery, college faculty must strive to align with student expectations, and focus this connectedness toward academic success.

Student's personal digital device of choice is the smartphone, essentially a hand-held computer with a phone application. The processing power of the smartphone has led to opportunities in education through the development of quality applications. The small size and transportability of the device has rendered the smartphone as a spontaneous educational tool. (Ilkyu & Chonggun 2014).

Smartphones are common personal/professional accessories. Their ready access to instant communication, information searches, and applications render them a powerful asset to educators. "In particular, the smartphone's potential as an educational tool is an area which is starting to gain recognition" (Robinson, Cronin, Ibrahim, Jinks, Molitor, Newman, & Shapiro, 2013, p. 2).

LITERATURE REVIEW

"Tech-savvy curriculum leaders understand that technology is a tool to create a rich, stimulating environment that fosters collaboration, inquiry, and decision making" (Parkay, Anctil, & Hass, 2014, p. 364). Today's students have the natural capacity to devour large volumes of information while multi-tasking. To engage these students, educators must design their teaching/learning activities to align educational requirements with individual learning styles. The connectivity between the technology and effective learning environments is the design of authentic learning tasks. "Authentic learning tasks enable students to see the connections between the curriculum and the world beyond the classroom – both now and in the future" (p. 353). Learning takes place when a person can integrate

learning into different aspects of their lives. Within the adult education environment, Tinto's theory of integration, (Tinto 1975) indicates that if the student does not have a good social network of peers and academia, learning will not be as effective. The use of technology in the classroom can enhance and enrich the learning experience, yet it's important that the educator "...carefully reflect when it will further the attainment of curriculum goals" (Parkay, et al, p. 367). In absence of a college professor's development in curriculum technology applications, they risk limiting the academic growth of their students. This literature review will examine the integration of smart phone technology into the curriculum domain of the college student.

The goal of this literature review is to examine the impact to the learning efficacy which accompanies curriculum/technology integration. To accomplish this examination, this author will cross-pollinate the selected literature into college educator perspectives about smartphones, using smartphones for educational support, opportunities for integrating this technology into the major components of the lesson plan; presentation, application, and evaluation, and finally a summary of student perspectives on the use of smart phones as an educational device.

Educator's perspectives

Educator's perspectives vary regarding the use of the smartphone as a support media. Since this author was interested in including perspectives from a "holistic smartphone environment" (i.e. a community which does not have diverse media selections), the results in one study yielded interesting results. Within the country of Tanzania, there exists very few communication, internet, radio device choices, making the smartphone prolific because of its broad accessibility, applicability, and affordability. The study cited that all participating teachers and approx. sixty percent of students possessed smart phones, yet teacher attitudes toward smartphone use in the educational environment was correlated to teacher's (pre-service or in-service) experience (Kafyulilo 2014). The study concluded that pre-service teachers favored the educational use of smart phones while in-service teachers viewed the technology as more of a distraction to students. It's understandable that teachers may avoid the use of technology to mitigate distractions, yet some teachers were more likely to embrace its use.

The literature also revealed that the concern for student distractions varied with the topic of study. In the case of healthcare related subjects, college faculties were more included to embrace the use of the smartphone in their learning environments. As correlated with the consumer health-related applications available to smartphone owners, healthcare faculty were more encouraged to incorpo-

rate the tool into their practices. One study concluded that when teachers avoid the use of this technology, they;

> "...may be keeping students from recognizing that technology can be used to inform them about their health. Wellness educators need to be proactive about using appropriate technology in their classrooms" (Garver, McCurley, Bell, Geeslin, Priest, & White, 2015).

In addition to concerns about student distractions while still remaining enthusiastic for application to some topics of study, the literature indicated that teachers are also concerned with possible student psychological impacts of smartphone use.

One study on the frequent use of smartphones indicated that, "smart phone use motivation was correlated positively with addiction, while addiction was correlated negatively with self-control" (Cho, 2014, p. 322). The literature suggested that the smartphone addiction phenomenon is becoming more popular among students as evidenced by the frequent sight of congregated students concurrently staring into their devices. Additionally, "significant positive relationships were also established between mobile addiction and socio-psychological dimensions such as loneliness, boredom, egoism, and self-independence at varying levels" (Afolayan, Oluyinka, & Titilope, 2014, p. 1). The literature's conclusions on addiction echoed a consistent theme; future studies should focus upon students' cravings for smart technologies along with institutional policies to help shape more productive use of the devices. Educators not only cited concerns relative to addiction, but also other psychological impacts of smartphone usage.

Teacher's perspectives included other student psychological impacts which accompany the use of smartphones. One study focused on the heavy use of smartphones by African-American students, as gateways to micro-blogging services such as Twitter and Facebook. Of the behavioral traits most associated with heavy use, "...anxiety was the most important predictor of heavy utilization of smartphone and Facebook, not extroversion, agreeableness, neuroticism, or conscientiousness" (Lee, 2014, p.58). Additionally, multitasking behaviors were correlated with high smartphone usage, yet did not necessarily have a negative impact upon academic performance. Multi-tasking was correlated across multiple studies as associated with both a positive and negative impact on student's Grade Point Average (GPA). While educators perspectives regarding excessive smartphone use range from positive to negative, "The significant links between smartphone addiction and smartphone usage, loneliness, and shyness have clear implications for treatment and intervention for

parents, educators, and policy makers" (Afolayan, et al, 2014, p. 1).

Educators are cautioned in the literature to develop their understanding of technology and smartphone integration, yet to sustain a balanced perspective. "While technology has the potential to enhance student engagement, it should not be used as a substitute for good old-fashioned teaching" (La Roche, & Flanigan, 2013, p. 47). Supporting this goal of a balanced approach, institutions have implemented different policies (some not so balanced) to stabilize and make more productive the use of technology within their classrooms. A sampling of the policies include; banning the use of technology, monitoring lecture halls for inappropriate smartphone use, implementing acceptable technology use policies, and developing procedures which encourage teachers to know their students better (La Roche, & Flanigan 2013).

In sum, educator's perspectives still vary widely regarding the use of smart phones as an educational tool. The literature indicates that the broad range of teacher endorsements and concerns are supported across different nationalities, races, and cultures. The common theme was that additional studies are required for college educators to continue to make informed decisions regarding the integration of technology and curriculum within their classrooms.

Smart phone use for educational support

While the policy of smartphone use in educational environments may be encouraged, banned, or exist somewhere along a range of acceptability, students use of the technology will not end. Millennials possess a much different perspective of information gathering than that of their parents. While their parents may have labored in libraries or later in digital catalogs, or on-line searches by way of their personal computers, today's students are accustomed to and demand immediate access to information. This instant access through a wide band of search applications is made portable through their smartphones as a constant "connected companion." The thought of physically traveling to a location to gather information is not an option for how today's students will use their time.

One study indicated that seventy six percent of participants used popular academic web sites which included encyclopedias, dictionaries, translators, or search engines (Reese 2013). Students expect to gain fast access to information and are not tolerant of delays in responses to their inquiries. Since there are several options available to gather information; Wikipedia, Ask.com, Google, Safari, and Yahoo!, at no cost to the user – there may also be an opportunity to avoid critical thought in measuring the va-

lidity of the gathered data. Other studies suggested that institutional libraries can better support students by creating on-line search applications which emulate the look and functionality of the current popular applications. By offering familiarity, yet retaining the encouragement of critical thought during information retrieval and evaluation, schools can better align with student's practical use of their companion technology (2013).

Thus far both educators' perspectives regarding the use of smartphones and the student's use of the technology within the literature review conclude that the use of these tools will remain ever-present in teaching/learning environments. What then are the opportunities for teachers to harness this capability in the delivery of their lessons?

Direct instruction opportunities within lesson presentation

In addition to the information search and recording capabilities of smartphone technologies, there also exists an opportunity to leverage their communication applications. Smartphones are heavily vested in both written and oral communication, and therefore enable both teachers and students to create and share information, as they collaborate in satisfying a course's objectives. Collaborative learning events such as language learning, group projects, and multi-media team assignments all benefit from the presentation of a lesson which is scalable to the individual learning needs of students. One of the opportunities to enhance a lesson presentation is the podcast application.

The podcast application benefits students by providing a readily available delivery and review of the subject matter for student's reference as needed. "Podcasting is one of today's most prominent trends in media and computing, but until now, actors predicting its adoption in higher education settings remain largely unexplored" (Zacharis, 2012, p. 174). One study suggested that the perceived ease of teacher recording and student retrieval and use were positively correlated to enhancing lesson presentations. (2012). Since active student participation facilitates effective learning, college professors can also leverage student smartphones within the application phase of their lessons

Opportunities within lesson application

Meaningful application of professor's lesson presentations help to reinforce the teaching/learning environment. As students practice and apply what they have learned, so too does their opportunity for lesson retention and success on measurement increase. Because the relative costs of building and maintaining brick and mortar schools are higher than the cost of most technology, institutions are seeking to leverage mobile technologies where appropriate in support of student learning.

The literature review revealed a study where an insect ecology program was supplemented by the use of smartphone technology. The program contained a course on butterfly life cycles, where the construction of a butterfly garden would have been ideal (yet cost prohibitive) for observing butterfly behavior. "In this study, the augmented reality and mobile learning technologies were used to develop a virtual butterfly ecological system by combining with campus host plants and virtual breeding activities" (Wernhuar, Kuo-Liang, Chuan-Sheng, Fong-Lu, & Hsin-Hun, 2015, p. 253). This system engages students through their smartphones "...to breed virtual butterflies on host plants and observe their life cycles at different growing stages" (p. 254). In addition to ecology courses, student engineers also benefit from reinforcement through application.

Electrical and software engineering students receive extensive lectures on how to configure their networks. In one study, college engineering professors provided an application opportunity for students by sending "learning pills" to the students' smart phones. "A learning pill is a simple exercise that summarizes some of the key concepts explained in class and promotes reflection and self-study" (Munoz-Organero, Munoz-Merino, & Kloos, 2012, p. 85). The study's results suggested that the use of the learning pills contributed to students' academic success by "improve[ing] student class attendance, performance, and motivational patterns" (p. 87). Whether reinforcing presentations on butterfly ecology or electrical engineering networks, teachers who harness student's smartphones as an opportunity to apply their lessons, posture their students for success on the course's measurement devices.

Opportunities within evaluation

Assessment and evaluation play a key role in an instructional system as they determine the effectiveness of the teaching/learning environment in support the student's accomplishment of the course objectives. Since student measurement is not limited only to post-presentation/application events, smartphone technologies may also be exploited to measure student pre-requisite learning. The smartphone may be used for pre-course testing applications to determine the individual learning needs of each student prior to enrollment in a computation course (e.g. mathematics). Distance learning courses may also benefit from student pre-tests, since they can serve both teachers and students as an effective diagnostic tool (Rita 2012).

One of the most effective student assessments which college professors employ is the question and answer method. This method allows for an interim measurement of the students grasp of the subject concepts through effectively timed and phrased questions. The communication application of the smartphone enables teachers and students to interact as needed regardless of their physical proximity. Often the best timed questions are those that are posed to students in an asynchronous environment. These off-line question and answer periods permit teachers to measure student learning by allowing for students to process the inquiry, apply critical thought, and develop a comprehensive response to the question. In this case measurement not only serves as a terminal assessment but also as reinforcement to the presentation and application previously experienced. "We think that it is because the student who gets a better grade has positive attitude to his class" (Ilkyu & Chonggun, 2014, p. 24). The literature indicated that college teachers have opportunities within the lesson phases of presentation, application, and evaluation to leverage the capabilities of the student's smartphone, the last section of the review will capture student perspectives regarding these opportunities.

Student perspectives

In general, the literature indicated that college students sustain both high rates of smart phone ownership and positive attitudes regaining the role which the devices play in their academic success. One study measured students attending three separate American universities. The research collected data relative to the student's smartphone use of teacher integrated learning activities across two semesters. The overarching theme included "mobile computing devices and the use of social media created opportunities for interaction, provided opportunities for collaboration, as well as allowed students to engage in content creation and communication..."(Gikas, & Grant, 2013, p. 23). More specifically, this and other studies highlighted student preferences to employ cloud-based note-taking applications and information search engines in support of research or clarification of concepts presented within the course. Social networking services were also indicated high on student preferences in support of their education.

Students attending healthcare programs indicated their preferences to collaborate by way of social networking sites (SNS) with their classmates on student assignments or projects. Among the most popular sites of 147 students surveyed, "Facebook and YouTube had been utilized for educational purposes by 97 and 60 % of participants respectively, and 85 % believed that SNS could benefit their learning experience" (Maloney, Moss, & Ilic, 2014, p.14). The studies found within the literature presented consistent student perspectives throughout the review, specifically that students prefer to exploit the full abilities of their digital companions wherever possible. Those perspectives extend to student research, communication, collaboration, and information gathering. The portability and connectedness of the smartphone make the technol-

ogy a valid companion for students to engage the challenges which are presented in their college programs.

CONCLUSION

The literature review indicated that while college educators and college student perspectives may not completely align regarding the smartphones capability as an effective educational tool, they do agree that the technology is here to stay. By harnessing the capabilities which accompany smartphones, teachers have the opportunity to enhance the presentation, application, and evaluation phases of their lesson plans. Studies suggest that when the application of the technology is well plan and stabilized by policy and practices, it has enhanced student academic performance. Concurrently, the overuse of smartphones has presented some unintended consequences to users in the form of addiction and collaborative alienation among peers. Both sides of the smartphone advocacy debate agree that additional research focus is needed to discover more about the psychological phenomenon instigated by smartphone overuse.

The overarching theme within the literature is that by definition there exists no single learning prescription to fit every student's individual needs. College professors must commit to developing their technology savvy to remain relevant by providing meaningful learning events to their students. A professor who invests in lesson preparation and effective delivery will more naturally encourage their students to remain engaged, and to not participate in the temptation of attention drift by way of their smartphones. Leveraging creative lesson application and evaluation strategies will more closely align college professors with their students.

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