Foundations for a Next Generation Digital Learning Environment: Faculty, Students, and the LMS
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Authors

Jeffrey Pomerantz, EDUCAUSE
Malcolm Brown, EDUCAUSE
D. Christopher Brooks, EDUCAUSE

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Introduction

Students and faculty may not agree about much, but they do agree about online learning. Students prefer to learn, and faculty prefer to teach, in blended environments; both agree on the types of activities they prefer to conduct online; and both are highly satisfied with the LMS’s delivery of functionality to support their preferred online activities.

The LMS has become critical to teaching and learning. Almost every higher education institution deploys at least one if not multiple LMS platforms. Indeed, the rate of LMS adoption by institutions (99%) and by faculty (88%) puts it in the category with cars and cellphones as among the most widely adopted technologies in the United States. The fact that LMSs are both widely available and widely used positions the LMS as a convenient platform into which other teaching and learning tools are frequently integrated. Yet the LMS is not the final chapter in the evolution of the postsecondary digital learning environment; it is merely a prologue to what is to come. This report takes a closer look at some of the findings from the 2017 Student and Faculty Technology Research Studies about the LMS, as well as the preferences of students and faculty for teaching and learning environments, to set the stage for a discussion of what might come next for the LMS.

Throughout this report we use the term “blended learning.” We recognize that this term is as complex as it is ambiguous: If an instructor uses an LMS to post the course syllabus, does that make an otherwise fully face-to-face course blended? If students hold an in-person study group for a fully online course, does that make the course blended? What percentage of students’ interaction with the course material must be online for a course to be considered blended? Interaction with the instructor? With the other students? Which online tools qualify for a course to be considered blended? While some excellent work has been conducted on evaluating the functionality of courseware products that may be online, and serious scholarly effort has been expended to define “blended learning,” there nevertheless is no agreed-upon measure of the “blendedness” of a course. The way this term is used by instructors and at institutions—and, unfortunately, sometimes in the published literature—is therefore often largely subjective.

In this report, we therefore adopt the broadest possible definition of “blended learning.” We take our definition from the work of Barbara Means and colleagues at SRI International’s Center for Technology in Learning, who conducted an extensive meta-analysis of research on online learning: “There are many forms of blended learning (also known as ‘hybrid’ learning), which encompass all of the middle ground in the spectrum between fully face-to-face and fully online
instruction.” We recognize that this definition is going to encompass most courses. We also suggest that it may be time to stop considering trivial uses of online tools (such as using an LMS to post a course syllabus) as worthy of qualifying a course as “blended.” That, however, is a topic for another essay. Lacking a principled narrower definition, “blended learning” will be taken to mean everything between the poles of fully face-to-face and fully online learning.
Teaching and Learning in Blended Environments

The LMS often supports the integration of tools and technologies into teaching and learning. Of course, what it means to “integrate” a tool into an LMS depends on the tool. Many tools are implemented as components of the LMS, such as discussion forums and gradebooks. Other tools may be integrated into an LMS with minimal setup, such as those that make an application programming interface (API) available for Learning Tools Interoperability (LTI) integration. Still other tools may not be integrated into the LMS at all (such as polling tools or statistical analysis packages), though the instructor may use the LMS to point students to the tool.

Blended instruction has stronger learning outcomes than either face-to-face or online learning alone. While it seems unlikely that many undergraduate students are aware of the body of research on this topic, students are perfectly aware of their own preferences. And their preferences align neatly with this best practice: 79% of respondents to the 2017 EDUCAUSE Center for Analysis and Research (ECAR) student study said that they prefer to learn in a blended environment (see figure 1). Not only do students prefer a blended environment, but they also believe that such an environment is beneficial to their academic success: 77% of students believe that they learn best in a blended environment, a position also supported by research.

![Figure 1. Students’ preference for learning environment](image)

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Students were asked what type of learning environment they prefer, and faculty were asked an analogous question: In what type of learning environment do they prefer to teach? ECAR has conducted fewer studies of faculty than of students and so does not have longitudinal data available for an equivalent timespan. Nevertheless, the 2017 findings about faculty preference closely parallel those about students: Far and away the majority (71%) of faculty prefer teaching in a blended environment (see figure 2).

![Faculty preference for teaching environment](image)

**Figure 2. Faculty preference for teaching environment**

It is often the LMS that enables blended learning, as the LMS may be used as the platform by which other tools are made available. And the usefulness of the LMS as this central hub is reflected in student and faculty attitudes about it: Not only do students prefer to learn in a blended environment, but 87% of students also wish their instructors would use the LMS more. Likewise, faculty prefer to teach in a blended environment, and 74% of faculty agree or strongly agree that the LMS is critical to their teaching.
Course Activities and Assignments

While the blended environment is a generalized preference for an overarching teaching and learning modality, faculty and students expressed an equally clear preference for the sorts of assignments and activities they prefer to perform in different environments.

In 2017, we asked both faculty and students what sorts of assignments and activities they preferred to do in online and in face-to-face environments. When we compared the responses of students and faculty across these items, we found considerable overlap and agreement on the preferred environment in which to carry out various tasks related to their courses, especially for face-to-face learning environments. However, the reasons given by each group for their respective preferences are quite different.

Face-to-Face Environments

In face-to-face learning environments, students’ most preferred activity is to attend lectures, an activity that appeared in student comments nearly twice as frequently as their second favorite face-to-face activity, discussion. Taking exam, quizzes, and tests was the third most preferred face-to-face activity, followed closely by collaboration with other students (see table 1).

Table 1. Faculty and student preferences for face-to-face assignments and activities

<table>
<thead>
<tr>
<th>Rank</th>
<th>Students</th>
<th>Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lecture</td>
<td>Discussion</td>
</tr>
<tr>
<td>2</td>
<td>Discussion</td>
<td>Collaboration</td>
</tr>
<tr>
<td>3</td>
<td>Exams/ quizzes/tests</td>
<td>Lecture</td>
</tr>
<tr>
<td>4</td>
<td>Collaboration</td>
<td>In-class activities</td>
</tr>
<tr>
<td>5</td>
<td>–</td>
<td>Exams/ quizzes/tests</td>
</tr>
<tr>
<td>6</td>
<td>–</td>
<td>Instruction</td>
</tr>
<tr>
<td>7</td>
<td>–</td>
<td>All</td>
</tr>
</tbody>
</table>

Students told us that face-to-face lectures offer the opportunity for their instructors to provide more depth on course content, expand on course materials, and answer questions they have about the course materials and content. One student told us baldly that lectures are simply easier to follow in a face-to-face environment. Another averred that “there is no better [way] to learn new material
than for a teacher to explain the concepts face-to-face. This allows the instructor’s in-depth knowledge to be seen and also lets them transfer their enthusiasm for the subject to me.” Students’ reasons for their preference of discussion in a face-to-face environment were slightly less instrumental than those given for lectures, focusing instead on the importance of human interaction. As one student told us, “I like to have discussions face-to-face; it keeps the discussion interesting and more personal.” Some students, however, stated their preferences for face-to-face discussion in terms of the limits of online discussions, suggesting that “it is difficult to judge tone in typed discussions” and that “discussion board posts are pointless—I have yet to meet a student that reads them.”

Very few students provided reasons for why they prefer to take their quizzes and examinations in face-to-face environments, but reduced opportunities for academic dishonesty was one of the main reasons given. For example, one student told us, “I strongly believe that testing should be done in a classroom setting to avoid academic dishonesty problems.” When citing their reasons for preferring collaboration in a face-to-face environment, students emphasized both the limits of online collaborations (e.g., “Group projects are very difficult online”; “online group projects never work”) and the benefits of human interaction with their peers (e.g., “I enjoy to do [sic] group work with other students with the oversight of the instructor”).

Instructors’ preferences for student activities and assignments in a face-to-face environment are the same as four of those identified by students, although they are ranked somewhat differently. Having students engage in discussion was the face-to-face activity most frequently named by faculty, citing the importance of dialogue to deeper learning. Instructors mentioned discussion nearly twice as often as either collaboration or lecture. Faculty emphasized the importance of synchronous interactions between instructors and students, and both synchronous and asynchronous interaction among students. Representative examples of faculty’s emphasizing the importance of discussion include:

- “Can get immediate feedback from students and they can get immediate feedback from each other.”
- “There simply is no substitute for face-to-face interaction with an instructor and one’s peers. Lectures can be stopped and started to accommodate questions and intervening discussions.”
- “Large group discussions are important to do in person to make sure voices are being heard and/or represented.”

When it comes to student collaboration, faculty prefer face-to-face environments to online ones because of the benefits of the former and the limitations of the latter. According to some faculty, face-to-face collaboration that engages students in “higher-level thinking” allows instructors “to float between groups,”
“to facilitate learning and provide feedback,” “to mediate and to keep them focused,” and “to see that everyone is contributing equally.” When this happens, one instructor suggested, students “seem to work better and generate more motivation and fun than when done online.” Indeed, one instructor proclaimed, “Group activities do not work online. Invariably there are a few students who do not participate. It leads to frustration to the students who are dedicated.”

Finally, faculty cited the personal interactions with students that facilitate an understanding of topics, provide opportunities for questions, and enable peer interactions as their justification for preferring to conduct lectures in a face-to-face environment. Quotes from instructors illustrate this point:

- “Lecture and discussion…make the best use of their time and…facilitate personal interaction that leads to better understanding of the topics.”
- “In general, [lecture] allows me to get to know my students and engage with THEM instead of my computer.”
- “Lecture/discussion [makes] it easier for me to read students’ comprehension and dialogue, and allows me to clarify confusion immediately so that students don’t get lost in the material.”

**Online Environments**

Although taking exams, quizzes, and tests was the third most preferred activity in a face-to-face environment by students, it was the overwhelmingly number one choice for both students and faculty among all online activities (see table 2). From the student perspective, online exams, quizzes, and tests are low-stress experiences through which they obtain immediate feedback on how well they know the material. A couple of students told us that, in addition to actual assessments, online practice quizzes and study guides are “extremely helpful for studying” and that doing so helps to “learn from choosing the wrong answer.” Students prefer online testing conditions because they “are far less stressful” than face-to-face: The student's home or a testing facility has fewer distractions and allows for flexibility in terms of when they take the exam.

Faculty also agree that the testing conditions in an online environment are more conducive to formative assessments, with the goal of improving student performance. One instructor told us, “I think there are fewer distractions with online exams versus the classroom, and students retain information better when they can go at their own pace.” Issues of efficiency in terms of grading exams were often cited by faculty. Another instructor embraced online exams explicitly for the automaticity with which exams and quizzes are graded as justification for preferring them; yet another embraced the more pedagogically grounded function of having students complete chapter quizzes “to prompt reading of the
text before we discuss it in class”; still others gestured to the flipped classroom model when they suggested that taking exams online “reserves class time for things better done face-to-face.”

Table 2. Faculty and student preferences for online assignments and activities

<table>
<thead>
<tr>
<th>Rank</th>
<th>Students</th>
<th>Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Exams/quizzes/tests</td>
<td>Exams/quizzes/tests</td>
</tr>
<tr>
<td>2</td>
<td>Homework</td>
<td>Discussion</td>
</tr>
<tr>
<td>3</td>
<td>Writing/essays</td>
<td>Reading</td>
</tr>
<tr>
<td>4</td>
<td>–</td>
<td>Video</td>
</tr>
<tr>
<td>5</td>
<td>–</td>
<td>Homework</td>
</tr>
<tr>
<td>6</td>
<td>–</td>
<td>Research</td>
</tr>
<tr>
<td>7</td>
<td>–</td>
<td>Submissions</td>
</tr>
<tr>
<td>8</td>
<td>–</td>
<td>Papers</td>
</tr>
</tbody>
</table>

Homework is another activity preferred in an online environment, ranked second by students and fifth by faculty. For students, completing homework online is seen as beneficial for its pedagogical value: Not only does it serve as a convenient method by which to complete coursework, but it also provides the opportunity for immediate feedback. Learning from mistakes in an online environment was cited by one student as “very useful to practicing a concept.” Some students did suggest that online homework for some subjects for which there are “definite problems and answers” (e.g., mathematics) was preferable to online homework for other courses. For faculty, the value is less pedagogical and more operational: The convenience and efficiency associated with collecting and grading student assignments were cited as the most important reasons for preferring online homework. Additionally, faculty identified the proliferation of plagiarism software as a tool that also makes the completion and submission of online homework more attractive.
Satisfaction with LMS Functionality

Satisfaction among students and faculty with features of the LMS—the subject of this section—reveals a pattern suggestive of both the limitations of the tool itself and the training faculty receive to use the LMS as a learning tool instead of a course management tool.

Although students are satisfied with the LMS implemented at their institution, there is a clear division in the level of student satisfaction between the basic functions of an LMS and its more sophisticated features (see figure 3). A majority of students are either satisfied or very satisfied with the course management functions of the LMS: submitting assignments (77%), accessing course content (75%), checking course progress (66%), managing assignments (62%), and receiving feedback on assignments (59%). The greater the level of engagement required of the student, however, the lower the level of student satisfaction with the LMS: engaging instructors (54%), accessing information about the institution’s news, events, or activities (54%), engaging with other students (49%), collaborating on projects (43%), and participating in study groups (40%).

<table>
<thead>
<tr>
<th>Function</th>
<th>Very dissatisfied</th>
<th>Dissatisfied</th>
<th>Satisfied</th>
<th>Very satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submitting course assignments</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Accessing course content</td>
<td></td>
<td></td>
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<tr>
<td>Checking course progress</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Managing your assignments</td>
<td></td>
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<tr>
<td>Receiving feedback on course assignments</td>
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<tr>
<td>Engaging with your instructors</td>
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<tr>
<td>Accessing information about your institution’s news, events, or activities</td>
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<tr>
<td>Engaging with other students</td>
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<tr>
<td>Collaborating on projects</td>
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<tr>
<td>Participating in study groups</td>
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</table>

Figure 3. Student satisfaction with the LMS, by function
As discussed above, most faculty agree or strongly agree that the LMS is critical to their teaching. Peering more closely, however, we find that what faculty find critical and most satisfying are functions that enable asynchronous interaction: pushing out documents such as a syllabus and handouts, pushing out and collecting assignments, and posting grades in the gradebook. These are the same operational, course-management functions of the LMS with which students are most satisfied (see figure 4). Not quite half (45%) of faculty use the LMS to promote interaction outside the classroom by using discussion boards, and only about half (53%) of faculty are satisfied or very satisfied with the LMS as a tool for engaging in meaningful interactions with students.

Figure 4. Faculty satisfaction with the LMS, by function
Prior to the advent of the LMS, some faculty posted course content to the web; prior to the advent of the web, some faculty posted grades on sheets of paper outside their office doors. These operational, course management functions are nothing new; faculty have been using whatever tools are available to perform these functions since there have been faculty. The fact that the LMS is now used so widely by faculty to perform these functions shows the extent to which the LMS has become simply infrastructural in higher education. These functions are fundamental to teaching and learning, and the vast majority of faculty are using the LMS to accomplish them.

So, where does this put us? We have the tools in place. We have both faculty and students widely adopting the LMS. We have both faculty and students preferring blended learning and believing in its ability to improve student learning outcomes. We know that both students and faculty have developed sophisticated preferences for what they do in different learning environments. And, we have faculty and students largely satisfied with the LMS as a utility with which to manage their teaching and learning. These are important milestones in the world of educational technology. What we seem to be struggling with are the next steps—how do we leverage this knowledge, enthusiasm, and end-user buy-in to enhance and improve teaching and learning? This is the subject to which we now turn.
NGDLE, the Wave of the Future

The research summarized in this report shows that the LMS is now a standard component of the campus digital learning environment: Almost every higher education institution deploys at least one, if not multiple, LMS platforms. But despite this ubiquity, the LMS is not, by any means, the final chapter in the evolution of the post-secondary digital learning environment. Indeed, the LMS is just the point of departure, and we are now at a stage where things really begin to get interesting.

For over two years, EDUCAUSE and others have been promoting the idea of a next generation digital learning environment (NGDLE)—a digital learning architecture encompassing a confederation of learning applications, tools, and resources woven together by means of open standards. Such a confederation may or may not include an LMS; in this regard the NGDLE concept is agnostic. What is clear is that postsecondary learning is far too diverse to be enabled adequately by a single application or platform. Therefore, it seems legitimate to conclude that any LMS will always need to be supplemented by additional components and resources, resulting in a digital learning environment instead of an LMS platform. This is the crux of the NGDLE idea, and it is essential to evolving our learning environments to add learning enablement to course management.

In the original NGDLE white paper, published in May 2015, we made the assertion that the LMS has been “highly successful in enabling the administration of learning but less so in enabling learning itself.” This assertion is borne out by the findings in this report: Both students and faculty appreciate the LMS for its course management functions but, upon closer inspection, less so for the functions that enable learning. Indeed, these results document the high value that both faculty and students place on face-to-face interactions, which have no need of the LMS. Along with permitting the communication of content, face-to-face interaction seems to be a much stronger vehicle for engagement and the communication of enthusiasm.

These results also remind us that a more nuanced consideration of the lecture is important. All too often the lecture is one-dimensionally dismissed as mere “transmission” of “content.” But the imparting of content is essential to learning, and we see in the results here that students and faculty see the lecture as a vehicle also for transmitting enthusiasm for the subject of the course. Sparking enthusiasm in the learner creates engagement, and in learning, student engagement is half the battle.

Further, against the blanket dismissal of the lecture, as noted above, we know that today many faculty are augmenting the traditional lecture by integrating nonlecture learning engagements. Indeed, new designs for lecture hall/auditorium learning spaces are encouraging this creative interweaving. One example is an approach pioneered at Iowa State University well over a decade ago: One auditorium in LeBaron Hall was outfitted with swivel chairs in every other row, allowing the students to
form ad hoc, face-to-face discussion groups as a part of the class session. Today many schools are including this feature in their auditoriums and learning-theater designs.

The research described above also contributes to the ongoing exploration of blended learning. The research summarized is suggestive in at least two important ways. First and most obviously, it shows that both faculty and students have an intuition that a blended learning environment—some mix of online, face-to-face, digital, and analog components—is better than environments that rely too heavily or even exclusively on either online or face-to-face components. This intuition makes sense, as it stands to reason that an environment that combines the strengths of heterogeneous components will be more productive and engaging. It is also a sign of the times, when online elements are part of the majority of the things we do.

Second, this research also makes it clear that there is some work to be done to sort out terminology. Over the past several years, it has become common to distinguish between a narrow and a broad definition of the term “blended learning.” The narrow definition involves the extent to which “seat time in a conventional classroom” is replaced by “an online component.” In the broader sense, blended learning is “a wide variety of technology/media integrated with conventional face-to-face classroom activities.” This report, and ECAR’s research generally, uses the second, broader definition. The preferences expressed by the faculty and students in the ECAR student and faculty studies document the appeal of this broader notion while also underscoring the value of face-to-face course activities.

The clear faculty and student preferences discussed in this report suggest that future research can productively focus on the broader sense of this key term. As stated above, however, this broad definition is likely to encompass the vast majority of courses. This is an area ripe for discussion in the field, since “blending” in this broader sense involves so many factors, such as digital applications and tools, learning space design, and learning engagement designs. The idea of an NGDLE anticipates increasing the variety of elements, both online and off, in the learning environments of the future.

Finally, this expanded sense of “blending” shows why the NGDLE concept is so important. The variety of blends required by postsecondary education is immense, given the wide variety of learners and the rapid pace of change, with respect not only to technology but also to the evolution of teaching practices. To support and keep pace with these developments, the digital architecture for learning must be able to quickly morph and evolve to enable experimentation and innovation. This is the goal of the NGDLE idea: a digital confederation of tools, content, and applications, dynamically connected by means of open standards. All this is implied by the broader scope of the term “blended learning,” making it clear that a next generation digital learning environment is an idea whose time has come.
Acknowledgments

The authors want to thank the students and faculty who participated in the 2017 EDUCAUSE Technology Research in the Academic Community (ETRAC) research project, from whose responses the findings of this report are derived. We also want to thank our EDUCAUSE colleagues Susan Grajek and Mark McCormack for their review of the manuscript and suggestions for improving it. Additionally, we thank Kate Roesch for her elegant and gripping figures that help us convey our story in ways that we otherwise could not. Finally, thanks go to Mike Roedema, whose statistical acumen makes this and all ETRAC research stronger and more accurate. Special thanks go to Joseph D. Galanek for his thorough and insightful qualitative analysis of student and faculty preferences for online and face-to-face activities.

Notes


2. Among US households, 91% own a car and 95% of Americans own a cellphone.


5. According to the ECAR Study of Faculty and Information Technology, 2017, use of the LMS is nearly ubiquitous: 88% of faculty use it, at a minimum, to post a syllabus.


8. Rank is determined by response frequency; responses with frequencies below $n = 100$ not reported.

9. Subsamples of 1,100 student responses and 1,100 faculty responses were randomly chosen for qualitative coding. Four hundred and thirty-three students expressed a preference for online exams/quizzes, 164 more than the next most commonly listed preference, homework. Three hundred and seventy-two faculty said that they prefer online exams/quizzes; the next most frequently cited preference was online discussion, with 268 mentions.

10. Rank is determined by response frequency; responses with frequencies below $n = 100$ not reported.


12. See the issue of EDUCAUSE Review focused on NGDLE.