A Student View of Technology in the Classroom: Does it Enhance the Seven Principles of Good Practice in Undergraduate Education?

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We are living in the midst of a technological revolution. Computing power is growing by leaps and bounds. Younger consumers are at the forefront of the current technology use, which is evidenced by the facts that 83% of young adults use social networking sites (McNaughton, 2011; Zickuhr, 2010), and 54% of millennials have smart phones (Boorstin, 2011). They also send and receive, on average, more than 1,600 texts per month (Lenhart, Purcell, Smith, & Zickuhr, 2010; Mathieson, 2010). Because this cohort likely has been surrounded by technology from a very young age, they are apt to arrive on campus expecting technology to be an integral part of their college experience. Thus, it appears logical to integrate technology into the learning environment for these digital natives.

Such integration is encouraged by the Association to Advance Collegiate Schools of Business (AACSB): “Management scholarship, pedagogy, and learning require sufficient up-to-date technology hardware, software, assistance and instruction” (AACSB, 2009, p. 31). In addition, in the economic environment of funding cuts to education, university administrators may seek to integrate technology into college classrooms as it can be a means to teach more students, with fewer resources, while maintaining the same level of quality in the education process. More and more university classrooms are “mediated.” Instructors are expected to use course management software (CMS), such as Blackboard, and are encouraged to use podcasts, online discussion groups and other technologies to connect with and engage students.

Conventional wisdom suggests that educational technology tools enhance learning (Clarke, Flaherty, & Mottner, 2001). There has been ample anecdotal support for the integration of technology in learning. It has been presumed to build technical skills needed for future careers (Clarke et al., 2001; Hunt, Eagle, & Kitchen, 2004), promote more efficient teaching and better student learning (Hunt et al., 2004), and engage students in learning through regular, one-on-one interactions (Hunt et al., 2004). Technology-based learning environments have also been shown to increase understanding (Dillon & Gabbard, 1998) as well as student participation and teamwork (Sweeney & Ingram, 2001; Ueltschy, 2001). However, there also has been research questioning the value of technology in the classroom. Some arguments

Abstract

There has been an explosion of classroom technologies, yet there is a lack of research investigating the connection between classroom technology and student learning. This research project explores faculty usage of classroom-based course management software, student usage and opinions of these software tools, and an exploration of whether or not the use of classroom-based course management software enhances student perceptions of learning based on the Seven Principles of Good Practice in Undergraduate Education. The authors find that although students enjoy using many of the course management tools, they do not see the tools as highly effective at enhancing the learning experience. When designing courses and considering if or how to use course management tools, it is critical for faculty to consider the connection between the Seven Principles for Good Practice in Undergraduate Education and the specific technology tools. Implications of the research findings and suggestions for improved use of classroom management software tools are provided.

Keywords

student learning, classroom technology, course management software, perceptions of technology

Deborah Brown McCabe and Matthew L. Meuter

Deborah Brown McCabe1 and Matthew L. Meuter2

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1Menlo College, Atherton, CA, USA

2California State University, Chico, Chico, CA, USA

Corresponding Author:
Deborah Brown McCabe, Menlo College, 1000 El Camino Real, Atherton, CA 94027-4301, USA
Email: dmccabe@menlo.edu
against technology are that it is a hindrance to learning (Hiltz, 1998), increases cognitive load, which then reduces understanding (Oliver, 1996), and can have a steep initial learning curve and requires effort to remain up to date (Cavanaugh, 2004). Clark, Yates, Early, and Moulton (2009) argue that the effect of technology in the classroom is, at best, neutral and that its value is linked more closely to course structure than to course effectiveness.

“Marketing professors are using various educational technology tools to assist learning in their classes. However, little is known about students’ perceptions of how these unique teaching tools influence their overall experience” (Clarke et al., 2001, p. 169). Therefore, it is paramount to explore whether technology truly does enhance student learning. The financial costs for universities and psychic costs for students and faculty of integrating technology into the classroom provide additional incentive to better understand the impact of technology. Because “all technologies should be judged on how they may be used to promote and enhance learning” (Bates, 1995), this study is designed to understand how CMS influences student learning, as evaluated through the Seven Principles of Good Practice in Undergraduate Education.

Given the rapid change in the capabilities of classroom technologies, the continually increasing skill level of college students in relation to new technologies, and the monetary expense and investment of energy to use new technologies, it is important that the enhancements to student learning are verified. To this end, our research project explores the fundamental question: Do students feel that the integration of technology into the classroom enhances learning? In this study, we examine the frequency with which faculty use CMS in their classes; the frequency with which students use the course management tools that are available to them; how much students like the tools; and whether or not, from the student perspective, the use of CMS, as it is currently being used in college classrooms, facilitates the application of the Seven Principles of Good Practice in Undergraduate Education (Chickering & Gamson, 1987). In addition, we explore student learning styles to determine if certain styles of learners view CMS more positively.

**Background**

CMS is an integrated set of web-based tools for course administration and delivery. Although there are tools to help facilitate traditional face-to-face classroom environments as well as online or distance education settings, the focus of this study is on the usage of CMS tools in a traditional face-to-face class. Typical platforms used include Blackboard, Sakai, ILearn, and Moodle, among others. Blackboard is the most widely used platform (Lane, 2008). Course tools are designed to aid faculty members in meeting their instructional goals. Enhanced communication, skill building, quick feedback, increased availability of course participants, and tracking have been cited as benefits of using the tools (Bradford, Porciello, Balkon, & Backus, 2007).

The specific CMS tools that are available to faculty vary by vendor and also by academic institution. Course materials, such as a syllabus, PowerPoint slides, readings, assignments, and web links, can be uploaded to the course and accessed at any time from any location where there is Internet access. Tools, such as class announcements and reminders, can be posted to the calendar or highlighted in the announcement section of the course website. Through the software, individuals can communicate one-to-one or in groups, synchronously or asynchronously, depending on their choice of tools, such as e-mail, discussion boards, or virtual classrooms. Students can manage real-time discussions outside class using the who’s online function and chat tool. Team projects can be facilitated by giving students access to the roster, which allows students to create online groups that were formed in class for projects. Instructors can create learning activities via the discussion board or wikis while online quizzes and tests, created through the assessments tool, can be used to reinforce course concepts. Students can watch and listen to items in the media library, play podcasts, and exchange files among themselves and submit work to the instructor. In turn, faculty can evaluate assignments, provide feedback, and grade work all within the CMS and post scores to an online grade book, enabling students to know their standing in the class at all times. Finally, the learning modules and goals tools help faculty keep classroom materials organized and communicate expectations to students with regard to what they should be learning and how course content fits together.

**The Seven Principles**

To assess student perceptions of the learning environment, we use the Seven Principles of Good Practice in Undergraduate Education, which is based on decades of research investigating the undergraduate educational experience (Chickering & Gamson, 1987). The Seven Principles were developed based on faculty concerns with declining student performance, student apathy, and even poor teaching (Chickering & Gamson, 1987; Hutchins, 2003). These principles have been commonly used to assess and define effective teaching in traditional classroom settings (Batts, Colaric, & McFaden, 2006; Chickering & Ehrmann, 1996). The principles also have been used as a set of guidelines to enhance courses taught online (Arbaugh & Hornik, 2006; Batts et al., 2006; Hutchins, 2003) as well as to evaluate online courses (Chizmar & Walbert, 1999; Graham, Cagiltay, Lim, Craner, & Duffy, 2001). Although the principles were originally developed to apply to traditional classroom settings (Chickering & Gamson, 1987), this recent research has shown that the same principles are relevant for the evaluation of technological aspects of the educational process. Thus, we feel that the
Seven Principles is an appropriate framework to evaluate the effectiveness of integrating technology into a traditional classroom environment.

The Seven Principles, which are directly related to faculty and student behaviors and characteristics, as well as relationships among faculty and students, offer these guidelines for good practice. Good practice (a) encourages contact between faculty and students, (b) encourages reciprocity and cooperation among students, (c) encourages active learning, (d) gives prompt feedback, (e) emphasizes time on task, (f) communicates high expectations, and (g) respects diverse talents and ways of learning (Chickering & Gamson, 1987). There is a great deal of literature that supports the importance of the categories in the Seven Principles. We provide an overview of this work in the following paragraphs with some insights and expectations about how CMS might enhance each of these principles.

**Good practice encourages contact between students and faculty.** Faculty members who encourage contact with students in and outside the classroom are more likely to enhance student motivation, intellectual curiosity, and, perhaps, even student personal development (Astin, 1996). In addition, faculty—student contact is found to be the best predictor of performance in numerous studies (Braxton, Sullivan, & Johnson, 1997; Pascarella & Terenzini, 1991; Stage & Hossler, 2000). CMS tools, such as e-mail, clearly encourage contact between students and faculty, but this tool is not unique to CMS. Chat and discussion tools, however, are more easily integrated into the learning experience when facilitated by CMS. The platform can aid students who may be less likely to engage in a classroom discussion to interact with faculty and other students. In addition, the asynchronous nature of these tools allows for expanded contact between faculty and students, which is at the heart of this principle of good practice.

**Good practice develops reciprocity and cooperation among students.** The benefits of cooperative learning in face-to-face settings are well established (Batts et al., 2006). Working with others has been shown to increase involvement in learning, as well as productivity and self-esteem (Batts et al., 2006). Computer-facilitated learning, specifically, is shown to provide opportunities beyond those afforded by face-to-face interactions to build cognitive and social presence (Garrison, Anderson, & Archer, 2000; Shea, Pickett, & Pelz, 2003). CMS tools, such as Blackboard, provide various opportunities for students to work together. The roster tool and the groups feature provide an easy and efficient way for groups to stay connected outside the classroom, in many cases not even requiring interpersonal group meetings outside class. These groups can share documents, discuss topics, and move toward the goals of a group through the use of CMS tools. Of course, chats and discussions can also link all students in a class in the sharing of ideas to bring class concepts to life.

**Good practice encourages active learning.** Active learning creates learning experiences in which students discover and construct knowledge and solve problems (Barr & Tagg, 1995). The use of active learning has been shown to be superior to lectures in maintaining student attention and involvement (Bok, 2006) and to increase students’ retention of information and development of higher order learning skills, such as the “transfer of knowledge to new situations or measures of problem-solving, thinking, attitude change or motivation for further learning” (McKeachie, Pintrich, Lin, & Smith, 1986, p. 69). Although many assignments can be designed to encourage active learning, CMS tools help facilitate active learning by creating a platform that allows students to be engaged and take charge of their educational experience. Self-assessments and feedback, discussions and chats all require student engagement and active learning. In addition, the media library and web links provide a platform for students to share information with other students, thus creating active engagement between students.

**Good practice gives prompt feedback.** Prompt feedback has been found to accelerate and improve learning (Sadler, 1998) as well as enhance the strategies used to achieve learning goals (Nicol & MacFarlane-Dick, 2006). Students who receive prompt feedback have a clear road map for what they are doing correctly and how they can improve their work. CMS tools can make providing grade and assessment results more efficient and, in many cases, instantaneous. A grade book open to students keeps them informed at all times of their status in the course as well as providing prompt feedback on grading related to specific assignments. The discussion, chat, and e-mail tools also help provide prompt feedback to students. Rather than requiring students to wait until the next class meeting or to visit a professor in office hours, these CMS tools can be used to get feedback on questions or issues much more rapidly.

**Good practice emphasizes time on task.** Learning to effectively manage time is a critically important skill for students. By allocating realistic amounts of time, faculty can create a more effective learning environment for students. In addition, articulating the amount of time students are expected to spend on a task has been shown to facilitate time management while developing course materials and processes with high levels of engagement has been found to motivate students to spend more time on task, which can foster learning (Sorcinelli, 1991). The calendar function can be used by faculty to ensure students stay on task with deadlines and activities throughout the semester. The goals and learning modules can be used to signal expectations to students for various parts of a course, and the announcements tool can be an efficient way to remind students about deadlines or expectations. These efforts during a semester can be a much more effective way to keep students focused with time management than simply showing due dates in a syllabus and expecting students to know how to best allocate time to meet those deadlines. The use of CMS tools also makes it more efficient to collect, grade, and return assignments if faculty would like to use interim due dates on
large projects during the semester. Finally, faculty can use the CMS to help manage the length of time students are allowed to work on assignments or track how long students spend on various assignments.

**Good practice communicates high expectations.** A large body of literature demonstrates a link between achievement expectations and performance (e.g., House, 1993; Tavani & Losh, 2003). Instructors who develop challenging goals, that are also achievable, motivate students to reach for those goals. Faculty members can reiterate their expectations for a class or for specific assignments through the use of the goals tool in Blackboard. In addition, CMS provides an opportunity for faculty to easily provide students examples of exemplary work done by students in previous classes. The assignments tool can be used to provide details on what should be done to complete an assignment and, at the same time, show examples of past student work and what is expected from current students. Although bringing physical copies of outstanding work by previous students to class or having copies available in office hours is a common strategy used by faculty, it seems much more likely students will review past high-quality work at their leisure in an electronic format if it is provided to them.

**Good practice respects diverse talents and ways of learning.** “Faculty who show regard for their students’ unique interests and talents are likely to facilitate student growth and development in every sphere—academic, social, personal, and vocational” (Chickering & Gamson, 1991, p. 21). It has been proposed that it may be more important for instructors “to have an understanding of the learning process and skill in facilitating individual and group learning than subject matter skill” (Sims & Sims, 1995, p. 9). The CMS tools provide variety in comparison with the classroom experience. Whereas some students may thrive in the interpersonal setting of lecture and discussion, CMS allows for other students to shine through the use of chats and discussions or online assessments. In addition, the electronic foundation of CMS allows for the inclusion of a variety of information sources used through the media library or web links sections that might be more difficult to broadcast in a traditional classroom environment.

The preceding paragraphs establish the framework of the Seven Principles with support from previous literature. When faculty establishes a classroom environment based on the development of these Seven Principles, the outcome is likely to be the creation of an effective learning environment. In addition to the support of the Seven Principles, we provide the conventional wisdom as to why Blackboard or other CMS should be effective platforms for enhancing the Seven Principles. However, in addition to the conventional wisdom, it is critical to measure student perceptions to determine if the ultimate customer of the learning environment also feels that the use of CMS tools, in fact, enhances learning. Many studies rely on student perceptions as an indicator of effectiveness of instruction with most postsecondary institutions using these evaluations for administrative decision making (d’Apollonia & Abrams, 1997; Perry & Smart, 1997). A meta-analysis by Cohen (1981) provides evidence that students’ perceptions of the effectiveness of a course is moderately to highly correlated with students’ learning, thus offering validation for students’ perceptions as a useful source of information about the learning process variables. Student assessments of the value of CMS take on increased importance when framed with the perspective that college students today are digital natives who are generally comfortable with technology and expect it to be well integrated into their educational experience.

**Learning Styles**

The second theory on which we ground our investigation is learning styles. Because a learner-centered educational approach should meet the varied learning styles of students, it is important to identify any connections between learning styles and the perceived value of classroom-based technologies. The study of learning styles is based on the notion that each person has a predisposition to go about learning in a particular way: “Students have distinctively different learning profiles and experiences, and these affect how students respond to traditional and new technological modes of teaching” (Hunt et al., 2004, p. 75). D. A. Kolb (1981) suggests that students with similar learning styles prefer specific academic disciplines and teachers with methods of teaching that are most congruent with their learning style: “In marketing education, Web-assisted formats should be carefully considered within the curriculum because certain students may be better prepared for such learning than others” (Priluck, 2004, p. 162). One study has explored the link between learning styles and the use of instructional technologies, such as e-mail, Internet access, and Blackboard CMS. Different learning styles were not found to influence preference for instructional technologies (Young, Klemz, & Murphy, 2003). Our study builds on extant learning styles research by connecting learning styles to an in-depth analysis of one classroom technology. In this study, we connect student perceptions of CMS and learning styles to the Seven Principles of Good Practice in Undergraduate Education.

**Method**

The research was conducted at a residential AACSB-accredited business school in California. All faculty members were expected to use Blackboard CMS to manage their classes. Courses selected for participation included consumer behavior, services marketing, e-marketing and strategic marketing management. These courses were selected because of their upper division status to ensure that all participating students would have sufficient exposure to Blackboard CMS tools. This study focuses specifically on Blackboard because this is a CMS platform that is commonly used by many universities. The findings, therefore, will be applicable to a wide range of marketing faculty.
Using a paper-and-pencil survey administered in the first month of courses during the fall 2009 semester, students were asked a series of questions about 14 tools available through Blackboard’s CMS. The survey questions were single-item measures using a 7-point Likert-type scale that focused on how frequently each Blackboard tool is made available to students by faculty (endpoints tool is always available in my classes to tool is rarely or never available in my classes), how frequently students use the specific tool (endpoints I frequently use this tool to I rarely or never use this tool), and how much students like the tool (endpoints I really like using this tool to I really dislike using this tool). Although there are a wide range of tools available through CMS, the 14 included in this study were all of the tools available at the university at the time of data collection. Because the survey focused on frequency of faculty and student use as well as student perceptions, only tools that were currently being used by students and faculty were included in the study.

In addition, students were asked their agreement with a statement of the importance of each of the Seven Principles (endpoints strongly agree to strongly disagree) and with a statement that the classroom management tools help enhance each of the principles (endpoints strongly agree to strongly disagree). Because the Seven Principles relate to dynamics mainly within the classroom and interactions between students and faculty, a set of more global learning objectives (Meuter, Chapman, Toy, Wright, & McGowan, 2009) was also included.

To measure these global learning objectives, students were asked the importance of the learning objectives and if the Blackboard software, in general, helps or hinders the objectives. As with the Seven Principles questions, the questions about the six general learning objectives used end points of strongly agree to strongly disagree. The six general learning objectives included in the study are earning a better grade in class, staying interested in the topic of study during the semester, retaining knowledge long term, enhancing my educational experience outside the classroom, enhancing my educational experience inside the classroom, and learning more about the topic. Because there are no existing scales to measure these items, all the survey items were created specifically for this project and use a 7-point Likert-type scale.

Student learning styles were assessed using Kolb’s Learning Styles Inventory (Kolb & Kolb, 2005). The inventory measures learning style preferences. Responses to 12 statements indicate how each person perceives information (either concrete experience or abstract conceptualization) and processes information (either active experimentation or reflective observation). Using these categorizations to create a two-dimensional scale, participants are classified as diverger, converger, assimilator, or accommodator.

Surveys were collected from 195 business students. Most of the students were marketing majors (81%) and all were upper division students (92.5% seniors and 7.5% juniors). The average respondent was 22 years old. 53.5% of the respondents were male and 46.5% female.

Results

The data in this study revealed insights regarding how frequently students use the individual Blackboard tools, how frequently faculty offers the tools as part of the curriculum, and how much students like each tool. As shown in Table 1, the same tools rank in the top four spots in terms of how frequently faculty includes the tool in the curriculum, how much students use the tool, and how much students like using the tool. On the question of how frequently faculty includes the tool, the tools in rank order are course content (M = 6.1), announcements (M = 5.5), mail (M = 5.6), and assignments (M = 5.2). On the question of how often students use the tool, the tools in rank order are course content (M = 6.6), announcements (M = 6.0), assignments (M = 5.8), and mail (M = 5.2). On the question of how much students like using the tool, the tools in rank order are course content (M = 6.0), announcements (M = 5.9), assignments (M = 5.6), and mail (M = 5.2).

Similarly, the tools that rank in the bottom four spots on how frequently faculty incorporates the tool in their classes also hold the same rank in terms of how frequently students use the tools and how much they like using the tools. The tools that had the lowest scores for faculty use are roster (M = 3.8), chat (M = 3.1), media library (M = 2.2), and goals (M = 2.2). The tools that had the lowest scores for how frequently students use the tools are roster (M = 2.4), chat (M = 1.8), media library (M = 1.8), and goals (M = 1.6) and for how much students like using the tools, the tools are roster (M = 2.9), chat (M = 2.8), media library (M = 2.5), and goals (M = 2.2).

There are important differences worth noting in the rank ordering for those tools in the middle of the ranking order. Calendar ranks tenth (M = 3.9) for how often faculty incorporates the tool; yet it ranks seventh (M = 3.9) for frequency of student use and sixth for how much students like the tool (M = 4.7). Who’s online ranks fifth (M = 4.7) for how often faculty uses the tool, yet it ranks tenth for frequency of student use (M = 2.6) and how much students like the tool (M = 3.0).

The study also provides insight into the connection between CMS and the Seven Principles of Good Practice in Undergraduate Education with data shown in Table 2. The principles that are rated as most important to students are prompt feedback (M = 6.5) and emphasizes time on task (M = 6.4). The two least important principles, as rated by students, are communication of high expectations (M = 5.8) and cooperation among students (M = 5.6). As a point of comparison, the principles that students feel are the most enhanced through the use of Blackboard are student–faculty contact (M = 5.1) and active learning (M = 5.0). The two principles that are viewed as least helped by the use of Blackboard are...
cooperation among students ($M = 4.5$) and communication of high expectations ($M = 4.3$). Although there is consistency about the least important tools and the principles that are enhanced the least through the use of Blackboard (rated sixth and seventh out of seven for both), there is clearly a disconnect between what are the most important principles and which principles are enhanced the most with the use of Blackboard. The most important principles are “middle of the pack” in relation to Blackboard’s ability to enhance these principles (rated third and fifth out of seven).

The mean scores for how important the Seven Principles are to students range from a high of 6.5 to a low of 5.6, which is much higher than the ratings for how effective Blackboard is at enhancing these classroom dynamics, which range from a high of 5.1 to a low of 4.3. To determine if there are significant differences between the importance students place on the Seven Principles and Blackboard’s perceived effectiveness in addressing each principle, we executed a series of paired sample $t$ tests. For each pair, the mean score on the importance of the principle was significantly higher than the mean score for the student evaluations of Blackboard’s role in enhancing that principle ($p = .000$).

A similar analysis was conducted with six learning objectives and results shown in Table 3. The objectives rated as the most important are earning better grades ($M = 6.6$) and staying interested in the topic during the semester ($M = 6.5$). The least important objective is learning more in my classes ($M = 6.1$) with three others having a mean of 6.4. There

### Table 1. Student Evaluations of Individual Blackboard Tools

<table>
<thead>
<tr>
<th>Blackboard Tool</th>
<th>How Much Do You Like Using Each Blackboard Tool? (1 = Really Dislike Using Tool, 7 = Really Like Using Tool) Mean</th>
<th>SD</th>
<th>Rank Order</th>
<th>How Frequently Do You Use Each of Blackboard Tool? (1 = Rarely Use This Tool, 7 = Frequently Use This Tool) Mean</th>
<th>SD</th>
<th>Rank Order</th>
<th>How Frequently Is Each Blackboard Tool Available for Use in Your Classes? (1 = Rarely Available in My Classes, 7 = Always Available in My Classes) Mean</th>
<th>SD</th>
<th>Rank Order</th>
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</thead>
<tbody>
<tr>
<td>Course content</td>
<td>6.03 1.13 1</td>
<td></td>
<td></td>
<td>6.58 0.90 1</td>
<td></td>
<td></td>
<td>6.13 1.13 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Announcements</td>
<td>5.89 1.21 2</td>
<td></td>
<td></td>
<td>5.97 1.39 2</td>
<td></td>
<td></td>
<td>5.53 1.38 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assignments</td>
<td>5.64 1.54 3</td>
<td></td>
<td></td>
<td>5.78 1.51 3</td>
<td></td>
<td></td>
<td>5.22 1.54 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mail</td>
<td>5.17 1.83 4</td>
<td></td>
<td></td>
<td>5.22 1.83 4</td>
<td></td>
<td></td>
<td>5.64 1.48 3</td>
<td></td>
<td></td>
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<tr>
<td>Assessments</td>
<td>4.91 1.96 5</td>
<td></td>
<td></td>
<td>5.14 2.04 5</td>
<td></td>
<td></td>
<td>4.41 1.84 7</td>
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<td>Calendar</td>
<td>4.65 2.04 6</td>
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<td></td>
<td>3.88 2.10 7</td>
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<td></td>
<td>3.90 1.84 10</td>
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<tr>
<td>Learning modules</td>
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<td></td>
<td>4.80 2.01 6</td>
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<td></td>
<td>4.68 1.48 6</td>
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<td>Discussion</td>
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<td>3.39 1.94 8</td>
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<td></td>
<td>4.31 3.63 8</td>
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<td>Web links</td>
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<td>3.10 1.80 9</td>
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<td>4.25 1.67 9</td>
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<td>Who’s online</td>
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<td>2.36 1.76 11</td>
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<td>3.10 2.02 12</td>
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<td></td>
<td>1.81 1.80 12</td>
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<td></td>
<td>2.23 2.01 13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goals</td>
<td>2.23 1.90 14</td>
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<td></td>
<td>1.57 1.46 14</td>
<td></td>
<td></td>
<td>2.15 2.0 14</td>
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</tbody>
</table>

### Table 2. Student Evaluations of the Seven Principles of Good Practice in Undergraduate Education

<table>
<thead>
<tr>
<th>Principles of Good Practice in Undergraduate Education</th>
<th>Student Rating of the Importance of Each Principle (1 = Not Very Important to Me, 7 = Very Important to Me) Mean</th>
<th>SD</th>
<th>Rank Order</th>
<th>Student Perception That Blackboard Enhances Each Principle (1 = Blackboard Helps Very Little, 7 = Blackboard Helps a Lot) Mean</th>
<th>SD</th>
<th>Rank Order</th>
<th>Paired Sample t Test of Means Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good practice gives prompt feedback</td>
<td>6.50 0.90 1</td>
<td></td>
<td></td>
<td>4.94 1.38 3</td>
<td></td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>Good practice emphasizes time on task</td>
<td>6.43 0.89 2</td>
<td></td>
<td></td>
<td>4.68 1.77 5</td>
<td></td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>Good practice encourages student–faculty contact</td>
<td>6.04 1.13 3</td>
<td></td>
<td></td>
<td>5.14 1.38 1</td>
<td></td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>Good practice encourages active learning</td>
<td>5.93 1.13 4</td>
<td></td>
<td></td>
<td>5.00 1.51 2</td>
<td></td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>Good practice respects diverse talents and ways of learning</td>
<td>5.89 1.18 5</td>
<td></td>
<td></td>
<td>4.76 1.44 4</td>
<td></td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>Good practice communicates high expectations</td>
<td>5.82 1.21 6</td>
<td></td>
<td></td>
<td>4.31 1.53 7</td>
<td></td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>Good practice encourages cooperation among students</td>
<td>5.57 1.28 7</td>
<td></td>
<td></td>
<td>4.48 1.51 6</td>
<td></td>
<td></td>
<td>.000</td>
</tr>
</tbody>
</table>
Table 3. Student Evaluations of the Six General Learning Objectives

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Student Rating of the Importance of Each Learning Objective (1 = Not Very Important to Me, 7 = Very Important to Me)</th>
<th>Student Perception That Blackboard Enhances Each Learning Objective (1 = Blackboard Helps Very Little, 7 = Blackboard Helps a Lot)</th>
<th>Paired Sample t Test of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earning better grades in class</td>
<td>Mean: 6.62, SD: 0.89, Rank Order: 1</td>
<td>Mean: 4.97, SD: 1.67, Rank Order: 2</td>
<td>.000</td>
</tr>
<tr>
<td>Staying interested in the topic of study during the semester</td>
<td>Mean: 6.54, SD: 0.77, Rank Order: 2</td>
<td>Mean: 3.91, SD: 1.55, Rank Order: 6</td>
<td>.000</td>
</tr>
<tr>
<td>Retaining knowledge long term</td>
<td>Mean: 6.43, SD: 0.94, Rank Order: 3</td>
<td>Mean: 3.95, SD: 1.54, Rank Order: 5</td>
<td>.000</td>
</tr>
<tr>
<td>Enhancing my educational experience outside the classroom</td>
<td>Mean: 6.38, SD: 0.90, Rank Order: 4</td>
<td>Mean: 5.05, SD: 1.64, Rank Order: 1</td>
<td>.000</td>
</tr>
<tr>
<td>Enhancing my educational experience inside the classroom</td>
<td>Mean: 6.36, SD: 0.97, Rank Order: 5</td>
<td>Mean: 4.43, SD: 1.75, Rank Order: 4</td>
<td>.000</td>
</tr>
<tr>
<td>Learning more in my classes</td>
<td>Mean: 6.14, SD: 1.04, Rank Order: 6</td>
<td>Mean: 4.97, SD: 1.64, Rank Order: 2</td>
<td>.000</td>
</tr>
</tbody>
</table>

Discussion and Implications

Today’s technology-savvy students assume technology will be integral to their college experience (Kvavik & Handberg, 2000). Although it is critical that faculty incorporates technology to enhance the learning environment, much of the recent focus on educational technology has been aimed at using technology to more efficiently interact with a larger number of students. This study, however, directs attention toward determining whether technology creates a more effective learning environment as reflected in the Seven Principles of Good Practice in Undergraduate Education.

CMS Tool Usage and Liking

The findings demonstrate which Blackboard tools are being used most often by professors and students and which tools are most liked by students. Although some expected patterns in the data appear, the cases of inconsistency can provide valuable input for faculty designing courses using Blackboard or other CMS. For example, the student perception data show us which tools are seen as valuable to students (e.g., calendar) that are not commonly used by faculty. When students see value in a tool and desire to use it, faculty should more fully understand that tool and more deeply embed it within their courses. For those tools that are frequently available, yet less frequently used or liked (i.e., who’s online), it is apparent that the tools either are not correctly used by faculty or are simply ineffective tools. Faculty should either more fully develop the tools or perhaps discontinue their use.

Use of CMS Tools and Impact on Student Learning

Several interesting implications arise from the data relating Blackboard to the Seven Principles of Good Practice in Undergraduate Education and the six general learning objectives. First of all, it is useful to have a better understanding of
which of the Seven Principles students find most valuable. Although, we do not advocate only emphasizing those principles which students value, knowing this information can serve as a signal to faculty that there may be a need to educate students about the importance of the least valued principles. For example, since students rated “cooperation among students” as the least important of the Seven Principles, it may behoove faculty to more strongly highlight the value of this aspect of a classroom environment. In general, it is encouraging that even the least important principle still maintained a mean of 5.6, indicating that students do generally value all the Seven Principles.

Second, the striking pattern of consistently lower rankings for Blackboard’s effectiveness in relation to the importance of the Seven Principles is one that should alarm us. It is clearly evident that students find value in the Seven Principles; but the significantly lower ratings associated with assessments of how well Blackboard facilitates these principles indicate that classroom management tools, as they are currently being used, may not truly enhance student learning. It is clear that “prompt feedback” and “emphasizing time on task” are two areas that are valued by students, and Blackboard currently is not enabling these areas. Faculty should look first for ways to use Blackboard more effectively to address these two principles that students value highly. Specifically based on the data presented here, we encourage faculty to more actively use the grade book to keep students continually apprised of their grades and use various discussion-based tools (chat, e-mail, discussions) to stay in regular, close contact with students. Perhaps faculty can revise the concept of “office hours” using these tools to provide students with an opportunity to interact real time with instant feedback to questions from students. In addition, the calendar tool is one viewed positively by students but is less commonly used by faculty. Enhanced usage of this tool will address “time on task,” which is an area students perceive as one that is not enhanced through the current use of Blackboard.

In addition, we must recognize that course management tools, such as Blackboard, may not be able to adequately address all the Seven Principles. For example, we expected that “communicating high expectations” would be addressed by the “goals” tool in Blackboard. However, this is a tool rarely used by faculty or students, and is the least liked tool as rated by students. Perhaps the communication of high expectations should be emphasized through other means. Essentially, technological tools, such as Blackboard, must not be used without thought to the strategic implications of their inclusion in a class.

The Three Waves and the Creation of Engaging Learning Environments

A framework that can help provide insights into our findings is Celsi and Wolfinbarger’s (2002) three waves typology. The authors propose that faculty adoption of technology occurs in stages or “waves.” In the first wave, technology serves simply a support function for the faculty member. A Wave 1 technology improves efficiency but does not influence teaching performances or learning. An example of a Wave 1 technology is the use of a spreadsheet to record grades. In Wave 2, technology is used to replicate traditional teaching methods, such as putting syllabi online or using PowerPoint slides rather than transparencies but with “little significant behavioral or structural change in the classroom or classroom outcomes” (Celsi & Wolfinbarger, 2002, p. 65). With Wave 2, faculty uses the technology to “mirror” the activities traditionally done in the classroom. Wave 3 is the category where we see the technology having the greatest potential to create an enhanced learning environment. In this wave, technology is used to develop innovative learning situations and make learning more active, engaging, and ultimately better for students (Celsi & Wolfinbarger, 2002). In Wave 3, students and faculty work together to create the learning process. Based on our findings, it is important to reflect on which wave (or waves) of technology appear to be present in the use of CMS.

With our data we can identify the tools most commonly used by students and faculty and whether these CMS tools are those that provide incremental adjustments to teaching models previously in place (Wave 1), transfer an offline teaching function to an online environment (Wave 2), or create “a more current, active, and interactive learning environment” (Wave 3). As reported above, the tools that students indicate to be most frequently incorporated in the course management platform are course content, announcements, mail, and assignments. These are the same tools that students like using the most. Drawing on Celsi and Wolfinbarger’s (2002) definitions of the three waves, these four tools generally support the teaching function and mirror tasks previously imparted to students orally or via written documents, which categorizes them as Wave 1 and Wave 2 tools. The tools whose functional capabilities have the most potential to meet the criteria as a Wave three innovation appear to be learning modules, discussion, and web links. Student responses indicate that faculty use these tools less often than the Wave 1 and Wave 2 tools: Learning modules ranked 6th, discussion ranked 8th, and web links ranked 13th out of 14 tools. When asked their likelihood of using each of the tools, students ranked learning modules 6th, discussion 8th, and web links 12th and when asked how much they enjoyed using each tool, students ranked learning modules 7th, discussion 8th, and web links 13th.

The pattern of statistically significant differences between the importance of each of the Seven Principles and the effectiveness of Blackboard in addressing that principle may seem to indicate that faculty use of Blackboard falls short of the definition of a Wave 3 technology, where the technology creates a better learning environment. Perhaps a more accurate assessment would be achieved through a thorough investigation of each specific tool usage within Blackboard. Some of the tools...
are clearly Wave 1 (supporting), such as announcements and course content. Others could be classified as Wave 2 (mirror-ing), such as chat or discussion. The true value of Blackboard lies both in the identification and development of the critical Wave 3 tools and in aiding faculty in using Blackboard’s innovative potential to dramatically improve the classroom experience and student learning.

Faculty would benefit from positioning their use of CMS from within the three waves and Seven Principles perspectives. By asking themselves questions such as, “For what purpose am I using this technology—‘Supporting?’ ‘Mirroring?’ or ‘Actively changing how students learn?’” and “How can my use of this tool foster one or more of the Seven Principles?” faculty could enhance the potential effectiveness of the CMS tools used in their courses.

Because Wave 3 tools require more than changing the platform in which faculty and students engage, these tools are likely to be the most challenging for both faculty and students to accept and some of the slowest tools to develop. Blackboard tools used in creative or innovative ways can create that Wave 3 environment, which should be the ultimate goal and focus of classroom-based technologies. For example, discussion could move beyond a faculty-driven set of written questions with individual students providing written responses to the establishment of an open space for students and faculty to jointly construct and share knowledge. This co-created environment could be developed through video and audio interactions including the flexibility for participants to change or update comments.

Another example of how some aspects of Blackboard could become more like a Wave 3 tool is through advanced use of the web links tool. Students could use web links to access a faculty-created Wiki page placeholder, which students then would build into a living document, available to anyone with Internet access, by constructing content and editing each others’ work on a designated set of topics, such as “What are the four P’s in marketing?” or “What do we mean in marketing when we say the goal is to delight the customer?” They could use web links to access blog sites where they could compose reflective journals or evaluate marketing events and get rapid feedback from classmates and potentially the broader online community. (For an in depth analysis of other Wave 3 tools, see Granitz & Koernig, 2011.)

We suggest, in summary, that there are overarching roles that faculty and students must take for CMS to reach its potential as a learning tool. First, when developing courses, faculty must determine which, if any, of the specific tools enhance one or more of the Seven Principles. If it is determined that a tool enhances one or more principles, it should be included on the course page. Otherwise, it should not be used. It is critical that faculty “pay attention to student perceptions and address them within the contexts of their programs” (Priluck, 2004, p. 172). Furthermore, one key attribute of CMS tools is that they are collaborative (Anonymous, 2004), and collaboration requires students to be part of the integration of technology in the classroom rather than passive recipients. As our data show, students are more likely to use a tool they find stimulating and engaging. Regularly seeking student feedback of the most effective use of CMS tools will help faculty continue to improve the value of technology in the classroom.

As Celsi and Wolfinbarger (2002) contend, administrators must “be supportive of the time and resources needed for [faculty] to investigate new technologies” (p. 70). Time and resource support for the training necessary to aid faculty in effectively integrating technologies is essential. Support from technology specialists, collaboration from faculty regarding what is working well in their classes (and what is not), and training opportunities are important ways to support and assist faculty in endeavors to more effectively use technology.

Last, our findings indicate that in most instances students do not make a direct connection between using Blackboard and enhancing the Seven Principles. Faculty must ensure that students not only understand how to use these technologies to their fullest but also recognize the value of technology as a vehicle for enhancing learning.

Limitations and Future Research Directions

One limitation of this study is that it does not include all possible CMS tools. For this study, all Blackboard tools that were currently available to students and faculty at the university where the data collection was conducted were included. However, there is a wide variety of tools, such as podcasts, wikis, and course capture, which were not examined. Deeper insight might be garnered by a future comprehensive study exploring all available CMS tools.

Another limitation is that many of the scales and measures used in this study were single-item measures created specifically for this project. We were unable to find previously established scales for these measures, so future studies could focus on the scale development of measures focusing on the Seven Principles, CMS tools, or other aspects of our study.

Despite these limitations, the study does offer opportunities for future research. The research showed that some tools are better received than others and that Blackboard is more effective in relation to some of the Seven Principles than others. Extending this line of thinking, it would be valuable to determine which courses might have the most opportunity for enhancement through the use of Blackboard. For example, a comparison of Blackboard’s effectiveness across introductory courses, upper division, and graduate-level courses would be illuminating. In addition, fields of study might provide differences. For example, Blackboard may be more or less applicable to marketing courses than to accounting or management courses.

Future research can provide more insight into the issues of where and when classroom-based technologies are most
appropriate, based on the knowledge that some tools may work better than others in different situations. Additionally, pedagogy would benefit by further research into the relationship between the Seven Principles for Good Practice in Undergraduate Education and Celsi and Wolfinbarger’s (2002) three waves of technology. For example, since the three waves are rooted in innovation literature, it could be useful to determine whether a Wave 2 tool can be advanced to a Wave 3 tool via incremental innovation or whether Wave 3, by definition, requires an out-of-the-box approach to technology implementation. Finally, it was a bit surprising that we did not find differences in student learning styles and use or opinions of Blackboard. Perhaps CMS tools do an effective job at addressing needs of various learner styles and this is a direction of research to be explored in greater depth with a future study.

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