



Digital Learning Preferences: What Do Students Want?

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With the advent of Learning Management Systems (LMS) and proliferation of the use of digital devices, instructors have increasingly incorporated digital approaches into classes - some converting classes to online versions, others to hybrid versions that have distinct face-to-face and online components, and still others to an approach that integrates digital technologies into traditional classes. EDUCAUSE reports that 85% of faculty use a learning management system (LMS), with 74% reporting that it is a “useful tool to enhance teaching” (Brown, Dehoney, & Millichap, 2015). Eighty-three percent of students use a LMS with 56% reporting it as useful (Brown et al., 2015).

Learning management systems provide opportunities for a variety of instructional approaches. Instructors are able to consider instructional strategies for their courses that have both a digital and a non-digital implementation approach. If both digital and non-digital versions of the same (or similar) strategies are available, how does the instructor make the choice of whether to incorporate the digital or the non-digital version into their courses? It is important that educators make decisions about using a digital versus a non-digital tool or strategy in an informed manner. Which is better for the students, the instructor, or other stakeholders in educational processes? Although digital approaches can be successful, some non-digital approaches may still be preferred. In order to determine the digital tools that are perceived as most effective by students, this research surveyed 222 students, enrolled in seven different course sections during the 2017 spring semester at a U.S. research university. The survey identified instructional features/strategies that are available for both digital and non-digital implementation; students were queried as to their perceptions of the relative value of each feature/strategy with respect to its implementation, digital versus non-digital, for their personal learning.

Using the results of the survey and related literature, the current study explores and addresses issues such as the following:

- What comparative value do students perceive for the non-digital implementation of a particular instructional feature/strategy compared to its digital implementation?
- Do students who complete most courses online differ in their preference for specific digital tools from those who complete most of their courses in a traditional format?

Results of the research are presented with implications for how instructors can integrate digital and non-digital strategies to encourage student learning.

Background

Recent observations and trends outside of higher education may inform thinking about using digital learning tools. The term ‘digital’ is now used broadly to encompass all forms of content that are stored and delivered using information and communication technologies (ICTs) that depend on computers (Peppard & Ward, 2016). In his popular book *The Revenge of Analog: Real Things and Why They Matter*, David Sax cites numerous examples where consumer behavior indicates a renewed preference for older, tactile versions of information goods (music, books, photographs, and board games) that are readily available in digital formats. Then he examines how markets in the areas of publishing, retail, education, and manufacturing should take notice of these signs and focus development efforts on finding the best blend of digital and non-digital product and experience elements to create the products and product experiences of the future (Sax, 2016). His observations, while not scientific research, inspired the authors to examine research related to digital versus traditional versions of learning elements that are used in higher education today and to explore what is known regarding their efficacy and student preference for one format over another.

Use of ICTs for Learning

Claims abound that today’s digitally native students are eager and capable of applying information and communication technologies to learning tasks, yet research reveals inconsistency across the globe with respect to student use of ICTs for learning. For example, a study by Lai and Hong (2015) found that students in the United Kingdom spend a large amount of time on a limited range of digital technologies which include laptop computers, mobile phones, mp3 players, Internet browsers, a spectrum of Google tools, and Facebook or MySpace. Miertschin, Stewart and Goodson (2017), in a study focused on mobile versus non-mobile technologies, found that their students (located in the U.S.) most frequently used desktops and/or laptops for their academic work, and they used smartphones and tablets more for nonacademic pursuits. They also found that 13% of the students reported not using a desktop computer at all, confirming a trend of affinity for at least portability with respect to devices. Several studies of students in South Africa reported that, while the majority of students are exposed to a wide range of digital technologies, their use of ICTs for learning is mostly LMS use and use that is required as part of the course content (Lai & Hong, 2015). In a study of 711 students across Andalusia, Yot-Dominguez and Marcelo (2017) found that university students do not tend to use digital technologies to regulate their own learning process even when they are frequent users of digital technologies in other contexts.

Use of ICTs for Instruction

Some researchers look to ICTs for their potential to transform higher education instruction from predominantly didactic, teacher-centered approaches to student-centered approaches, with student-centered approaches being shown as an effective strategy for developing critical thinking and problem solving skills. However, a number of studies found that the ICTs most frequently employed in instruction in higher education are used to transfer information (content) from instructor to student, which is a teacher-centered, didactic approach (Daniel, 2012; Kirkwood & Price, 2014). Additional research showed that ICT-supported pedagogy is changing over time to more student-centered approaches (Englund, Olofsson, & Price, 2017; Kirkwood,

2014; Ng'ambi, 2013). One study also found that student satisfaction with the learning experience is higher when the teacher's approach with technology is more student-focused (Englund et al., 2017). Research focused on creating a model of how technology could be infused in education includes work by Ruben Puentedura who created the SAMR model (Puentedura, 2006). This model describes technology integration through four levels including: 1) substitution (providing no functional change), 2) augmentation (providing functional improvement), 3) modification (supports significant task redesign) and 4) redefinition (enables entirely new learning tasks and experiences). Clearly, in the area of how to best employ technology to improve higher education, additional research is needed.

Thus, while digital formats for information goods abound, and digital approaches to instruction are established and successful, some non-digital approaches may be preferred. Using the results of the survey and related literature, the current study explores and addresses the following issues:

- What comparative value do students perceive for the non-digital implementation of a particular instructional feature/strategy compared to its digital implementation?
- Do students who complete many courses online differ in their preference for specific digital tools from those who complete only a few of their courses in a traditional format?

Study Procedures

A survey was developed that identified instructional features or strategies that are available in both digital and non-digital implementation. Two-hundred and twenty-two students enrolled in seven different course sections in the 2017 spring semester were queried as to their perceptions of the relative value of each feature/strategy with respect to its implementation, digital versus non-digital, for their personal learning.

The format of participating courses included online (2), face-to-face (4), and hybrid courses (1). Course levels included sophomore, junior, senior, and graduate. The learning management system, Blackboard, was used to deliver the questionnaire. In general, Blackboard was the exclusive delivery interface for the online courses and supplemented delivery for the hybrid and face-to-face courses.

Table 1: Courses Used for Survey Administration

Format	Level	Course Name
Face-to-Face	Sophomore	Information Systems Applications (39)
Face-to-Face	Junior	Integrated Information Systems (42)
Online	Junior	Visual Merchandising (43)
Face-to-Face	Senior	Database Admin. & Implementation (36)
Online	Senior	Research Concepts in HDCS (49)
Face-to-Face	Senior	Project Management & Practice (5)
Online/Hybrid	Graduate	Data Analysis (8)

Survey completion was voluntary and students were assured that all responses were anonymous to the instructor and that anonymity would be maintained in any publication of the results as well. Student responses were downloaded for analysis with each response record by a non-identifying number assigned by the learning management system.

The survey began with demographic characteristics including: 1) student classification (freshman, sophomore, etc.), 2) number of online courses completed, 3) enrollment status (mostly full-time or mostly part-time), 4) age, 5) estimated overall GPA, 6) employment status, 7) gender, 8) major, 9) course format, 10) employment, 11) computer use, and 12) computer acquisition information. Information was self-reported to assure anonymity.

In addition to demographic information, items in the survey included the following.

- Ten instructional/learning tools were identified; students indicated their preferences for use of the tool in college courses by indicating preference for use of the tool on a scale that ranged from non-digital (low) to digital (high).
- Items were listed that identified ways that the student might use their computer while engaged in a non-classroom instructional type activity. Students reported their use on a scale that ranged from never use (low) to always use (high).
- Open-ended items were presented to explore approaches that instructors and students could use to incorporate online learning experiences into the classes.

Student responses to the survey items described were tabulated. Tables, graphs, and descriptive measures were used to analyze the data.

Study Results

Demographics

Participating students could be characterized as students with experience in online learning in that 45% of them had completed at least six online courses. Only 2% had never completed an online course. The survey also addressed mostly those who were experienced students in that 89% of the students were classified as juniors or beyond. Most students were under 29 years of age (85%) and employed, in either a full-time or part-time position (69%), with a GPA greater than 2.50 (90%). More of the students who completed the survey attended school mostly full-time (89%). Forty-two percent (42%) of the respondents were women and 58% were men.

Computer Tool/Activity Preferences

In reviewing the data on technology features in the classroom, it is interesting to note that many students had a preference for digital approaches whether enrolled in online or traditional classes.

The study identified ten instructional tools or activities that are frequently used in courses. The students were asked if they would prefer to use the tool in an identified digital format or would prefer the identified non-digital approach. These features included: discussions with other students, reading course material, team projects, testing, homework, research compilation, questions to the instructor, class news, lecture presentation, and grade information.

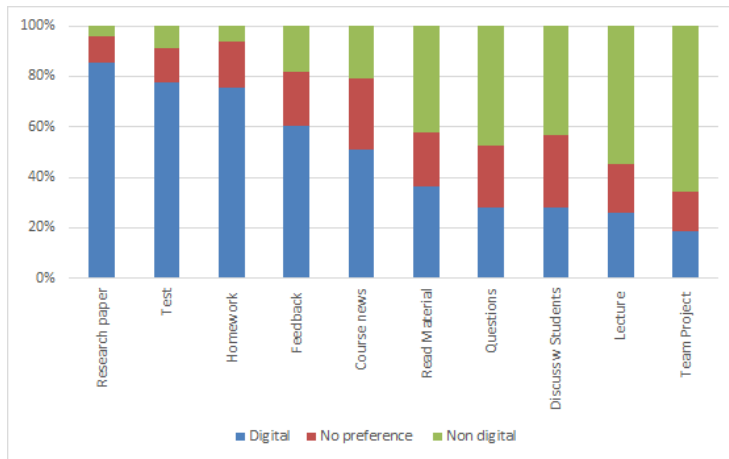
Students were asked to report their preference for a digital or non-digital approach to the activity on a scale that ranged from 1 (a common and specific non-digital approach) to 7 (a specific digital approach). Results were tabulated for all responders and are presented in Table 1 and Figure 1

Table 2: Digital vs Non-digital Preference by Activity*

Activity	Digital	No preference	Non digital
Research paper	86%	10%	4%
Test	78%	13%	9%
Homework	75%	18%	6%
Feedback	61%	21%	18%
Course news	51%	28%	21%
Read Material	36%	22%	42%
Questions	28%	24%	48%
Discuss w Students	28%	29%	43%
Lecture	26%	19%	55%
Team Project	19%	15%	66%

*Ranks of 1 through 3 were categorized as a non-digital preference; 4 implied no preference; 5 through 7 were categorized as a digital preference.

Figure 1: Digital vs Non-digital Preference by Activity



Indications were that students preferred a digital approach to research for a paper, testing, homework submission, grading feedback and receipt of course news. Non digital preference was for lectures (face-to-face over videos) and work on team projects. There is a split on reading course material; about a third preferred the electronic version while 40% preferred to read a paper version of the material.

These approaches were then considered in relation to student responses regarding the number of online courses that were completed. The mean preference for students who completed at least six online courses (about 15% of their program) was compared to the mean preference of those who

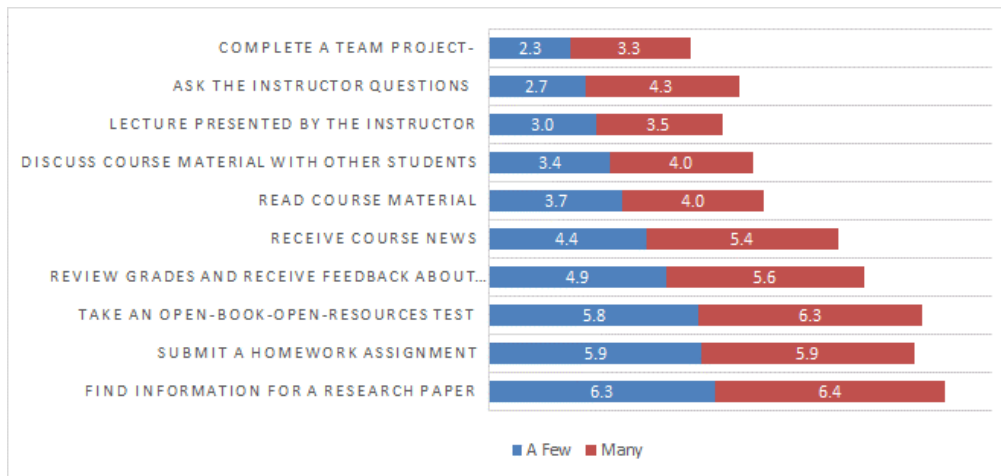
had completed fewer than six online courses. The results are summarized in Table 3 and Figure 2. (Note a higher score indicates a preference for the digital approach.)

Table 3: Preference for Digital (higher number) vs Non digital (lower number) by Online Course Experience*

Activity	Many OL Courses	A Few OL Courses
Find information for a research paper	6.4	6.3
Take an open-book-open-resources test	6.3	5.9
Submit a homework assignment	5.9	5.8
Review grades and receive feedback about your work	5.6	4.9
Receive course news	5.4	4.4
Ask the instructor questions	4.3	3.7
Discuss course material with other students	4.0	3.4
Read Course Material	4.0	3.0
Lecture presented by the instructor	3.5	2.7
Complete a team project-	3.3	2.3

*Red indicates digital preference; yellow indicates no preference and blue indicates a non-digital preference.

Figure 2: Preference for Digital (higher number) vs Non digital (lower number) by Online Course Experience



All students, regardless of their online experience, had a preference for the digital approach to research for a paper, testing, and homework submission. All students, regardless of their online experience, had a preference for the non-digital approach to lectures (face-to-face over videos) and work on team projects.

In addition, students who had more online experience had a preference for the digital approach to feedback on their work and receipt of course news. Students who had less online experience had

a preference for the non-digital approach to asking questions, discussions with other students and reading material.

Reported Computer Use

In the third section of the survey, students were asked about use of their computers in activities outside of the regular classroom activities. Results were tabulated and are shown in Table 4.

Table 4: Student Computer Use

Student Computer Use	Yes	Sometimes	No
In online courses I meet face-to-face in study groups with other classmates.	52%	38%	10%
During a face-to-face lecture I use a digital device to communicate with classmates.	35%	41%	24%
While working on my homework I use a digital device to communicate with the instructor.	31%	44%	25%
During a face-to-face meeting of a class project team I use a digital device to communicate with classmates.	29%	43%	29%
During a face-to-face lecture I use a digital device to take notes.	19%	49%	33%
While working on my homework I use a digital device to communicate with classmates.	18%	48%	35%
The content of a course influences my preference for using digital versus non-digital tools	13%	52%	35%
During a face-to-face lecture I use a digital device to look up information.	13%	46%	42%
During a face-to-face meeting of a class project team I use a digital device to look up information.	8%	38%	54%

A majority of students (about 75%) reported that they sometimes or always

- met face-to-face in study groups for online classes
- used a digital device to communicate with classmates during a face-to-face lecture
- used a digital device to communicate with the instructor while working on my homework
- used a digital device to communicate with classmates during a face-to-face meeting of a class project team

About two-thirds of the student surveyed reported that they sometimes or always:

- used a digital device to take notes during a face-to-face lecture
- used a digital device to communicate with classmates while working on homework

It is interesting to note that during a face-to-face meeting of a class project team they did not use a digital device to look up information. Finally, students indicated that the content of a course influences their preference for using digital versus non-digital tools for learning.

Implications for Instruction

Finally, students were queried as to what instructors could do to integrate online learning experiences and face-to-face class (35 responses) and what students could do to integrate online learning experiences and face-to-face class learning experiences? (32 responses)

Fifty-one percent of those responding to the question regarding instructor contributions wrote comments that supported “more use of videos” and 17% indicated that the institution should offer “more hybrid courses.”

Other individual comments suggested the following:

- More office hours
- More electronic devices
- Add material in a clear and comprehensible manner
- Provide resources
- Live stream of f-2-f classes
- Use reliable technology
- Don’t rely on discussion boards for participation

In response to what the students could do, 22% indicated that they could make better use of resources. Other suggestions included:

- “participate in discussions, chatrooms, live study groups” (16%)
- “actually participate” (9%)
- “review lectures” (9%)
- “take hybrid classes” (6%)

A scattering of individual comments suggested:

- More critical thinking
- Use instructor office hours
- Buy and use more technology
- Find concept examples online
- Create study tools and share them with classmates
- Be more eager to learn and ask questions
- Ask for more online material
- Be on time/don’t procrastinate

Discussion and Conclusions

In general, the data showed that many of the students surveyed had a preference for digital approaches to their instruction. This was true whether they were currently enrolled in online or traditional classes. It should be noted, however, that the participants as a whole were experienced in online learning in that 45% of them had completed at least six online courses, and only 2% had completed no online course. Additionally, these students were mostly (89%) juniors and seniors. Hence, they were familiar with both online and face-to-face approaches to instruction.

Preference was indicated for digital approaches to research for a paper, testing, homework submission, grading feedback, and receipt of course news. While student motivations are not entirely known, it is possible that these preferences are based on general expediency. For

example, researching for a paper is greatly enhanced by today's availability of digital library resources and online search engines. It is much less likely, or perhaps even impossible, that a student would prefer to physically peruse the wide variety of resources available online by visiting individual physical libraries. Similarly, preferences for testing online and homework submission may be driven by convenience in both physical space and time. Since receiving grading feedback and course news both require communication, students may prefer digital formats to facilitate immediacy. Contrastingly, student preferences for non-digital formats for lectures and working on team projects, may indicate value for interpersonal interactions, perhaps that face-to-face lectures and meetings with team peers are more effective.

Interestingly, when analyzed by the number of online courses students had taken, additional insights were gained. The finding that students who had the most online experience had a preference for the digital approach to feedback on their work and receipt of course news suggests that greater experience with online courses results in greater comfort with digital communication tools and strategies. This is in comparison to the state that students who had the least online experience had a preference for the non-digital approaches to asking questions, discussions with other students, and reading material. In this case, it appears students with less experience had greater comfort with familiar non-digital means for communication and reading.

Since the reality of the current higher education landscape is that students have access to multiple digital and non-digital approaches to learning, it is valuable to note that these participants indicated that they use mixed formats to facilitate their educational goals. Meeting face-to-face in study groups for online classes; using digital devices to communicate with peers during a face-to-face lecture, or with peers or the instructor while working on homework; and using digital devices to communicate with classmates during a face-to-face meeting of a class project team all illustrate students' abilities to integrate digital and non-digital tools. It is important to note that their ability to learn this coordinated use of mixed format tools will be valuable in future professional and personal roles.

Of specific interest is the finding that students felt the content of a course influences their preference for using digital versus non-digital tools for learning. This merits further investigation with impacts not only for student selection of courses, but also for instructional course design. For students, the availability of multiple sections of courses online, face-to-face, and hybrid offers the opportunity to select a format that meets their particular needs. Future investigation could focus on whether there are universal preferences for digital or non-digital formats based on course content that apply across large numbers of students. If so, what are they? For faculty members and instructional course designers, knowing which courses or content within courses works best in which format would be useful in creating highly effective courses.

Finally, the suggestions gathered here of what instructors and students can do to integrate digital and non-digital learning experiences offer opportunities for growth. The recommendations for instructors can guide faculty members to create courses better matched to student needs. Especially the incorporation of more videos into courses and the offering of more hybrid course formats may be useful. The recommendations offered for students can be shared and implemented to maximize student learning potential and drive personal achievement.

In summary, since student learning occurs in a context rich with multiple digital and non-digital tools, understanding and then being able to accommodate student preferences for specific

formats offers the best opportunities for maximizing student success. By knowing, understanding, and applying the modes through which students learn best, both students and faculties can enhance the educational process.

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