Evaluation of Brigham Young University's Blackboard Implementation and Its Effects on the Instructional Experience

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Executive Summary

Background

This evaluation of the implementation of Blackboard at Brigham Young University was conducted by the Center for Instructional Design. Seven questions, derived from interviews with stakeholders, were evaluated using surveys and interviews with instructors and students.

Findings

Evaluation Question 1

How well do faculty and students understand how to utilize Blackboard, and how can BYU better train faculty to use Blackboard effectively and creatively?

What We Learned

1. Most instructors are aware of Blackboard and know of the basic features, especially features related to efficiency. Their knowledge is not as strong about other Blackboard features.
2. Sometimes the knowledge gap is not in what features are available or how to make the features work; rather, the gap is in how to integrate the features correctly into instructors' teaching.

Evaluation Question 2

How is Blackboard being used on campus? Does usage vary? Why?

What We Learned

1. The most commonly used features are those designed to make the delivery of information from the instructor to the students more efficient. For example, course documents, email, announcements, and the gradebook.
2. In general, Blackboard is used more often in large classes.
3. Blackboard is more likely to be used in courses that have a standard, unchanging curriculum, such as survey courses and general education courses.
4. Instructors are less likely to use Blackboard for courses they teach less often.
5. Many instructors feel pressured to use, or not use, some features of Blackboard because of what they perceive students want.
6. Many instructors who use Blackboard do not actually use it themselves, electing instead to have their TA or other students set up and organize the course.

Evaluation Question 3

How stable is Blackboard? How does stability impact faculty and students?

What We Learned

1. Instability is the most critical issue for faculty and students. Many believe that the benefits from using Blackboard are not sufficient to balance the challenges they face from instability.
2. Stability problems are increasing, and most of the problems with Blackboard seem to be with the most critical features, such as being able to access a Blackboard site and safely recording quiz

scores.

3. When Blackboard is unstable, it can damage student/teacher relationships and student perceptions of a course.
4. Faculty and students use Blackboard less because of stability problems.
5. Besides stability issues, faculty and students also feel that Blackboard functions too slowly, decreasing the positive gains from using the tool.

Evaluation Question 4

Do faculty and students like using Blackboard? Why, and for what purposes?

What We Learned

1. Most students enjoy using Blackboard, and they prefer that instructors use the tool.
2. Instructors may not be completely satisfied with Blackboard, but they generally do not want BYU to consider adopting a new tool.

Evaluation Question 5

Does Blackboard save time and increase efficiency?

What We Learned

1. When used correctly and when it is stable, Blackboard can make many methods of teaching and learning more convenient and efficient.
2. Using Blackboard can help organize a class for a teacher.
3. Using Blackboard can save in-class time, allowing more time for other activities.
4. Using Blackboard, or similar tools, can improve feedback about grades to students.

Evaluation Question 6

Is the way Blackboard is used by faculty enhancing student learning?

What We Learned

1. Blackboard can effectively improve teacher-centered instruction.
2. Blackboard is not as effective in supporting constructivist, student-centered approaches.

Evaluation Question 7

What are the experiences of instructors as they are persuaded to use the tool, and work to integrate it into their teaching?

What We Learned

Instructors typically begin to use Blackboard by experimenting with one or two features that they have heard about from their colleagues. They struggle with learning the technical aspects of how to make the features work, as well as the integration aspects of how to use the features in their regular practices. In time, they grow more familiar with the features and often try adapting the features to fit their contexts. Eventually, they consider whether the Blackboard features they have tried are useful for them and decide to either embrace the Blackboard system, reduce their use of Blackboard, or reject Blackboard completely and seek other tools to support their online instruction.

Introduction

Why this Evaluation?

Brigham Young University has invested significant resources into purchasing and supporting Blackboard, a course management system (CMS) designed to assist instructors and students. The majority of faculty and students on campus now use this technology to varying degrees, and supporting its use on campus is an important goal of the Center for Instructional Design (CID). CID's purpose is to work with university departments and faculty members to improve teaching and learning. Because the Blackboard usage in BYU classes has become widespread, affecting nearly every department on campus, it has become imperative to evaluate the effects this technology is having on teaching and learning, as well as how BYU can improve the integration of Blackboard and other educational technologies.

Who Conducted this Evaluation?

Greg Waddoups, associate director and evaluation supervisor of the Center for Instructional Design, supervised this evaluation. Richard West, evaluation assistant, and Meghan Kennedy, instructional design consultant, collaborated with Waddoups to develop the methodology for this evaluation, as well as to collect and analyze the data and report the results.

When Was this Evaluation Conducted?

The evaluators administered surveys during Fall and Winter semesters of 2004-2005. They collected most of the interview data January, 2004, through May, 2005. Analysis of the data began during data collection and continued through July, 2005.

Where Was this Evaluation Conducted?

The team conducted this evaluation at Brigham Young University in Provo, Utah, collecting data from faculty, students, and administrators representing all 13 BYU colleges, in a total of at least 28 departments.

What Was Evaluated?

Instructors at BYU use many Blackboard features. Some of these features provide support for course management and teacher/student efficiency (grading, posting of course documents, etc). Other features are pedagogical tools, usually for improving communication/collaboration in the class (discussion board, virtual classroom, group pages, etc.). All of these features are included in the description of the evaluand (the object being evaluated), and through stakeholder analysis, the evaluators determined that the stakeholders were interested in learning how BYU uses and supports all of the features.

Evaluation Background

Blackboard Inc. began in 1997, when two education consultants, Matthew Pittinsky and Michael Chasen, joined forces with a student-faculty team at Cornell University that developed software for scalable online education ("About Blackboard," 2005). That merger created a product that is now one of the most popular products in a category of software applications called course management systems (CMSs). What is a CMS? The definition varies. For example, one author defined a CMS as a "comprehensive software package that supports some or all aspects of course preparation, delivery, communication, participation and interaction and allows these aspects to be accessible via a network" (Collis & de Boer, 2004). For these authors, a CMS is an efficiency tool, designed to help a professor prepare and deliver instruction more efficiently. John Meerts, on the other hand, described a CMS as simply a way to help teachers lacking Web design skills to easily create a Web accompaniment to their courses (2003). Other educational writers argue that CMS tools can actually improve students' learning. For example, Thomas Pollack (2003) defined a CMS as "a technology tool that supports and enhances the learning process" (p. 5). Many other instructors, administrators, and educational researchers define CMS tools as something in between—a tool that can support some kinds of learning and provide some efficiency benefits.

Blackboard has grown rapidly in recent years to become one of the two largest companies in the CMS market (WebCT is the other). Each of these CMSs claims over 2,000 different academic institutions as customers (Pollack, 2003; Arnone, 2002). Besides Blackboard and WebCT, there are several other CMS companies, including Desire2Learn, eCollege, and Jenzabar. There are also many open-source or freely distributed CMS products, such as the Manhattan Virtual Classroom Project, Sakai, OpenCourseWare (developed by Utah State University) and a popular open-source alternative called Moodle. Finally, several universities have developed their own CMS systems; these include Penn State (Angel) and Indiana University (Oncourse). Web sites such as Edutools (http://www.edutools.info/course/productinfo/) provide lists of many of the most popular CMS products available.

At one time, commercial CMS products were relatively affordable, and institutions found it much more beneficial to purchase one than to develop their own system. However, in recent years Blackboard and WebCT have both raised their prices dramatically. While the open-source and free alternatives to Blackboard and WebCT might appear to be a much cheaper option, some, including Meerts, 2003, have predicted that any possible benefit would be small because of the cost of installing, training, and supporting the free software. In addition, home-grown systems come with their own set of problems (Olsen, 2001).

The rising cost of purchasing or supporting a CMS has become a problem for many institutions, especially because, for many, going without a CMS is not a realistic option. "Course management systems are likely to become as commonplace as email and the web. No institution of higher education will be able to do without either an open source or commercial version of the software," Meerts argues. Already 95% of colleges and universities are employing a CMS (Pollack, 2003), and Young

(2002) reports that the CMS is now a "fixture" on many campuses, claiming, "CMSs have become mission critical systems for many institutions." This leaves many institutions scrambling to find the most effective—and affordable—tool for their e-learning (instruction via the internet) support needs.

When considering the cost of purchasing and maintaining a CMS on campus, institutions often want to know what benefits a CMS offers. Several small studies have found that using CMSs in specific types of courses yields positive effects. These studies reported that using a CMS can help improve communication and collaboration in a course (Hutchins, 2001; Anderson, 2003; Pollack, 2003); increase student preparation for class and improve the quality of in-class time (Massimo, 2003); enhance class lectures and feedback to students about grades (Morgan, 2003); give students greater access to materials (Yip, 2004); and improve learning in other ways (Klecker, 2002). However, other studies have found no significant difference comparing the grades of students using a CMS and students who did not (Vessell, 2001), and that the benefits of using a CMS can be counter-balanced by many flaws in the software which cause slowness or instability (Dutton, Cheong, & Park, 2004).

Unfortunately, few published studies have adequately examined the big picture by evaluating the institutional impact of integrating a CMS. Institutions have adopted CMS tools at a significantly faster rate than most educational technologies, which makes the relative lack of published studies assessing the impact of using CMSs surprising. This evaluation is BYU's attempt to reflect on our implementation of Blackboard, evaluate its implementation and use, and determine the benefits and disadvantages of using the technology.

Based on principles from Patton (1997) about utilization-focused evaluation, we identified key stakeholders, ascertained what they cared about, determined their criteria for evaluating what they cared about, and identified evaluation questions based on those factors. These evaluation questions guided the data collection and analysis methods.

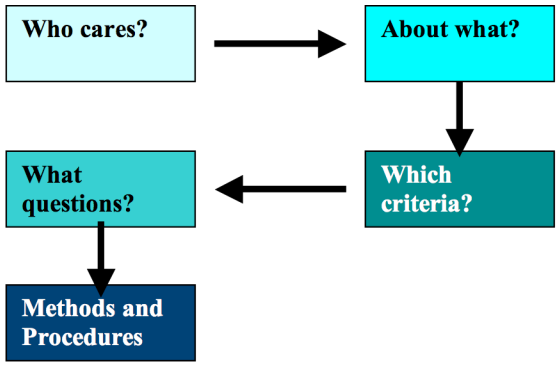


Figure 1. Patton's Utilization-Focused Evaluation model.

Stakeholder Analysis & Evaluation Questions

We interviewed each stakeholder, or representatives of a stakeholder group, to learn the questions they wanted the evaluation to answer. We continued this dialogue through emails, a mid-evaluation report, and personal conversations (see Appendix A for details of the stakeholder analysis). We synthesized stakeholder concerns into the following list of seven questions to guide this evaluation:

1. How well do instructors and students understand how to use Blackboard, and how can BYU better train faculty to use Blackboard effectively and creatively?
2. Do instructors and students like using Blackboard? Why, and for what purposes?
3. How is Blackboard used on campus? Does usage vary? Why?
4. Does Blackboard save time and increase efficiency for faculty and/or students?
5. Are the ways instructors are using Blackboard enhancing student learning?
6. How stable is Blackboard? How does its stability impact instructors and students?
7. What are the instructors' experiences as they decide to use Blackboard and integrate it into their teaching?

Data Collection Methods

We used both quantitative and qualitative methods to answer the seven evaluation questions. This evaluation combines the findings from semester surveys (n=124 instructors; 163 students), personal interviews (n=53 instructors), and a review of the calls reporting Blackboard problems to the Instructional Media Center, a technology support center associated with the CID. The surveys included both closed and open-ended questions, and the interviews followed a semi-structured, exploratory format. (More detail about the methodology of this evaluation is available in Appendix B.) We analyzed the data using an inductive approach to looking for themes within the domains identified by stakeholders (see Appendix B and C for details about the standards we used to ensure the quality of the data collection and analysis).

Findings

This report presents the findings from this evaluation in two sections. In the first section, we provide a thematic description of the findings relevant to evaluation questions 1-6. In the second section, we provide a model (Faculty Implementation Cycle) to answer the seventh evaluation question. This model attempts to describe the typical experiences that instructors have as they learn, adopt, and integrate Blackboard into their courses. This section gives a holistic view of what happens with, and to, instructors who use Blackboard. Many of the themes in the first section are elements of the instructors' experiences, as the Faculty Implementation Cycle shows.

Thematic Analysis of Faculty and Student Blackboard Use

The thematic analysis focuses on instructors' knowledge and use of Blackboard, as well as Blackboard's overall impact on learning and instructional efficiency at BYU.

Evaluation Question 1

> *How well do faculty and students understand how to use Blackboard, and how can BYU better train faculty to use Blackboard effectively and creatively?*

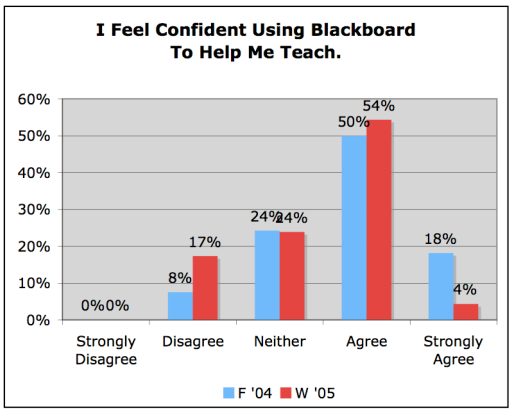
Disseminating knowledge about a new technology is critical to its successful adoption and implementation. Rogers (2003) explains that there are three types of knowledge needed for effective adoption of a new technology: First, awareness knowledge, or understanding that the tool exists; second, how-to knowledge, which we describe as technical knowledge in this report; and third, principles knowledge, which includes understanding the underlying principles of a tool or idea. This third level of knowledge is important for instructors to effectively integrate Blackboard into their teaching; they must know when and how to use the tool with particular teaching strategies to achieve the best results.

Overall, this evaluation found that most BYU instructors are aware of Blackboard and several of its more popular features. However, most instructors do have as strong of an understanding of principles for effectively integrating Blackboard into their instruction, and this limits how effectively they can improve their practices.

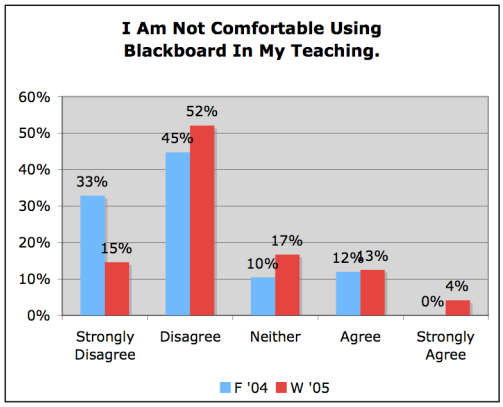
> Finding: *Most instructors are aware of Blackboard and know some of the basic features, especially features related to efficiency. Their knowledge is not as deep about other Blackboard features.*

Overall, most instructors know about Blackboard, and feel confident in their knowledge of how to use Blackboard if they choose to (see Graphs 1-4). Only 17% of faculty respondents to the Winter surveys and 12% from the Fall surveys indicated they were not comfortable using Blackboard in their teaching. Also, 60% of Winter semester faculty respondents and 63% from Fall semester felt that it was easy to understand how to use Blackboard.

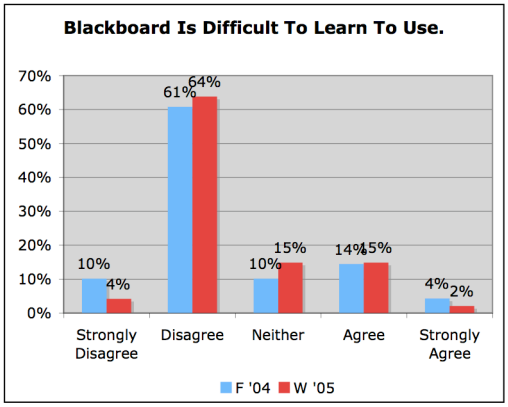
Graph 1



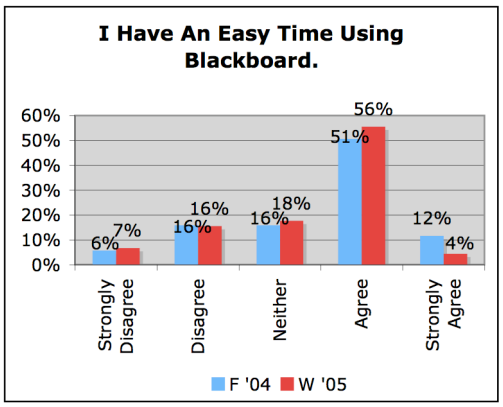
Graph 2



Graph 3



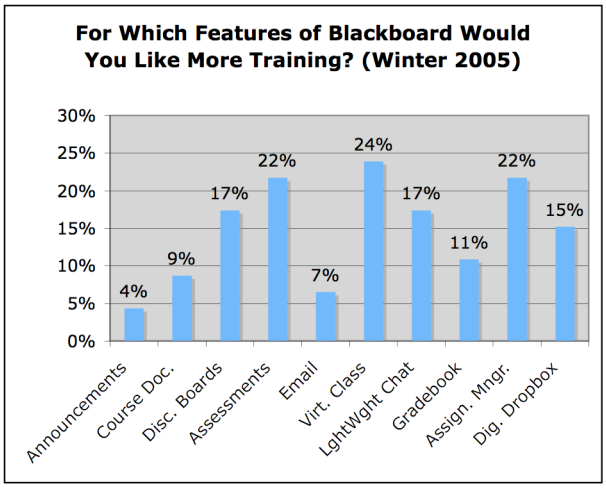
Graph 4



Graphs 1-4. How easy, overall, instructors feel it is to use Blackboard, and how comfortable they feel using the tool.

However, most of the time, faculty knowledge and understanding of Blackboard focuses on only four features: 1) announcements, 2) posting course materials to Blackboard, 3) email, and 4) the grade-book. These were the features that faculty used much more frequently than others, and in interviews with instructors, we found that this was often because many were not aware of the other features available, and if they were aware, they were not sure how to use them (see information under Evaluation Question 2 below). These four features are also the ones for which instructors were least likely to request more training (see Graph 5), while instructors are more likely to request training for assessment and synchronous chatting features.

Graph 5



Graph 5 (left) shows the areas where instructors would like to receive more training

Based on instructor interviews, we found that instructors used the four most popular Blackboard features (announcements, email, gradebook, and course documents) to make teaching and learning more efficient. Most instructors identified Blackboard simply as a tool for efficiency, however, and were often unaware of features designed to improve learning. Other times instructors indicated that they knew about a feature, and perhaps even knew how to make it work, but that they did not know how best to integrate the feature into their practices. The gap was not in technical knowledge, but integration knowledge. We will discuss this trend in more detail later in this report where we elaborate on the integration learning challenges faculty face when implementing Blackboard.

Evaluation Question 2

How is Blackboard being used on campus? Does usage vary? Why?

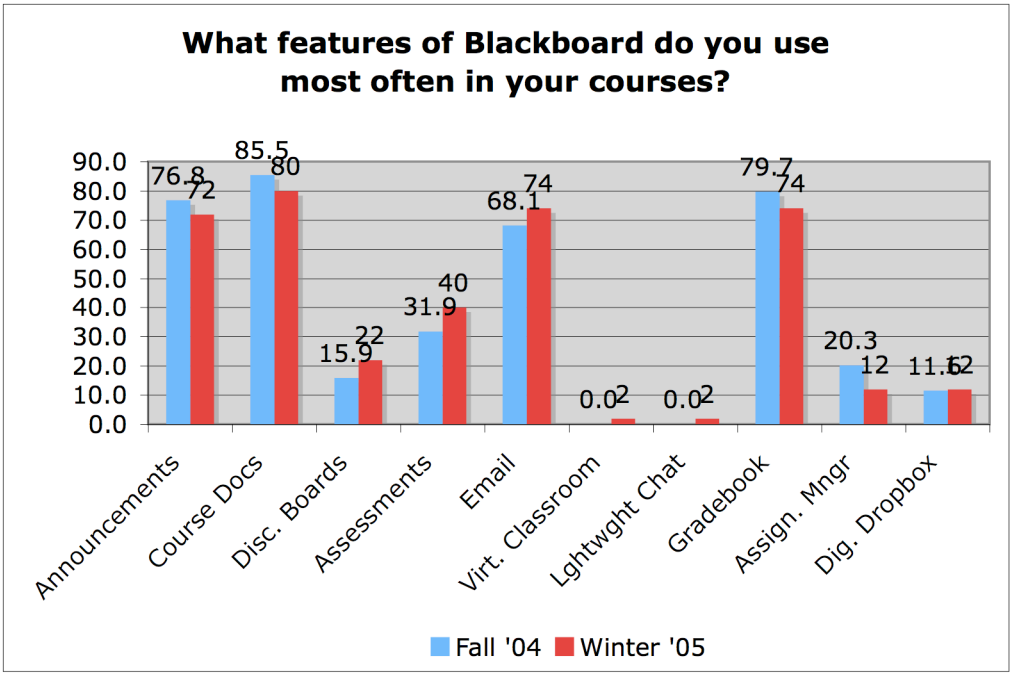
While a very high percentage of instructors use Blackboard, many of them use only a small percentage of Blackboard's potential features. The features they most frequently use are those with which they are technically most familiar, and also most familiar with how to integrate into their classroom practices. This supports the argument that BYU needs to improve knowledge about Blackboard among its instructors.

Finding: *The most commonly used features are those designed to make the delivery of information from the instructor to the students more efficient. For example, course documents, email, announcements, and the gradebook*

The most popular features used by instructors are the course documents/class assignments, email, announcements, and the gradebook. As indicated below (Graph 6), these were the only features consistently used by more than 68% of the faculty sample. The features used least are those designed to improve discussion and interaction in the classes, along with the features designed to assist in collecting student homework.

Graph 6

Graph 6



Graph 6. The most commonly used Blackboard features on campus, as reported by instructors.

The commonality among all of the features that instructors consistently used is that they make the transfer of information more efficient and convenient from the professor to the students, in the form of documents, announcements, or even grades (because most faculty do not use Blackboard's gradebook feature to actually calculate grades, but only to communicate scores to students). It appears that instructors ignored other features designed to assist in different methods of teaching.

> **Finding:** *In general, instructors of large classes use Blackboard more often because they perceive the efficiency gains to be greater.*

Through our interviews, we learned that instructors feel there is a greater benefit in using Blackboard to manage large classes than small ones, and often instructors who use Blackboard for larger courses do not use it for smaller courses, because they feel that they can "manage" the smaller courses more easily with just email. Typical comments about this theme included: "Of course, with our numbers being so small, we don't have a big rush or big need to use it"; "The class has been small enough in the past that I just haven't used it"; and "We're the graduate program … so we deal with small numbers, we don't deal with large numbers like they do in the undergraduate program [and that's why we don't use Blackboard]."

One professor who exemplified this trend had never used Blackboard until he was asked to teach the department's large general-education course of 200 students. He then felt that Blackboard was his best option for communicating with students about their scores on tests and homework. He began using Blackboard only for the gradebook feature, before experimenting with some of the other features with mixed results. In the end, this professor concluded he would probably continue to use Black-

board for the large courses, but he did not feel it worthwhile to use Blackboard for the other courses he teaches.

> **Finding:** *Instructors are more likely to use Blackboard in courses that have a standard, unchanging curriculum, such as survey courses and general-education courses.*

Several departments use Blackboard to ensure standard instructional content every semester, even though different professors may teach the same course. This was usually the case with survey or general-education courses offered every semester with little variability. In these situations, one instructor creates a Blackboard course, uploads materials, and establishes the assignments and quizzes, and other instructors copy the Blackboard site every semester when they teach the course. For example, one professor who supervised an introductory course found Blackboard very helpful for maintaining the consistency of the educational experience across different teachers. She said, "The class gets put up on Blackboard, the questions remain the same, the quizzes are the same so that we know that the information is consistent from professor to professor. Then within the lecture, you're free to go where you want, to tailor it how you want it, but Blackboard is going to keep it consistent." She said that using Blackboard in this way was so convenient that they decided to do the same thing with two other introductory courses so that "any faculty that rotates in can go, 'Oh, it's already set up, and I can lecture [about] what I want, but the class is consistent.'"

> **Finding:** *Instructors are less likely to use Blackboard for courses they teach less often.*

Because most instructors view Blackboard as mainly an efficiency tool, they are not as likely to use it for courses that they do not teach very often. This is because they do not believe the benefit from using Blackboard will outweigh the time and energy costs of setting it up and learning how to integrate it into one course. For example, an instructor who had not used Blackboard previously considered using it in the future during our interview. He remarked that the following semester he would be teaching a course for the first, and perhaps only, time, and so he did not feel Blackboard would provide enough efficiency gains. "This seems like a lot of work and this graduate class only comes up every two years, and I don't know if I'll even be teaching it in two years," he said.

> **Finding:** *Many instructors feel pressured to use, or not use, some features of Blackboard because of what they perceive students want.*

Many instructors feel that students pressure them to use Blackboard, or to use some features of Blackboard. About half of the instructors we interviewed indicated that they felt some pressure from students about Blackboard. One professor said, "I think there's a level of expectation now, that the students have, and I think even the professors have. . . . Students (these days) are much more visually oriented than before." Another professor noted that he felt that students now perceive Blackboard as a requirement, not an option. "Whereas a few years ago it was more of a bonus, not it's becoming more like microwave ovens." One instructor said that some of the concern is about not appearing to

be old-fashioned: "Now there's kind of this pressure, not so much from the faculty but from the students that if you don't use it you're a geek. The students will complain; it's my sense that students have expectations about technology. I get that more hearing them criticize other professors."

As Blackboard becomes more ubiquitous on campus, student expectations make it difficult for instructors to not use features—even if they feel the features are not useful for teaching and learning. One professor described in detail how difficult it is to make pedagogically appropriate decision about different Blackboard features when there is student pressure to use the tool. He does not feel that it is always useful in his class to post quotes or lecture slides on Blackboard because he wants students to take careful notes that require their own thinking while synthesizing the discussion, rather than allowing them to simply review material on the internet before an exam. However, he said that, "If Blackboard has 10 features, and they are all stable, and four of them I like and six of them I don't, I've found you get pressure from people to use the other six. So if I'm in class and I say, here's a quote from Elder Harold B. Lee, a young woman raises her hand and says, 'Can you put that on Blackboard?' Well, if I'm using Blackboard, it's awfully hard to say, yeah, I can, but I don't believe it [is good instruction], and they all think, 'Good grief.'" As result of this and similar experiences, this professor has discontinued using Blackboard altogether.

> Finding: *Many instructors who use Blackboard do not actually use it themselves, electing instead to have their TA or other students set up and organize the course.*

It is difficult to completely define how many instructors "use" Blackboard, because while they may have Blackboard courses listed under their names, some do not actually create or maintain the courses. Rather, they let their TAs run the online portion of class. This is fairly common because instructors are more likely to use Blackboard in large courses, large courses often have TAs, and TAs usually are involved in grading, distributing documents, and other tasks that instructors usually associate with Blackboard.

> Finding: *Reasons why instructors do not use Blackboard*

Some instructors do not use Blackboard, or some parts of Blackboard, because:

1. They feel some features are poorly designed and/or difficult to learn/use
2. The names of some Blackboard features are not intuitive, leaving instructors unsure what the feature is and less likely to experiment with it
3. They are not aware (24% of the survey respondents indicated this) of the free training available through CID
4. They feel learning to use Blackboard, or other educational technologies, is a low priority because of pressure to publish and handle other teaching/administrative concerns
5. They are in the habit of using familiar methods/tools, and they are comfortable with the way they have always done things
6. They have low technology skills and/or self-efficacy

7. They distrust digital technologies and do not believe they can be stable and/or useful
8. Many Blackboard features are "not flexible" and are difficult to innovate with or adapt to unique instructional contexts.

Many of these were reasons cited by only a few instructors, and further research would be needed to determine how widespread these situations are.

Finding: *Students do not use Blackboard materials as often as instructors expect.*

Many instructors are disappointed to learn that many of their students rarely use the resources posted on Blackboard. In one example, an instructor said she posted the syllabus on Blackboard, expecting students would download it so she would not have to print copies. When nobody did this, she ended up printing off copies for everyone anyway. Instructors have also found that without monitoring, students do not use the discussion board. As one instructor said, he was surprised because he thought that "students would move right to the internet and continue [the discussion], but they don't." He concluded, "I guess students really do check out when they walk out the door. I guess I thought and hoped that students would want to communicate more. I think their lives are so segmented that once they pass the door, they really have to start thinking of the next class."

Through interviews, students indicated that they do not usually check Blackboard unless they know there is a reason to (for example, to review for a test, take a quiz, or download homework). They also indicated that because Blackboard is often slow, unstable, and requires multiple logins (if you count logging into Route Y), they are less motivated to check their Blackboard courses. One professor who has had success in encouraging students to use many of his online activities said that it is important to give students a strong reason to go to Blackboard, if using the resources on Blackboard is, in fact, a goal of the instructor. Once they are there, they are more likely to stay and use other features. "I think if you stick things up and it's something you have to sign on because there's an extra exercise, then they probably won't use it," this instructor said. "But because they are getting an entire lesson through Blackboard, and they are going to have a test that does count at the end of the lesson, those exercises that don't count that are embedded within the lesson are seen as necessary by the students because it gives them a clue to what they are going to be tested on in the end, so they see the benefit."

Evaluation Question 3

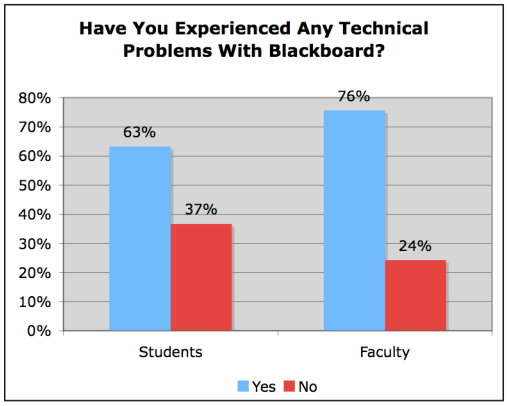
How stable is Blackboard? How does its stability affect faculty and students?

Blackboard's stability has been inadequate, and students and faculty have grown increasingly frustrated with the technical glitches and failures. This results in lower usage numbers and less confidence in the tool. The lack of software stability has also negatively affected efficiency, which for most instructors is the main or only reason why they use Blackboard in the first place. The stability of Blackboard at BYU has become a critical issue, and the university must resolve these stability issues.

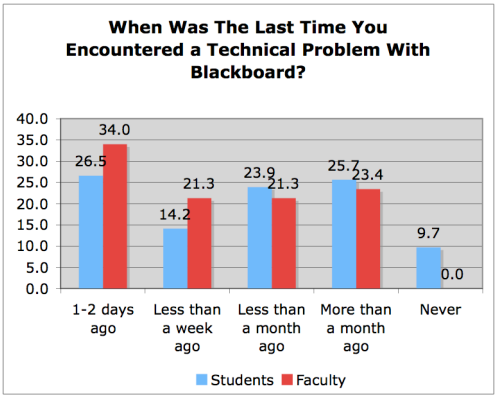
Finding: *Instability is the most critical issue for faculty and students. Many believe that the benefits from using Blackboard are not sufficient to balance the challenges they face from system instability.*

Instability and technical issues are part of the Blackboard experience for most instructors and students on campus, and the problem seems to be getting worse. In Fall 2005, 76% of instructors said they had experienced technical problems with Blackboard, but this jumped to a full 100% of Winter respondents. In Winter semester, over half of the instructors indicated they had encountered technical problems in the previous week. Students seemed slightly less likely to have difficulties with Blackboard, with 63% in Fall semester indicating they had had technical problems, but this number also jumped in Winter semester—to 90% of students encountering problems, and 41% having had problems in the previous week. See Graphs 7 and 8 for full details.

Graph 7



Graph 8



Graphs 7 and 8. The graph on the left represents the number of students/instructors who had technical problems with Blackboard leading up to fall semester of 2004. The next semester (Winter 2005), the question on the survey was changed to ask when *they had encountered their last problem.*

Many instructors and students like Blackboard, but they strongly agree that the instability problems have to stop. In interviews with students, their most common answer to the question about whether they like Blackboard was, "Yes, when it works." Following are some example quotes illustrating students' feelings:

- "I find Blackboard frustrating for the most part. It is terminally slow and often causes problems. Sometimes I wonder if the solutions really outweigh the problems."
- "If we rely on something that isn't dependable, students stress over not being able to prepare or meet the demands of the professors. At a crucial time when Blackboard isn't working, students are at the mercy of the professors. Some—though they are few—have no mercy."
- "I can't believe how many problems I have had with the email service. … I tell them [teacher or TA] that I sent it, but sometimes I wonder if they think I am being dishonest with them"
- "Blackboard is down most of the time or the features I need to use are not working. I have never had a good experience with Blackboard since it was started."

Instructors also felt that stability was the most critical issue related to Blackboard. One professor said,

"How do I know something's not going to crash and lose everything for me? That would be disastrous." Another instructor complained that because of stability problems, he had to spend time trying to resolve technical issues: "They [the students] may not know what they are doing, but now all of a sudden I am a computer support guy, and I have to walk them through how to find [locked-out quizzes] on Blackboard."

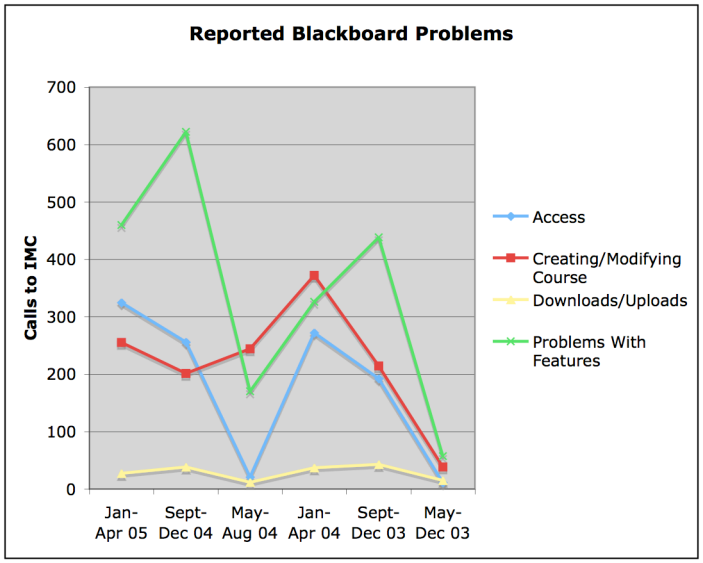
Sometimes, it was hard for instructors and students to know whether a technical problem was due to Blackboard, or some other BYU service. For example, one instructor said, "As of right now, I'm a pretty big fan of Blackboard, but my biggest problem . . . is the beginning of semesters . . . and also at the end of semesters. This applies to AIM; it applies to Blackboard. . . . BYU has a way of making everyone absolutely dependent on technology and then abandoning us at the most crucial times. It drives me insane." A few professors recognized that not all of the technical problems commonly associated with Blackboard really are the fault of the Blackboard technology. However, they cautioned that when BYU chooses to integrate Blackboard with its other systems, such as the library, Route Y, etc., when those other systems go down, Blackboard can become an easy target for angry students and faculty members.

> Finding: *The most common stability problems with Blackboard are with critical features, such as access, course creation, and assessment.*

The Instructional Media Center (IMC) is the technical support center to resolve calls from instructors and students about Blackboard technical problems. When IMC employees receive these calls, they record the date of the incident as well as the general problem category. For this evaluation, we looked at the IMC incident logs for four types of Blackboard problems: 1) access issues, where a student or instructor was not able to log in or access some part of Blackboard; 2) problems with setting up a course or copying course material from a previous course; 3) problems with uploading or downloading material from Blackboard, including grades; and 4) problems with specific Blackboard features.

Over the last two years, there has been an increase in the number of Blackboard problems reported (comparing Fall 2004 with Fall 2005, and so on) in all areas except uploading/downloading issues. This is logical, because Blackboard usage has also grown. In Winter semester 2005, there were 1,067 problems reported, down slightly from the 1,117 reported Fall semester 2004, but up from the 1,007 problems reported in Winter 2004 (see Graph 9). The increase in problems associated with specific features of Blackboard (such as the quiz or email features) has been the most dramatic.

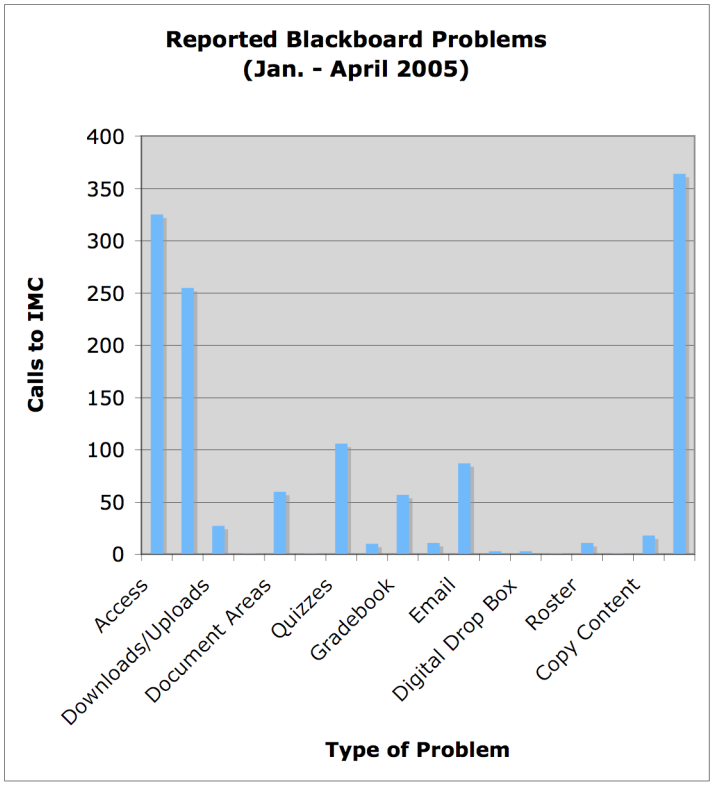
Graph 9



Graph 9. The number of problems reported to the IMC about Blackboard for the past six semesters. The number of problems drop during the summers, but this is expected because there are fewer courses taught during these times. Otherwise, the number of problems reported has risen, especially problems with specific features, with more problems typically reported during Fall semesters.

However, not all Blackboard problems are the same in how they affect a course. For example, there is a dramatic difference between losing quiz scores and not being able to access the calendar feature. Unfortunately, most of the problems with Blackboard seem to be with the most critical features, such as accessing Blackboard and safely recording quiz scores. In Winter semester 2005, for example, there were 325 calls about access problems, 255 calls about struggles to create or set up a course, and 106 calls about problems with the assessment features. Together, these critical areas of concern for faculty and students accounted for over 60% of the calls to the IMC (see Graph 10).

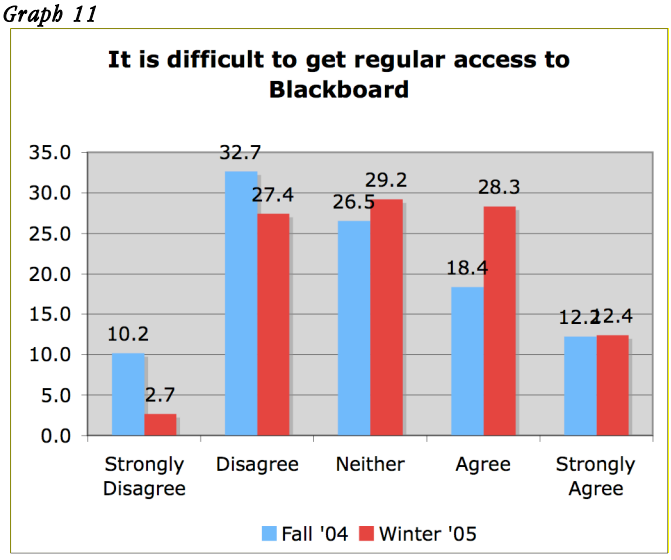
Graph 10



Graph 10. The number of problems by category reported to the IMC in the most recent academic semester (Winter 2005).

Students indicated that logging into Blackboard is a problem, and they sometimes need to log in multiple times before they can access a course. This discourages them from accessing Blackboard except when the instructor requires it. Forty-one percent of the students participating in the Winter surveys indicated difficulty with regular access to Blackboard, up from 31% of students from fall surveys (see Graph 11).

Graph 11



Graph 11. Many students, though not a majority, feel it is difficult to get regular access to Blackboard.

Finding: *Blackboard's instability can damage student/teacher relationships and students' perceptions of a course.*

Blackboard instability is not simply inconvenient for the instructor and students; it can also damage instructor/student relationships and the students' perceptions of the instructor's effectiveness—even though the instructor might not be able to prevent the instability problems. For example, one instructor, the week before we interviewed him, had attempted to use Blackboard to administer an online test in his course. When the system lost 25% of his students' scores, students were frustrated and angry that they had to take the test over again. The instructor explained that he felt powerless to stop the problems associated with this quiz, and all he could do is apologize and ask students to retake the quiz on paper. He also had problems the same semester with Blackboard not delivering three critical emails to his students. Blackboard does not inform an instructor when the emails are not delivered, so he was not aware that some students did not receive the emails—which made the situation worse.

This instructor said that the bitter feelings arising from these situations had permanently damaged his credibility with the students, and that he was sure he would be penalized in the student ratings—even though it was not his fault. "Whatever teacher ratings I would get this semester, Blackboard will take 1/2 a point off. It looks like it works great, but there are glitches," he said. Even though it was Blackboard that lost the quizzes and emails, he felt the blame also rubbed off on him and damaged how the students perceived him as a teacher. He said that he felt students were thinking, "What an idiot. Why didn't you know Blackboard's got problems?" He was also frustrated because he felt that the support staff did not understand how severe the problem was and were too casual in their attempts to provide help. "I don't think the techies over there understand how a technical problem can destroy anything good that's happened in the classroom." He then went on to explain that even though he would like to use Blackboard and feels it would be very useful for him, if there are technical problems, he will be very unmotivated to use the tool. "It's made me think I need to go back to the Stone Age and use hard copies. Then if I lose something, I'VE lost it."

Finding: *Faculty and students use Blackboard less because of stability problems*

With Blackboard's instability problems, instructors are growing more cautious about using the tool and are using it less. As one instructor explained, "That makes me nervous. It's like, 'Will my old car start when I turn the key?' feeling too often. You should just be able to climb right in and turn the key and not worry about it. . . . I'm not as anxious to redesign stuff or change class presentations to move them up to Blackboard because of that."

Because instructors have to take extra time to ensure that instability problems do not affect them, they lose potential efficiency gains. For example, it is common for instructors to send emails and post announcements about the same class assignment, just to make certain that students who did not get the email could still get the announcement. Other instructors have boycotted Blackboard's email

function, choosing instead to email students through Route Y. Here are some of the quotes from instructors explaining how instability made them less likely to use Blackboard:

- "I have thought about giving quizzes through Blackboard, but I have not done that. And I have heard from other people that they've had some problems with it, and since the paper version works so well [I won't use online quizzes]."
- "I can think of a lot of ways I can spend an afternoon other than fiddling around with Blackboard, which I don't think is that essential anyway. I'm very pragmatic when it comes to technology, if it's something that will help me to get something done quicker or more conveniently, then great, otherwise, it's not worth my time."
- "In the undergraduate program we have had students go in and try to take tests, and there's been problems with the testing, and the whole thing doesn't make you excited [to use the tool]."
- "It's creating a little more work for me and the TAs."

"I don't know if I have the necessary learning curve time to make that work because when I've tried to make it work in groups and in the gradebook, it's frustrated me, so I go ok, forget it I'm not going to do this, I don't have time."

- "I don't trust using the (Blackboard) grading program."
- "I have thought about giving quizzes through Blackboard, but I have not done that. And I have heard from other people that they've had some problems with it."
- "Maybe if I were going to do the exact same thing every semester, maybe, logically you would think, it'd be easier to use Blackboard. But for me it'd be the same frustrations every semester. . . . That's the kind of stuff for me that adds to my workload."

> Finding: *Faculty and students also are concerned that Blackboard functions too slowly and requires multiple logins.*

Many students and instructors mentioned frustrations about Blackboard being slow. Because Blackboard is sometimes slow, some instructors said the tool made them less efficient, and they questioned whether they should even use it. For example, one instructor wanted to use the online quiz feature to save precious class time. However, it took "five to 10 hours" to create a 40-question quiz because her quizzes rely heavily on photographs, which can take time to upload to Blackboard. Other instructors commented that Blackboard was especially slow when dealing with photographs, video clips, or the gradebook. Students feel that Blackboard responds poorly and is slow when they try to log in and access their Blackboard courses, and they are frustrated that after logging into Route Y, they must take the time again to log in if they want to access their Blackboard courses.

Evaluation Question 4

Do faculty and students like using Blackboard? Why, and for what purposes?

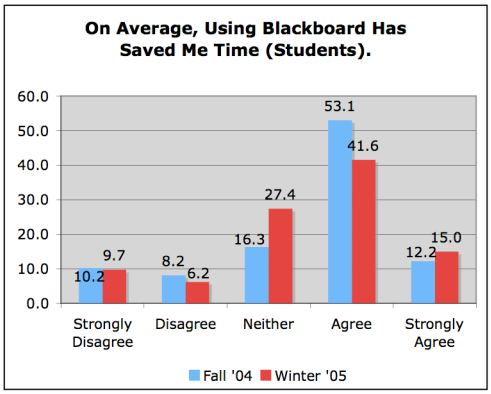
Faculty and student satisfaction with Blackboard, overall, has been good; they seem particularly pleased with Blackboard as an efficiency and communication tool. The poor stability and perform-

ance problems, however, have decreased satisfaction.

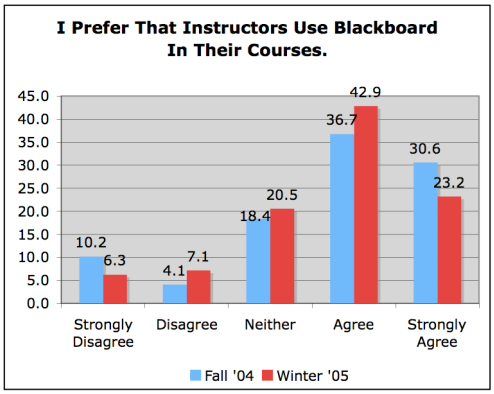
Finding: *Most students enjoy using Blackboard, and prefer that instructors use the tool.*

When Blackboard works without technical difficulties, most students are satisfied with it because it is convenient to use, easy to learn, and helpful in their studies. In Winter 2005, 57% of the students surveyed felt that using Blackboard helped them save time. Sixty-six percent preferred that their instructors use the tool, and 73.5% said it was easy to use Blackboard. The responses from the Fall 2004 surveys, as well as from brief, personal interviews with 29 students, correlated with and supported these results. (See Graphs 12-14.)

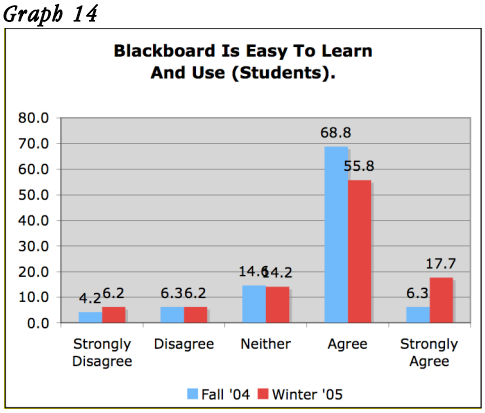
Graph 12



Graph 13



Graph 14

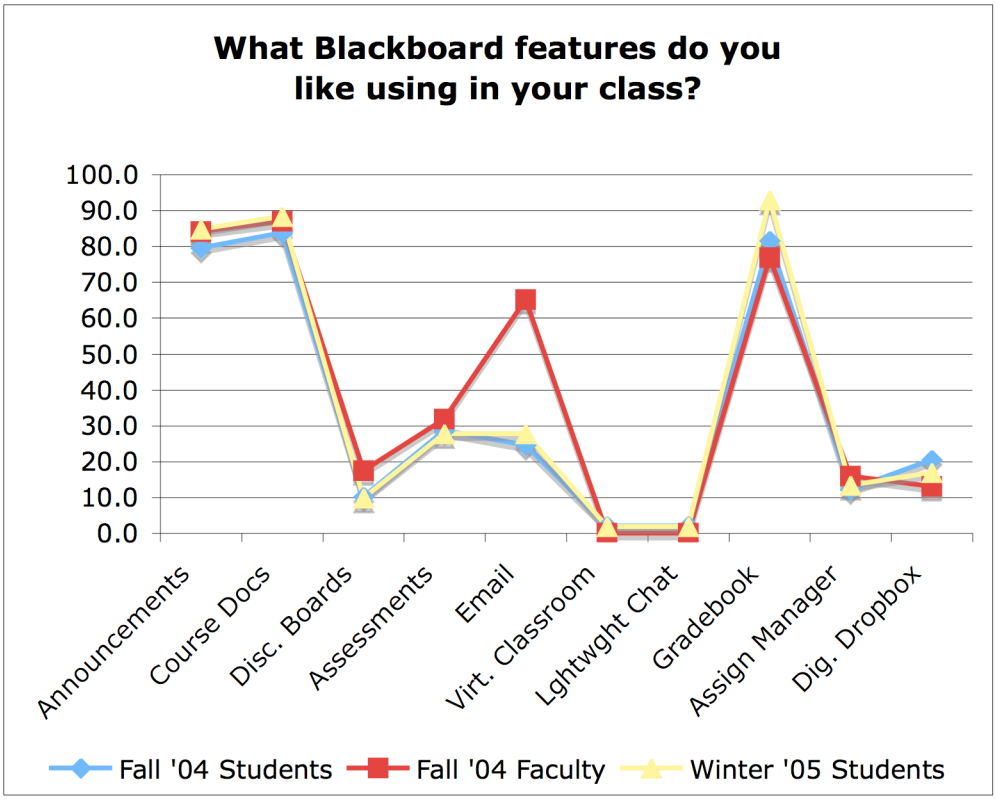


Finding: *The most popular features, those with which students and faculty are most satisfied, are course documents, announcements, and the gradebook.*

Students and faculty are most satisfied with the ability to post materials (documents/assignments), post/view announcements, and use the gradebook in Blackboard. However, these are also the features that faculty and students understand the best and are the most likely to use, so their satisfaction with these features may be due in part to how accustomed they have grown to using these aspects of Blackboard (see Graph 15.

Graph 15.

Graph 15

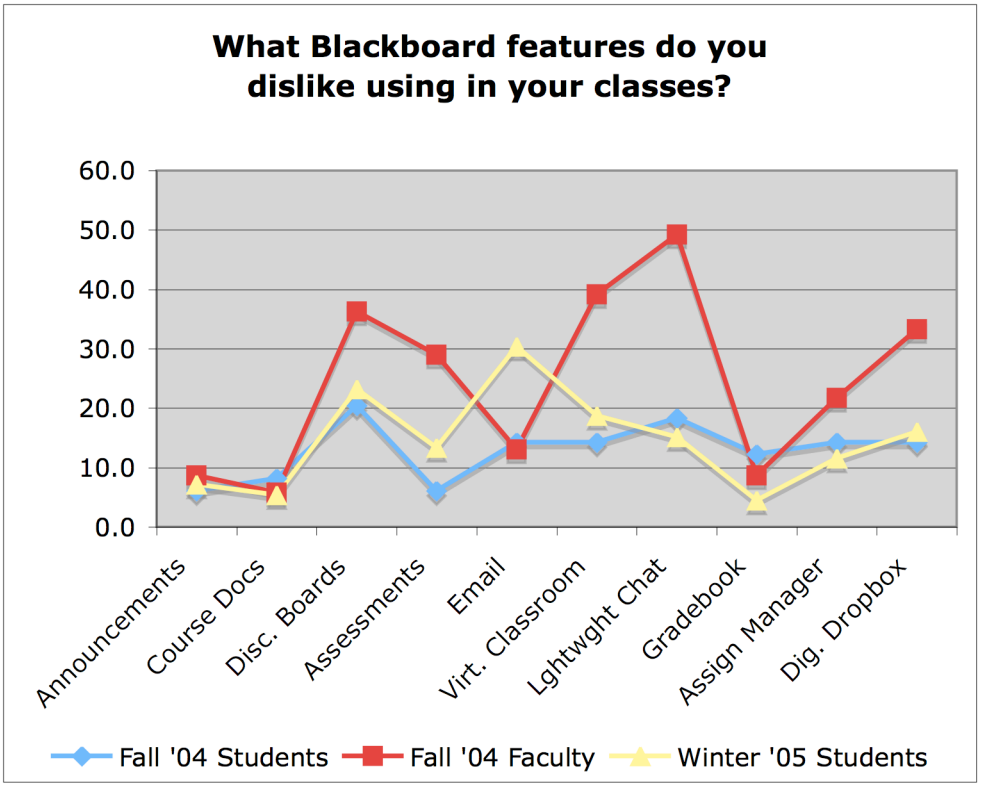


Graph 15. Which Blackboard features students and faculty like using—a question that was not asked of faculty member during Winter 2005. Faculty and students agree on which features they like to use, except that instructors are more satisfied with the email feature than are students.

The most unpopular Blackboard features are the synchronous chatting features, and this is probably because this feature is difficult to use and most instructors do not know how to integrate the chatting feature effectively. Some professors indicated they would like to use these features more if they worked better. For example, one instructor said that "My only disappointment was that we could never figure out how the virtual classroom was supposed to work or if it worked at all. I would have enjoyed trying out that option with a few of my lesson plans." Other instructors said they would like to do more distance learning in their departments if Blackboard's collaboration tools were "robust" enough to handle this. Students, in general, were more tolerant and reported less dissatisfaction with Blackboard features. However, there was a sharp increase in dissatisfaction with the email feature in Winter 2005, probably due to the increase in emails being lost during that semester.

Graph 16.

Graph 16



Graph 16. Which Blackboard features students and faculty do not like using—a question asked only during winter semester of 2005. Instructors report more dissatisfaction in general than do students.

Finding: *Instructors may not be completely satisfied with Blackboard, but they generally do not want BYU to consider adopting a new tool.*

Usually, instructors are not completely satisfied with Blackboard, liking it overall, but disliking some of its characteristics. For example, an instructor noted, "I've used Blackboard for three years now. Some aspects I really appreciate, and other aspects I have grown to dislike intensely." However, even though Blackboard is not a perfect tool for most people, most instructors are very nervous about the possibility that BYU might leave Blackboard for another CMS option. The professors who feel this way are usually the ones who have adapted Blackboard to meet their needs and have grown more and more reliant on it, despite its faults.

Many faculty members feel that once they have entered all of their instructional materials into Blackboard, they do not want to have to "do the work all over again" to create courses using another tool. One instructor expressed this feeling: "If we get rid of Blackboard, it would be discouraging. ...You don't want to do this but once in a lifetime. I've put hours and hours of busy work into it. I'd like to be able to use it next year." Somebody else remarked, "It dramatically reduces the effectiveness of the tool [to change to a new tool]. The purpose of the tool as I understand it is to save time and effort; but every time you update it, you redo everybody's effort. Please don't do that."

Usually, these instructors believe that it would be better to try and address Blackboard's problems and

to fix some of the difficulties (mostly technical issues) rather than go through the learning curve with an unfamiliar tool. For example, one instructor who studies technological trends said, "I think there's something to be said with having an interface, even if it's flawed, and sticking with it because people find ways to work with the tools they have. But if you constantly change the tools or constantly change the interface, then people become discouraged, and even if it is an improvement, you have to retrain to figure out how to do those things."

> Finding: *Instructors would like Blackboard to develop or adapt some aspects of the software.*

There are several features or attributes that instructors would like Blackboard to provide. The most popular items that instructors would like to see changed about Blackboard are:

1. *Fewer layers.* There are too many layers and too many "clicks" to get into the tool and to move around within it. It is often slow, so the more layers, the longer it takes to accomplish a task.
2. *Ability for one Blackboard section to interact with other sections.* Instructors would like to have students collaborate across Blackboard sections, and they would also like to manage multiple sections from one portal. For example, an instructor may want to keep the gradebook separate and unique for each section, but combine the announcements for all of the courses s/he teaches.
2. *Better ability to add guests to a course.* Currently, instructors can add guests to a Blackboard course only if they are BYU students or instructors. They would like to be able to add non-BYU people as visiting experts, non-graded participants, or even just observers.
2. *More flexibility/ability to customize features.* Instructors want to be able to adapt features, move things around, and otherwise configure Blackboard so it is easier to use. A few would also like the ability to use a Web page design tool, such as Dreamweaver, to create a page or activity that they could add to Blackboard.
2. *More robust gradebook.* Many instructors are frustrated with Blackboard's gradebook because it takes a long time to load and use in courses with many students, and because they cannot customize it to meet their needs (as they can with a spreadsheet program). For example, in Blackboard's gradebook, you cannot create formulas to drop the lowest quiz score and you cannot grade group work by entering one score for all group participants.
2. *Support for more file types/better handling of multimedia.* Some instructors would like Blackboard to more easily handle video, audio, and pictures. They claim the tool is too slow with these kinds of media, and that they have a limited amount of storage space available. Instructors sometimes said that Blackboard was not as useful for them because it did not handle file formats unique to their field of specialty.
2. *Easier-to-use chatting features.* Instructors who have used Blackboard's chatting features said it does not handle synchronous chatting very well. Consequently, they usually turn to other tools, such as MSN Messenger.

Evaluation Question 5

> *Does Blackboard save time and increase efficiency?*

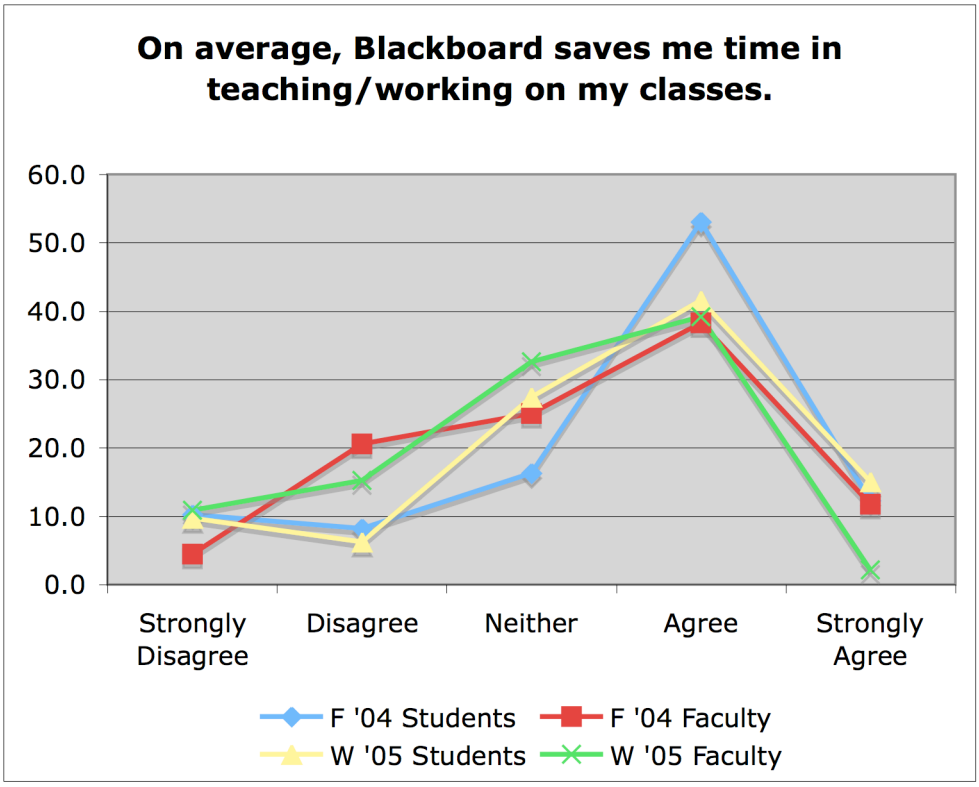
When it is stable and working, most instructors and students feel that Blackboard makes some as-

pects of the instructional/learning experience more convenient, efficient, and easier, while also saving them time with many tasks. However, these efficiency benefits quickly disappear when Blackboard is unstable or unreasonably slow, or when instructors utilize less effective methods.

Finding: *When used correctly and when it is stable, Blackboard makes teaching and learning more convenient and is a time-saving tool*

The majority of instructors felt that Blackboard saved them in-class and out-of-class time and made teaching more convenient (see Graph 17). When instructors combined the tool with good pedagogy, the majority of students shared these feelings (see Graph 17 and 18). However, this was not as strong a majority opinion as we expected, probably because the tool is often unstable, and because instructors sometimes do not use Blackboard as effectively as they could.

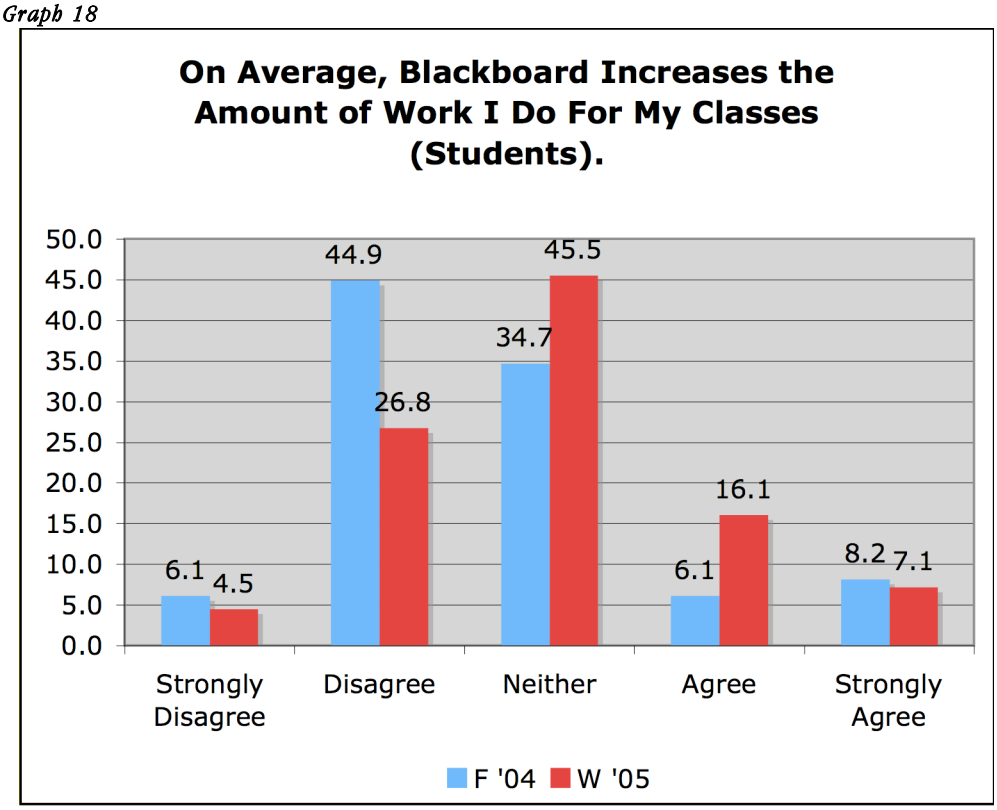
Graph 17



Graph 17. A comparison of students' and instructors' opinions of whether using Blackboard saves them time. Most agree that Blackboard saves them time to some degree.

Graph 18.

Graph 18



Graph 18. Students' opinions on whether using Blackboard increases their course workload.

Instructors and students commonly feel that Blackboard saves time in the distribution of class materials. As one instructor said, "I don't have to worry about creating a packet or publishing a textbook or creating a lengthy syllabus and pass[ing] out paperwork all during the semester. It's a major convenience for me." Many instructors commented that they used to employ other methods for posting materials online but have found Blackboard to be much easier. "In the past when I was posting something to the [school] website, it seemed it was a little more cumbersome," one instructor said. "Blackboard is so easy. You just click, click, click. It's so easy."

Another benefit of having course materials online is that instructors can update the documents electronically (without reprinting them) and direct students to the newest versions. As this same professor noted, "You change it once and have it readily available." Another instructor agreed and said, "The potential for me is that I can change it once in one place and not have to pass out 30 papers . . . and so I can just tell the students, 'Okay, I've updated the assignment,' and tell them in one place and broadcast an email message."

However, there are some concerns for students and instructors. One of these is that some instructors change materials online, do not notify the students of the change, but still expect students to have downloaded the materials. This means that some students are not aware of changes to the syllabus or the assignments, especially those students who do not work week-by-week but who download all of the materials at the beginning, or even before, the semester begins, and do not revisit Blackboard during the semester. As one student explained, "Sometimes teachers use Blackboard as an excuse to

make last minute assignment changes. Then when the student doesn't hear about the change they say, 'Well, I posted it on Blackboard.' . . . Unlike email, Blackboard does not notify you when a change has been made. Students who don't have Internet access at home are put at a disadvantage if they don't check Blackboard multiple times a day."

Another problem occurs when instructors say they will post things on Blackboard, then forget to do it, so students waste time checking Blackboard repeatedly. One instructor recognized this and said, "I'll say, 'Oh, I'll post this on Blackboard.' If it's not there within three hours, I'll get emails, [saying] 'I was looking on Blackboard trying to find the things.' I have to be very careful what I tell them I'm going to use Blackboard for." A student confirmed this problem: "Teachers haven't posted what they say is up. So it becomes a major hassle trying to track them down."

A common practice—which some instructors felt was beneficial—is to use Blackboard to keep students "connected" to the course. When a student misses class, they can find the materials they need online, including the lecture slides. Some instructors felt this increased students' sense connection to a course. It also means that students do not need to contact the professor about a missed day in class, which saves the professor's time. As one instructor said, 'If you're not in class for some reason, . . . I can just say, look on Blackboard. . . . In the past before I used Blackboard, there are 325 students in the class, I could get 25 emails that said, 'I wasn't in class, my wife had a baby,' and I'd have to send them out their question individually. And now they . . . can communicate [with] me about important things instead of where the focus question is." Another instructor agreed: "I think it alleviates some students from coming to me because they are able to access the information."

However, using Blackboard to help students who miss class has had some negative effects as well, and there is some evidence that it often encourages students to miss class. A few professors raised this concern, while student interviews and surveys show that many do believe that missing class is not as much of a problem if the course uses Blackboard. In fact, some students like Blackboard and would like professors to use it *because* it lets them miss class. As one student said, when asked if she liked Blackboard, "It tells me stuff if I don't go to class." Another student said, "I read it, because if I miss class, I need to."

Despite the support for the claim that Blackboard can make some things easier for instructors and students, most participants in this evaluation felt that these benefits hinged on Blackboard's stability. Comments such as "When it works—and I stress "when"—it makes things so much easier" were common. Most comments that Blackboard decreased efficiency actually said that it did not always work. In summary, Blackboard can enhance efficiency for students and instructors, but it has to work more reliably than it has in the past.

Finding: *Some methods for using Blackboard are less efficient or convenient.*

Some instructors commented that many common methods of using Blackboard can actually decrease efficiency. We have mentioned a couple of these already (for example, using Blackboard can increase the number of students skipping class; instructors wasting students' time by failing to post

promised material). Following are other examples of ineffective Blackboard use that can increase faculty or student workload.

1. *Homework creep*. Instructors sometimes have a tendency to post extra homework on Blackboard without realizing they are increasing the workload. Homework creep includes assigning additional assignments through Blackboard that the instructor would not assign in class, or posting of extra, unessential readings that some students may think are required.

2. *Too much access to instructors.* Many instructors and students appreciate Blackboard's ability to make communication more convenient; however, students may abuse the privilege, sapping instructor time because it is so easy to send questions to the instructor through Blackboard. This may explain instructors' hesitancy to use discussion boards and virtual chatting. For example, one instructor refuses to use discussion boards for question-and-answer forums because he feels that if students have to come by his office, they will ask only important questions. These visits also become teaching moments, as he teaches students how to find the answers. Another instructor shared this concern: "If you make things too easy, in terms of just typing off an email to somebody, they tend to ask questions they already have the answers to, and that wastes everybody's time."

3. *Using Blackboard for one required feature.* Another potential problem occurs when instructors use only one or a few Blackboard features, but require students to visit the course site. This frustrates students who have to spend the time logging into Blackboard for something that may seem unnecessary to them. For example, one student commented, "It seems like many professors use just one part of Blackboard [e.g. posting grades], but they don't use the others [e.g. announcements, etc.] That means we have to go all the way into Blackboard just to use that one feature."

4. *Poor organization within Blackboard.* Students express frustration because instructors use Blackboard differently, posting materials in the "wrong" folders (e.g. posting assignments in the "course documents" area). One student said, "It is very difficult to find what I am looking for because each teacher puts things in different places and I have to click through so many links looking for it." This is probably not so much an issue of every instructor needing to use Blackboard exactly the same way as much as recognizing the responsibility of instructors to be clear with their students about where they will post materials, and to be consistent with this method.

5. *Using Blackboard to dodge instructor responsibility.* One instructor admitted that using Blackboard has made him a "sloppier" teacher because he knows that all his materials will be on Blackboard, so he does not check his materials and prepare for class each day. Another faculty member agreed that instructors can use Blackboard's announcement feature as a crutch for changing due dates or expectations for assignments. "If I do have Blackboard, I can be sloppier," he said.

Finding: *Using Blackboard can help to organize a class.*

Instructors have effectively used Blackboard as an organizational tool. For example, in courses with multiple labs, Blackboard is a useful tool for organizing the different lab sections, as well as for monitoring the TA activity in the different sections. Even in one-section courses, instructors have found that Blackboard helps them organize their instruction because they have an online place dedicated solely to that course. Instructors often post weekly quizzes, assignments, or instructional modules, which helps them pace their teaching because everybody is aware of the schedule for the class. Students also recognize Blackboard's effect on organization: "It allows (and makes) professors be

more organized. For the class that doesn't use Blackboard, I am often confused at what material I should know, assignments, etc."

Finding: *Using Blackboard can save in-class time, allowing more time for other activities.*

Instructors indicate that using Blackboard helps them conserve in-class time. They spend less time on class announcements, in-class quizzes, distributing class material, and answering questions that they could answer online. In addition, instructors commonly use an in-class quiz to check the students' reading comprehension; with Blackboard, they can administer the quizzes online before class begins, saving 10-15 minutes of class time.

Most instructors use the extra in-class time to extend the activities they normally do anyway. So, for example, they can conduct longer, more in-depth discussions, or spend more time lecturing. However, a few instructors reported that they found Blackboard effective for disseminating lecture content out of class and that they now can use in-class time for application activities instead. One instructor said, "It frees us up immensely, and we have a lot more time to do group work." A language instructor was excited because, "It allows more time in class for exercises that allow students to do group work, to actually speak French, to discuss. So I am no longer a content delivery system; I become a facilitator for class discussion." A few courses have also eliminated some in-class meeting times, directing students to complete online assignments and interact through Blackboard instead of face-to-face.

Finding: *Using Blackboard, or similar tools, improves feedback about grades to students.*

Using the gradebook to communicate assignment and test scores to students has had positive results. This is more efficient and convenient than paper-based or spreadsheet-based gradebooks, especially in large classes. However, some instructors have reported that other commercial grading programs are easier to use and more efficient than Blackboard's.

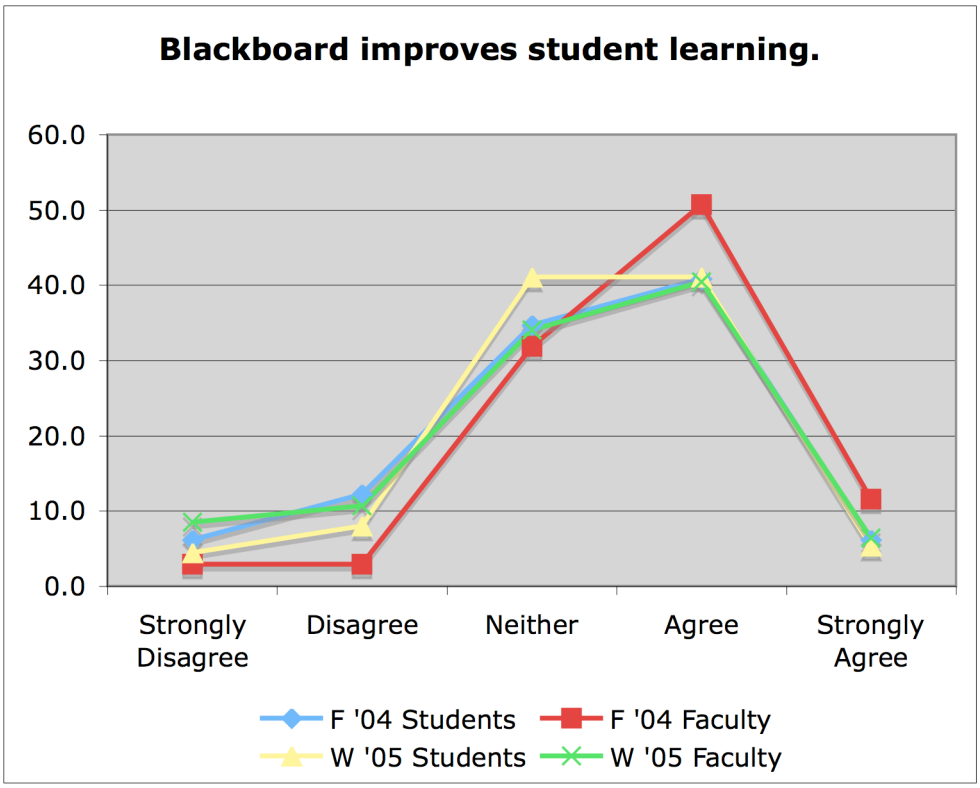
Instructors who use Blackboard or similar tools to communicate scores to students find that there are fewer disagreements about mistakes because the students are more aware of their standing in the course at all times. One instructor said, "It's a good way to keep track of grades, and make the students responsible for their own grades so that they can look, and if I haven't recorded something, it's their job to call me. . . . It saves time at the end of the semester so you don't get a whole bunch of students saying, 'C+? I thought I had a B.'" Another instructor commented that "Now it's all there, you can see everything, and if there's an error they can become the ones that are in charge of making sure the right grades are posted." Besides averting disagreements about grades, using Blackboard gives students prompt feedback about their assignments, which can help them regulate their learning and improve their performance.

Evaluation Question 6

Is the way instructors are using Blackboard enhancing student learning?

Blackboard appears to be a powerful tool for supporting some, but not all, types of instructional strategies and learning outcomes. Many instructors and students feel that using Blackboard has a positive effect on learning outcomes. For example, 47% of instructors in winter semester (62% fall semester) felt Blackboard improved student learning, compared with 19% (13%) who felt it did not. (See Graph 19.) However, Blackboard does not meet all needs; therefore, some instructors feel that they must find, adopt, implement, and support an alternative online tool.

Graph 19



Graph 19. Most faculty for both semesters and students in winter semester felt that Blackboard either improved learning or had no effect.

Finding: *Blackboard is effectively used at BYU as a tool for supporting teacher-centered instruction.*

Through interviews, we learned that most of the instructors who feel that using Blackboard positively effects learning also predominantly use a teacher-centered approach to instruction. Most instructors recognize this fact, and they described Blackboard as "an information dispersion tool" or "communication" tool, a medium to facilitate the transfer of information, documents, and assignments from the instructor to the students. Examples of how they use Blackboard to support teacher-centered instruction include:

1. *Access to materials.* Blackboard makes it easy to post and retrieve most kinds of instructional materials. Access to documents was the top feature ranked by students for improving their learning experience. One student commented, "The ability to download lecture notes and course materials from any location at any time is a huge advantage. This has helped me with exam preparation, and also [with] completing my assignments." One instructor supported this idea, saying, "They have access to it, of course, so when they don't understand something, or they want to review something, they can go back to it as many times as they want to," while another noted, "I think one of the biggest things that helps the learning thing is having my lectures online so they can pull them down and review or else they can get it if they miss the class, and that's huge."

   A positive side effect of using Blackboard is that instructors have to digitize their material to post it to Blackboard. From there, students can download it to palm pilots, laptops, and key drives, so have all the class materials for easy retrieval and studying.

   The potential to use Blackboard to transfer materials is not limited to Word documents and PowerPoint files (though that is what instructors often post). Instructors can also post multimedia resources. For example, a music professor uses Blackboard to disperse his own recordings of pieces of music so students can practice conducting. A German professor uses Blackboard as a sharable filing cabinet for pictures of German artwork. A French instructor posts recordings of French speakers reading the assigned articles. An instructor in the college of Health and Human Performance records his students performing physical skills and posts the video clips.

2. *Improved note taking during lectures.* Integrating Blackboard closely with PowerPoint is a popular technique. In fact, many professors would refer to Blackboard when they were really talking about how they used PowerPoint—to most professors, using them together comes naturally. This is not surprising, since PowerPoint is also a predominant avenue for dispersing information in teacher-centered pedagogy. Many instructors felt that using PowerPoint slides instead of overheads and posting these slides on Blackboard for students to preview or review improved student learning. Usually the instructor posts slides before class so students can download them and refer them during the lecture. Most instructors feel that this lets the students listen and participate in the lecture more effectively because they do not worry about taking detailed notes. Some also mentioned that they can cover material more quickly this way than they could before. Statements from professors who have felt that this has been beneficial include:

   - "We discovered that if we print out in a packet all of the PowerPoint images and slides, it really does help the students take notes, and virtually all of the students will bring their PowerPoint packets to class and use it to take notes with because it organizes their notes and focuses their attention, and that's been a helpful thing."
   - "I think in indirect ways it probably does [improve learning]. Them being able to get a copy of exactly what I presented in class and go back through it and not having to worry about writing everything down . . . and being able to concentrate on what I'm saying and the concepts rather than trying to transcribe what I put on the board."
   - "[They] no longer [have] to take notes furiously about everything I am saying, but rather, they can go back and look and know that everything they have to know for a test is there, and then the class time is used to elaborate, respond to questions, have debates in French, and do all kinds of other activities. So it's been really great for that."
   - "I use a lot of PowerPoint in my classes and I can provide that to my students before class starts, and they can print it out and bring it with them and take notes, and I think that facilitates learning."

- "It's interesting because I can get through a lecture now 30% faster because I don't have to write it all out on the board. . . . I can get through the material so I can get to discussion and application, which is really nice."
- "I think it's allowed a little more freedom in the classroom for students to ask questions and not feel they're going to miss something while they're writing it down."
- "With freshman, it's helpful to get them away from a Pavlovian response to everything you see on the board, you need to write down, so I tell them everything you see on the board you do not need to write down because it's going to be on the web, so you just write down notes to yourself about bridges between what you see on the board and what you need to complete your understanding."

Some participants in this evaluation noted that using Blackboard was especially beneficial for international students so they could download PowerPoint slides and other materials and follow along during the in-class lectures and discussions.

3. *Just-in-time preparation for teaching.* A few instructors mentioned that they felt using Blackboard could help them prepare for "just-in-time" instruction, tailoring the day's lecture or class activity to meet the students' needs. One of the instructors who has successfully employed this method explained it this way:

- "Part of what I'm trying to do is to get the students to come to class prepared so we can have better class discussions, so I'll have pre-class assignments with a quiz that are due an hour before class, and I'll use that bulk to give students a chance to self-assess how well they know the material. And . . . often I will shape the discussion and the learning activities we have in class on a quiz that I got just the hour before, and I'll say, 'Boy they didn't get this one, let's spend some time on that.' . . . For the large classes especially, you want to gauge them, it's easy to sit in the back of the room and get lost, but if they're seeing their answer come up and we're talking about something they just addressed themselves, and they've had a personal connection to it, they seem to be much more involved, their questions are better. . . . So I call that just-in-time teaching, and that's worked pretty well . . . I've seen some significant and measurable gains in student understanding."

Finding: *Using Blackboard for constructivist, student-centered approaches is difficult.*

Many of the instructors who do not feel that Blackboard helps them prefer more hands-on, exploratory, or student-centered approaches to instruction. When these instructors do use Blackboard, they use it minimally—only to disperse information such as grade reports, for example. Because Blackboard does not support information collection, and their instruction focuses more on student-generated knowledge, these instructors often feel that Blackboard's benefits do not outweigh its costs. They do not depend on it and would not object if BYU discontinued using it. (See Appendix D for an example case study of an instructor who struggled to use Blackboard to support student-centered, collaborative types of learning environments.)

We found at least two reasons why Blackboard's design promotes teacher-centered instruction:

1. *The control structures in Blackboard are available only to the instructor*. Students cannot regulate their learning because they have no control over the Blackboard course setup. For example, only the instructor can begin a discussion forum; post material to Blackboard outside of the discussion board; organize groups within Blackboard for studying or homework support; create and add modules, websites, or other items; and

finally, quiz class members, receive homework, or offer feedback/give scores on homework. In student-centered learning environments, students take active roles in one or all of these areas, which Blackboard does not let them do.

Another difficulty is that exploratory learning often requires exploring beyond the bounds of a single course, but Blackboard has only limited methods for involving outside guests, mentors, or materials. Asking an instructor to use Blackboard for student-centered learning activities is like asking her to create student-centered activities in a classroom where all of the chairs are bolted to the floor, facing the instructor. Instructors who try to use Blackboard for these purposes are often frustrated and eventually discontinue using the tool and seek other online resources.

2. *Adapting Blackboard is much more difficult for instructors who prefer student-centered pedagogy.* Effectively implementing Blackboard often depends on the instructors' ability to adapt Blackboard to fit their situations and needs. However, many instructors expressed frustration that Blackboard is not very "flexible" or easily adaptable, and most features only work in the manner that they were originally designed. Some instructors have tried to adapt Blackboard by using the discussion boards as places where students could post materials for the class, share documents, and offer feedback. Another instructor made every student in the course a TA so they would all have access to Blackboard's control structures. Another possible adaptation option is for instructors to create general, all-purpose discussion forums where students can then create their own threads—each thread becoming, in a sense, its own forum. However, these are all weak adaptations, and using the discussion board for encouraging student exploration yields poor results. Instead of attempting to adapt Blackboard, instructors often seek other methods and technologies that let students regulate their own learning.

Finding: *If not careful, instructors can allow Blackboard to replace good teaching.*

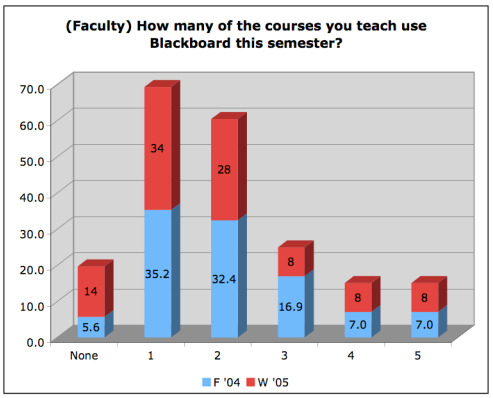
We found that using Blackboard can actually be counterproductive to learning, especially when instructors use the tool to off-load their own teaching responsibilities. Several students commented that instructors use Blackboard to decrease the time they spend attending to student concerns, answering questions, or even teaching material. For example, students complained:

- "It is really frustrating when teachers post assignments on Blackboard and ASSUME that their students are checking it daily. Some students only have one teacher who uses Blackboard and thus do not have any reason to be checking it daily. They seem to take advantage of technology to compensate for their poor scheduling and foresight."
- "Some professors will not teach what is on Blackboard. If you have a question, it will not be answered quickly. They direct everything to Blackboard. It's their response."
- "They just say that it's on Blackboard, so they take away our opportunity for clarification and discussion."
- "Usually my teachers avoid much work and quality time with students by using online services. You watch PowerPoint slides on Blackboard only to find out that the next day the instructor will not talk about it and just give you an assessment quiz."
- "Teachers stop teaching certain things in class and let Blackboard teach. I like it more when teachers teach everything and let Blackboard simply enhance their teaching."
- "Sometimes teachers use Blackboard as an excuse not to teach. Posting something on Blackboard does not,

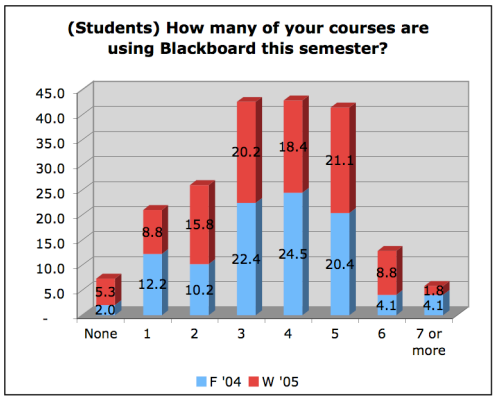
in my opinion, constitute a meaningful learning experience."

Instructors need to be careful about the tendency to use Blackboard as a way of decreasing their availability to students who need to communicate with the instructor for legitimate reasons. As one instructor said, "Just because it's easier doesn't mean that it's better."

Graph 20



Graph 21



Graphs 20 and 21. How many courses on campus use Blackboard.

Evaluation Question 7

There is a substantial body of literature about the implementation and adoption of new technologies or ideas. Many researchers (Ellsworth, 2000; Ely, 1990; Fullan, 1991; Hall, 1987; Havelock, 1995; Reigeluth, 1994; Surry, D. W., Ensminger, D. C., & Haab, M., 2005; Zaltman, 1977; and others) have attempted to explain the change process that occurs after the introduction of a new technology or idea. Blackboard Inc. itself uses the Gilfus Model to understand the institutional adoption of its Web-based technologies; in it, an institution moves through five stages (exploratory, supported, strategic, mission critical, and transformational) towards a fully integrated online instructional component.

Everett Rogers is the most influential researcher in the study of the diffusion/adoption of new innovations. In his book *Diffusion of Innovations* (2003), Rogers provides a model for understanding the adoption decision process. In his model, Rogers asserts that adopters pass through five stages:

1. *Knowledge* — The individual learns about the innovation
2. *Persuasion* — The individual decides mentally what his/her position is regarding the innovation
3. *Decision* — The individual decides to adopt the innovation
4. *Implementation* — The individual actually adopts the innovation
5. *Confirmation* — The individual seeks reinforcement for the decision to adopt, or decides to discontinue using the innovation

Because Rogers' research focuses on adoption, his model focuses on the factors that lead a person to adopt or reject an innovation. Four of the five stages of Rogers' model deal with issues leading up to adoption. What is lacking from Rogers' model is more understanding of *how* people implement an innovation that they have chosen to adopt, and what happens *after* they begin to implement the in-

novation. What happens during the implementation stage and before and after the confirmation stage? How can organizations help individuals implement an innovation effectively? What kinds of struggles will individuals face as they implement the innovation? These questions are of particular concern to our stakeholders as they consider the process of faculty integrating Blackboard into their teaching.

As we interviewed instructors and considered their experiences implementing Blackboard, we began to see many patterns emerge (see Figure 1). These patterns explained aspects of the instructors' experiences and helped us to better understand the process of implementing Blackboard at our university. While it seems that all of the instructors we observed and talked to experienced these patterns, they sometimes did so in unique ways or to varying degrees due to the effects of other variables, such as the instructor's previous experience with educational technologies, the presence or absence of the conditions necessary for change to occur (Ely, 1999), and pressure existing from departments, colleagues, and students about Blackboard.

Figure 1

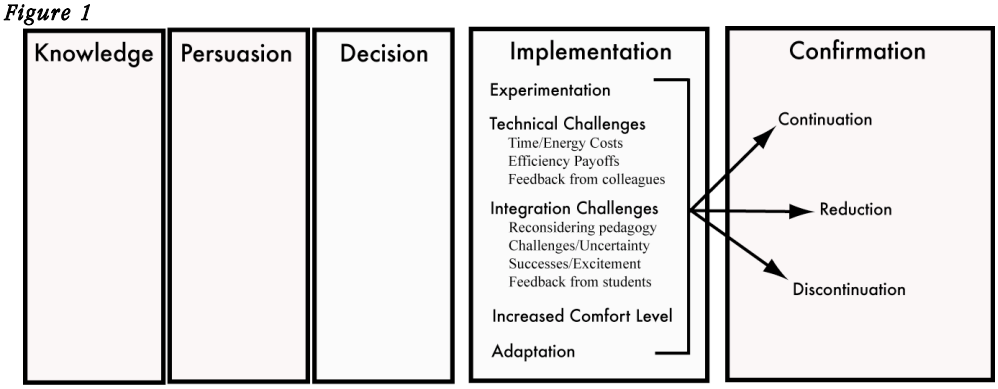


Figure 1. *A depiction of the implementation and confirmation patterns found in this research study, and how they relate to Everett Rogers' (2003) Innovation-Decision Model. The additions made by this study explain in more detail the kinds of experiences instructors have as they implement Blackboard features into their practices.*

The patterns we have found explain how the adoption of a multipurpose tool like Blackboard is in fact a culmination of the adoption and implementation of individual features of the tool. We will explain some of the events that instructors experience as they adopt Blackboard, a feature at a time, explaining how this leads them to re-evaluate their use of the CMS, and decide to either continue to use the tool (confirmation), scale down their use of the tool (reduction), or discard the tool completely in favor of other options (discontinuation). Following are some of the patterns that we identified in the experiences of instructors at our university as they began to implement Blackboard:

1. Instructors begin using Blackboard by **experimenting** with one, or a few, of its features rather than adopting the entire tool.
2. Each time instructors attempt to adopt a feature of Blackboard, they experience **technical challenges**, or struggles to get the feature to work properly. As part of these technical challenges, instructors experience time and energy costs, and early efficiency payoffs are needed to compensate and to encourage instructors to continue using the CMS. Instructors often turn to their colleagues for feedback and support during the challenges of learning how to overcome the technical aspects of a feature.

3. Along with technical difficulties, instructors experience **integration challenges** as they learn how to use a Blackboard feature effectively to achieve personal goals. These challenges become evident as instructors try to make the feature fit into their regular practice and routine. As part of the integration challenges of implementing a feature of Blackboard, instructors often are forced to reconsider their practices, whether consciously or subconsciously; they face new challenges and often uncertainty about how to use the feature effectively; and they seek feedback from students and teaching assistants as confirmation points. Instructors who experience success in integrating the feature effectively into an aspect of their practice often then experience new excitement and enthusiasm for the tool or for their job.
4. Eventually, if the instructors do not prematurely discontinue using the feature they are implementing, they experience an **increased comfort level** when they feel comfortable and confident with using the feature.
5. Often, but not always, instructors try to change the look of a feature or the methodology for using the feature so that it is different from the original intention and reflects the instructors' own individuality. This **adaptation**, or re-invention, of a particular feature reflects an effort to bend the tool to fit the instructors' needs and wants.
6. Eventually, after an instructor has attempted to implement one or several Blackboard features, they reach Rogers' **Confirmation** phase, where they now re-evaluate their use of the CMS as a whole. All of their experiences with individual features of the CMS play a part in this final decision. We found three possible decisions that instructors make: 1) continuation, where the instructors decide that Blackboard is a useful tool for their needs and gradually grow more and more dependent upon the tool; 2) reduction, where instructors decide to use Blackboard only minimally, and do not feel tied to the tool but open to other options; and 3) discontinuation, where instructors reject Blackboard and seek other options or their online instructional needs.

An important point to remember is that these patterns/events do not necessarily happen linearly. Some instructors approach the implementation of a feature of Blackboard by first considering the integration challenges. For others, the technical challenges are much easier to overcome, and they approach the integration and technical challenges simultaneously. However, it seems that despite these variances in how the instructors experience these events, they do, in fact, all experience these patterns as they implement individual features of Blackboard and progress towards a final decision concerning the tool. Understanding these different processes associated with the implementation of Blackboard can provide insight into why some instructors seem to use Blackboard more effectively than others, and how BYU can better support and train instructors to use educational technologies.

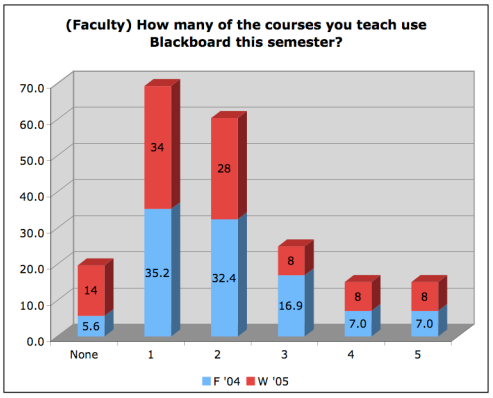
Faculty Implementation Patterns

Decision to Adopt

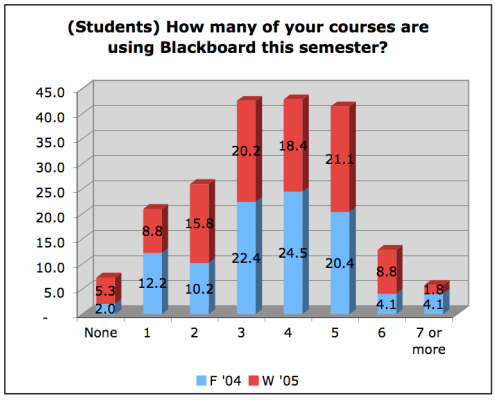
Our analysis of the implementation experiences of instructors begins with their decision to adopt and to attempt to implement Blackboard into their teaching. It seems that the majority of instructors on our campus have made the decision to adopt Blackboard. In the winter 2005 semester, only 14% of instructors surveyed were not using Blackboard at all, and 53% were using Blackboard for multiple courses. In the Fall 2004 semester, only 5% of faculty respondents were not using Blackboard, and 61% were using the tool in multiple courses (Graph 20). As a way of triangulating these numbers, only 5% of students surveyed during winter semester reported not using Blackboard in any of their

courses, and this was true of only 2% in fall semester (Graph 21). On the average, students are enrolled between three to four Blackboard courses each semester.

Graph 20



Graph 21



Graphs 20 and 21. How many courses on campus use Blackboard.

The numbers of instructors and students who have used Blackboard at least once are probably even higher, because in our interviews we learned that instructors often use Blackboard for only some of their courses. Thus, even if they were not using Blackboard during the semester when we surveyed them, they might have used it in previous semesters.

Most instructors arrive at the decision to adopt Blackboard in the way Rogers (2003) described. They first learn about Blackboard, usually from campus announcements or from their colleagues in their department. They then decide to try (or for the minority, not to try) the tool, often because of pressure (real or perceived) from students, colleagues, or administration. Sometimes they do not perceive any pressure to use Blackboard but feel that it could help them.

Experimentation

Instructors usually do not begin using all of Blackboard's features at first; rather, they experiment with one or two features that directly address their instructional or organizational needs and goals. For example, instructors commonly begin to use Blackboard to communicate assignment or test scores to students. One professor who is an avowed skeptic of new educational technologies, including Blackboard, had never considered using the tool until he decided he needed a way to communicate grades to 200 students in a large introductory course. He experimented with Blackboard, using only to distribute grade. As he worked with Blackboard, however, he began using other features, such as the course documents, as well. Like this professor, most instructors initially experiment with only a portion of Blackboard's functionality. If they have a positive experience, they often experiment with other features.

At the experimentation point of the process, the instructors may not even feel that they like Blackboard yet, or that they have made a decision to use or not use it. They are simply "trying it out" and exploring its functionality. Sometimes this experimentation comes after a CID training workshop, but more often instructors simply hear about Blackboard from somebody—often their colleagues or students—and decide to start a course to see how it works. At this stage, instructors often become frustrated, because setting up a Blackboard course is not very intuitive, especially if you are do it without

training. The professor mentioned above who tried Blackboard for the first time with his large, introductory course did not know how to create a Blackboard course because he had never done so before. He logged into Blackboard and saw that he had no existing courses, but he found no information about how to create a course. "The how to get started was pretty inadequate . . . You log in to the regular Blackboard course and it says you have no courses, but it doesn't tell you how to change that." Many professors also felt that learning how to set up and use Blackboard is difficult and confusing because the features are not "intuitive" and do not function the way the instructors expected they would, do not have names that clearly describe the their purpose. For example, it is difficult for professors to enable/access the virtual chatting features in the control panel, and we suppose this is one reason, among others, why this feature is so infrequently used.

Technical Challenges

As with all new technologies, ideas, or practices, it takes time and effort to learn how to use Blackboard. However, we found that there are actually two learning challenges for instructors: gaining technical competency with the tool as well as integration competency, or the ability to integrate the tool successfully into their daily practices.

The first challenge is similar to the effect research studies describe as a "learning curve"—in other words, learning which buttons to push when to achieve the result they want. These challenges begin as instructors experiment with the feature and continue until they become comfortable and confident. The technical challenges involve learning how to create their Blackboard course, how to set up the features they want to use, and how to use the tool throughout the semester. Instructors with previous experiences with technology overcome the technical challenges more easily—in fact, mastering the technical side of Blackboard may not seem like a challenge at all. However, for instructors with little technology experience, learning the technical aspects of Blackboard can be very intimidating. For example, one instructor received funding to hire a teaching assistant to help him set up a Blackboard course. During an interview, we asked this professor whether he might consider using other Blackboard features. He said he would, except that he was intimidated because he still did not have the technical competency required: "I'm not sure I can do it from here, I'm not that competent in it. It took a lot of time—a lot of time—to prepare the Blackboard. I really don't know how to do it that well."

Time/Energy Costs. Most instructors can overcome technical challenges, but it requires time and energy. Many are surprised at how much time it takes to set up a Blackboard course—especially if they upload many years' worth of materials. One instructor in this situation said, "It [Blackboard] saves you time in the long run. It takes an enormous amount to set up. It takes me 20-30 hours to set up a Blackboard site at the beginning. It takes me a full week of work to set up the Blackboard site. Now, once it's set up, the semester goes a lot more smoothly for me, but it takes a huge initial outlay of time." Besides the time/energy cost of setting up a Blackboard course, there are also costs with learning to use each new feature adopted. If instructors do not consider exploring new educational technologies as part of their instructional mandate, taking the time to overcome Blackboard's technical challenges becomes a low priority. "You also have to balance as a teacher how much time you spend on things . . . how much time the technology is going to cost you. It does take time," one instructor

pointed out. Some instructors also expressed frustration because they felt they expend additional time and energy to create a new Blackboard course every time a new semester begins, or when the technology is updated (for example, from 5.5 to 6.0).

Efficiency Payoffs. Instructors need to believe early in the process that the efficiency gain will make overcoming the technical challenges worthwhile—they need Blackboard to automate their tasks and save them time to compensate for the time/energy they lost initially. For the most part, instructors feel Blackboard provides these efficiency payoffs, and this motivates them to continue through the cycle to focus on effective integration practices. However, when Blackboard has stability problems, efficiency payoffs disappear. If this happens early in the implementation process, it can dissuade the instructor from using Blackboard.

Feedback From Colleagues. While many instructors do attend CID training sessions on Blackboard and indicated that these were helpful, it appears much more common for instructors to learn about how to use and integrate Blackboard from talking with other people in their department. At least half of the instructors we interviewed for this evaluation indicated that they learned about Blackboard from their colleagues, and this might have been the case with other instructors as well. One younger professor who, upon being hired, heard from the other instructors in the department that, "You better just use it and get used to it because it's going to be part of the normal procedure here on campus." This new instructor valued the opinion of his colleagues, so he said that he "just jumped into it and started using it." Another professor had a similar experience and said that "The [program] director … sold me on the idea, he came and spent five minutes with me, and I thought, 'This is terrific,' and I've used it ever since."

A few instructors said they learned about Blackboard from their TAs, whom they consider to some degree to be a colleague who understands the context of the course. One example is a younger professor asked to teach his department's large introductory course. He quickly realized he needed something to help him organize instruction for so many students. His TAs suggested using Blackboard and taught him about how to use the tool. Other professors rely so heavily on their colleagues and other people they consider to be "inside" the department that they will only use Blackboard if others set up their courses for them. For example, one professor remarked, "In the media classes, I have media savvy kids that will help me. So all I have to do is use it, I never have to set anything up. They set everything up for me. I just say, 'This is what I want,' and they set it up for me. I know that's awful, but it's true!"

It seems that the feedback from colleagues and TAs is especially important for instructors during the technical challenges phase of the process because they want confirmation from colleagues that the effort will be worth it. Thus, instructors seek quick answers to their technical challenges—and this often means asking colleagues and TAs before calling computer support personnel.

Understanding these trends has some implications for effective training. Most professors, when we asked about Blackboard training, indicated they wanted someone they knew within their department or college, and who knew them, as a trainer. One instructor who used Blackboard for large sections

of an introductory course said the trainer she preferred would be "somebody I'm working with all the time, not somebody that came from computer support or CID." Another instructor added that he would want to see how other instructors from his college use Blackboard: "If somebody in the business school was using it and came by and said, 'Hey this is how I am using it, and this is the success I am having with it' . . . [Training] could be general, but if it's business-school related, I certainly relate to that better than if it came from a discipline across campus." Another instructor suggested training students about integrating Blackboard, then sending them to different departments to provide one-on-one technical and integration training, much like the SCOT [Students Consulting on Teaching] program uses undergraduates to provide help with counseling teachers about their teaching. "[Train] a lot of students how to use it," this professor said, "And infiltrate those into the class and show them [professors] how to use it. Let them kind of guide you."

Integration Challenges A second challenge that instructors experience, after they understand how Blackboard works, is how to use Blackboard effectively to achieve their instructional goals—in other words, how to integrate it successfully into their practices. Often, instructors have not seen any of their colleagues using Blackboard, and they struggle to understand how to apply its features to teaching their subject and courses. A few examples of some integration knowledge gaps that we found included knowing how to:

1. Use online testing while still keeping the tests valid and cheating at a minimum
2. Effectively use a virtual classroom or synchronous online chat feature
3. Use Blackboard for hands-on courses, such as art
4. Use discussion boards so that the discussion is useful and effective
5. Moderate online discussions without spending an excessive amount of time.

One of the most common difficulties instructors have in learning how to integrate Blackboard into their teaching is understanding how to use the discussion/collaboration features to maximize student learning without requiring an excessive amount of student or instructor time. Most instructors know how discussion boards and chatting work, but they do not understand how to teach online, moderate online discussions, integrate this type of discussion into a typical face-to-face course, adapt their teaching strategies and styles to accommodate online discussions, or make appropriate decisions about when an online discussion can be an effective method. One case was of a graduate instructor who teaches a large introductory course of over 100 students. The course is entirely online, but until now she has not used any of Blackboard's interaction/collaboration features. Instead, the course relies on a series of units that the students work through, and they then take tests to verify their understanding of the material. One of the main complaints that she receives from students is that they would like more interaction with other students and with herself. It seems that in this context, where there is no face-to-face interaction, that it would be valuable to use some of Blackboard's discussion tools. However, the instructor did not use these tools, partly for practical reasons such as her poor typing abilities. Part of the reason why she didn't use these tools, however, seemed to be that she was not trained in moderating online discussion and didn't know where to begin. She also didn't know the difference between asynchronous and synchronous communication features, and thought they were all the same.

Reconsidering Practice. As instructors struggle with the challenges of how to effectively use Blackboard features in their courses, they often express apprehension towards online teaching because they are more familiar with face-to-face teaching. For example, one instructor said about using the discussion features that "for some types of classes. I just don't know how I'd use it. I don't know how other people use it. The type of class I teach is discussion-based in class." Another professor expressed a common worry about the same set of features that many do not know how to moderate online discussions without spending too much time on that aspect of the course: "I shy away from that right now because I'm thinking about how I would manage that, I'm thinking it's going to take more time to manage that discussion board and I'm not willing to invest the cost right now to do that. I simply don't know, there's the unknown: what is that going to do?"

As these cases show, for many instructors, learning to overcome integration challenges associated with Blackboard means reconsidering their own sense of what is good pedagogy, or even what the best methods are for class management, and what their responsibilities should be as teachers. This reflection is not always about a drastic change in the teacher's identity, in fact, it does not appear that using Blackboard is causing most instructors to radically re-invent their teaching styles. However, when instructors reconsider their practices it can often be something as simple as realizing that the instructor can now communicate with students more than in the past and considering whether s/he should do so. They may also discover that they want to explore delivering electronic lectures to let students take notes in new ways, or that they need to be more prompt with grades because the students will look for their scores online.

Setbacks/Uncertainty & Student Feedback. As instructors try to integrate Blackboard features into their practices, there are often setbacks where it appears that learning is negatively impacted. This might be because the tool was not properly implemented, or because the instructors' methods and the affordances of the feature are not well aligned. An example of this type of challenge is a professor who adopted several Blackboard features, but found that they encouraged some behavior from students that he did not feel was conducive to learning in his courses (for example, students stopped taking notes or were more likely to skip class because all material was available online). This professor struggled with how to use the features of Blackboard that he felt worked well for him, and how to justify to students his decision to not use the features he did not feel worked well. This setback proved more challenging than learning the technical aspects of the course documents feature of Blackboard, and it made him uncertain about how to effectively use Blackboard in his courses.

As instructors explore ways to integrate Blackboard features into their practices, there is also occasionally uncertainty about whether or not their methods for using the tool are good ones. This uncertainty can be increased through negative comments from students, who may have had bad experiences with Blackboard features in other courses and then discourage future teachers from using the same features for legitimate and effective purposes. For example, one instructor explained that when he considered using virtual chatting features, the students were strongly against it. "Nobody was really smitten with that idea, so I abandoned it," he said, even though he still feels the tool would be helpful in the context of the class he teaches. It appears that as instructors turn their attention to-

wards integration issues, the importance of student feedback for promoting or discouraging implementation of Blackboard increases. Instructors considering integration challenges care very much about students' opinions because they are trying to integrate Blackboard in a way that will have positive impacts on the students' experiences.

Successes/Excitement. When instructors are able to overcome some of the integration challenges and setbacks, and if they think that they have found a successful way to integrate a feature of Blackboard into their instruction, they often feel a rewarding sense that they have succeeded a little more as an instructor. "I use Blackboard for all of my classes because it is a little gift from heaven," one instructor said, before explaining how she felt using several features of Blackboard was helping her be a better teacher. This feeling of success is sometimes accompanied by a renewed excitement for teaching. For example, one instructor who is not very technology savvy was excited that he was now successfully teaching a blended (online and face-to-face) course. "This is still rather exciting that I have been able to pull it off at all," he said.

Some instructors, instead of feeling this success grow continually frustrated with Blackboard. To them, the integration challenges appear to be insurmountable because most of the features Blackboard do not appear to be useful for their unique situation, teaching style, or subject matter. However, if instructors do develop ideas and methods for integrating a feature of Blackboard effectively into their teaching, and if they feel the benefits outweigh the setbacks, they grow more likely in the Confirmation phase to choose to continue using the feature. Doing this increases their dependence on the tool as an integral part of their class experience.

Increased Comfort Level When an instructor becomes more comfortable with a Blackboard feature, they do not necessarily accept or reject the feature—they are simply proficient enough with it that they feel they can make a qualified decision about how well it meets their needs. At this point the instructors have overcome initial learning curves and are not as concerned about technical challenges. "I think it's an easy program to work with myself … I haven't had much of an issue," one instructor said who had reached this phase more quickly than many others. Another instructor described this feeling of confidence by saying, "Now I know it [Blackboard] well enough I don't think about it." Often, instructors reach this phase, then begin the process again, sometimes struggling as they experiment with new features.

Adaptation (Re-invention) Adaptation, as we call this pattern, is referred to as re-invention by Rogers (2003). In his book, Rogers describes re-invention as "the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation" (p. 181). We have chosen the term "adaptation" to emphasize the connotation that the instructors are adapting the tool to meet their own unique needs, and to connote that the changes might be small—much smaller than might be expected with the term "re-invention."

Instructors adapt Blackboard when they use the tool's features in atypical or unexpected ways to achieve their goals. The most commonly adapted feature is the discussion board, which is often used for many things besides actual discussions. For example, because there is no space in Blackboard for students to post materials for the class, instructors often have students post their reports, articles they

find, etc., on a discussion board. Some instructors use the discussion boards as a form of digital dropbox where students turn in homework. Others use it as a form of quiz, or assignment, where students simply respond to questions posed by an instructor, but where there is no real discussion with other members of the class.

Other examples of adaptation include the common practice of using the gradebook only to communicate grades before downloading the grades to Excel for actual calculation; adding or taking away buttons on the main navigational menu; adding class or department logos to a course; and using Blackboard courses to organize research groups, instead of student groups. Mr. Sorenson, in the case study we describe later on, was frustrated with how long it took to upload images to Blackboard quizzes, made a simple adaptation by posting a PowerPoint full of images, and then having a quiz with no images that instead referred students to the PowerPoint for the images they would need.

The adaptations made by instructors are usually not large ones—at least not as large as might happen with other kinds of technologies. This is because most instructors perceived Blackboard to be a rigid tool that did not allow for very much customizability or adaptability. In fact, the most common request from instructors for improving the tool was to make it more flexible, so that it could be adapted to individual needs. For example, many instructors wished that there were more options in the gradebook for spreadsheet-like functions. "It's not my primary gradebook because I can't do anything with the scores. It's not a spreadsheet," one instructor said. Instructors also found the quiz feature inflexible because it did not adapt well to implementing multimedia, or to importing large amounts of questions or information. "It's too clumsy to work in anything more than a quiz," one professor said.

We believe that the adaptation event is critical for instructors to be able to maximize the benefit they might obtain from using Blackboard, or other educational technologies. Rogers (2003) agrees, and writes that re-invention of an innovation leads to a faster rate of adoption and a higher degree of sustainability (p. 183). Rogers posits that it is possible for flexibility to be designed into an innovation, like a CMS, to allow for better adaptability. This is critical because there are many different kinds of instructional theories, whether implicit or explicitly acknowledged, that are employed at a university, and the best method for matching a single tool to all of these instructional methodologies is for instructors to adapt the tool to fit their unique situations. Insofar as adaptation is able to occur (because the tool is flexible enough to allow it and because instructors are skilled enough to do so), we believe the benefit derived from educational technologies, like Blackboard and other CMS tools, will increase.

Confirmation

After one or more iterations of the process through which they have implemented one or more Blackboard features, instructors make another decision concerning the tool. This may be a deliberate, thought-out decision, or an unconscious one hardly noticed by the instructor. But at this point, the instructor re-evaluates Blackboard as a tool and decides whether to continue using the tool, to discontinue using the tool completely and to seek other options, or to use Blackboard in a limited fashion (reduction).

Continuation. If the instructors decide that the Blackboard does meet their personal goals and objectives, then they strengthen their dependence on the tool through experimenting with and implementing more of Blackboard's features. "[When] I learn a thing about Blackboard, I tend to use it," said one instructor, a high user of the tool. Gradually the courses taught by these instructors change as Blackboard is more tightly woven into the instruction and organization of the courses, until the instructors and/or students cannot conceive teaching the course without Blackboard. These are the instructors most dramatically impacted by Blackboard stability problems because when Blackboard is not working, they feel that a major part of their course is absent. These are also the professors who are most vocal about the permanence of Blackboard at our university. "If the decision was to pull the tool and to utilize another one, it would have to be one that could be easily learned by faculty members because if not there would be an outright rebellion," one instructor said.

Discontinuation. It is possible that as instructors try to integrate features of Blackboard successfully with their practices that instead of adapting the tool (as we discussed above, under Adaptation) they instead adapt their methods to better match the tool. In other words, some instructors who favor a more collaborative, student-centered style of instruction may bend towards more teacher-driven, information-transfer styles of teaching once they started using Blackboard—because that is the kind of pedagogy that Blackboard serves best. However, it seems to be more common that if a Blackboard is not well matched with the instructors' objectives, that instructors instead seek other options to better meet their needs, and this is why they choose to discontinue using Blackboard. For example, many instructors decide to create/maintain their own personal websites, or use server space provided by their department. Other instructors increase their reliance on outside email services, blogs, wikis, instant messaging clients, or other online tools. It thus becomes important for institutions to recognize that one CMS tool may not be the best online option for every teaching style, and that accommodations should be made to support other types of online tools as well.

Reduction. Because, as we found in this study, instructors see Blackboard as a collection of many features that can be individually adopted or rejected, it is common for instructors to decide to continue using some Blackboard features while exploring other options as well. For example, one instructor explained that there were three areas where he needs online support for his instruction, and he felt that Blackboard fulfilled his needs in one area 100% (central repository of documents), met his needs about 60% in another area (online discussion boards), and failed miserably in the third area (gradebook). This instructor choose to continue using the features of Blackboard that he liked, while discontinuing the other features in favor of alternative tools. A reduction decision has its own challenges, however. For example, as one instructor said, "If Blackboard has 10 features, and they are all stable, and four of them I like and six of them I don't, I've found you get pressure from people [students] to use the other six." Despite these challenges, we found that most instructors who make a reduction decision are happy to continue using Blackboard for some purposes, but they do not feel as tied to the tool and they are more open to the university investigating other options.

An in-depth look at the model: A typical instructor's experience

Note: Up to this point we have explained the model in terms of its different dimensions without

exploring how these come together in an instructor's experience. This case study shows how one instructor, and his wife who is also a BYU instructor, progressed through the cycle. The quotes come from an interview with this professor.

Mr. Sorenson teaches in the College of Biology and Agriculture at our university. His teaching responsibilities include both large undergraduate classes of 100-150 students, and smaller graduate courses of 8-12 students. He uses Blackboard in both situations, but in different ways. His first introduction to Blackboard came about three years ago, when he became acquainted with some Blackboard features through talking with colleagues in his department and observing how they were using Blackboard. After creating his first Blackboard course, Mr. Sorenson did not experiment with very many of the features at first, but used Blackboard only for email. At this same time, Mr. Sorenson was learning how to use PowerPoint, and it was easy to post his PowerPoint lectures on his Blackboard course for his students to download. His students liked this, and their feedback encouraged him to use Blackboard more. "I think it's useful for getting information to students," he said. "And I think they've appreciated having access to that. I think it's allowed a little more freedom in the classroom for students to ask questions and not feel they're going to miss something while they're writing it down."

For the most part, Mr. Sorenson has enjoyed using PowerPoint and Blackboard to deliver his instructional materials, and like most instructors, he seemed to feel that the two tools compliment each other. He is worried, though, about the tendency to give more to students because it is so easy to do in digital form. As Mr. Sorenson said, "The one thing that I've noticed . . . sometimes I get, I find myself wanting to give too much information. . . . It's almost like replicating the chapter in a visual way."

Slowly, over time, Mr. Sorenson experimented with more and more of Blackboard's features. Three semesters ago he began using the gradebook feature. However, he only uses this feature to display grades to students, and for keeping track of the grades during the semester. At the end of the semester, he downloads the grades to Excel so he can do more complicated grade calculations that are not possible in Blackboard. In this way he has adapted how he uses Blackboard's gradebook feature so that it better helps him in the way he likes to handle grades. He also began using group discussion boards for his smaller classes. He has never tried using discussion boards with his larger classes, and is scared to do so. He is not sure how to moderate such large discussions because he likes to read the things the different groups are posting and give his input on occasion. "I'm afraid, I think I'll be overwhelmed. The smaller class I have anywhere from 8 to 12 students. It's something I can go in everyday and check on," he said. "It's probably been more fear oriented, fear that it might take so much time."

This past semester, Mr. Sorenson and his wife, who is also a part-time BYU instructor, experimented with a new feature: online tests. They chose to start doing tests online so that it would save class time, and allow them to do other activities during class. For Mrs. Sorenson especially, who gives a weekly quiz, this was anticipated to be a great timesaving feature. However, they found that Blackboard was agonizingly slow to create tests because they could only create one test item at a time. Because their tests require a lot of pictures, it took "hours" to upload the images one by one into Blackboard. This

was an experience they did not enjoy and hope to never do again. Instead, Mrs. Sorenson will reuse the same quizzes every semester. Mr. Sorenson found an easier way to adapt the testing feature by posting a PowerPoint full of images, and then having the test be only text-based with references to the PowerPoint for the images the students will need. However this requires students to download the PowerPoint so they can access the images, and this is cumbersome.

Overall, Mr. Sorenson's feelings about Blackboard are mixed. "Some aspects I really appreciate, and other aspects I have grown to dislike intensely," he said. However, because Sorenson and his wife have invested so much time in setting up their Blackboard courses, they hope the university never stops supporting Blackboard in order to acquire a new tool, unless there would be a way to set up their course in the new CMS without re-constructing all of the quizzes again. Now that they have their courses set up, they want to use these courses for many semesters to come. They have grown dependent on the tool to some degree because of the time and energy they have invested into setting up their courses. "If the decision was to pull the tool and to utilize another one, it would have to be one that could be easily learned by faculty members because if not there would be an outright rebellion. . . . If the plug were pulled now, she (his wife) would be in a world of hurt. It'd be all of last semester's time and effort right down the drain. Even though she's not happy about the time it took, I know she'd not want to do it again."

Conclusions

Overall, it is difficult to definitively answer the stakeholders' questions about the value of Blackboard, because the questions—and the criteria for measuring the answers—are not clearly defined. For example, if we ask "How much is Blackboard used on campus?", are we referring to how many courses use Blackboard, even if it is a TA rather than the instructor who actually manages them? Does it matter which features they use? How tightly does an instructor need to integrate a feature into her methodology to qualify it as "used"? Every evaluation question needs to specify these kinds of details so the evaluators can create survey and other research instruments that provide specific, informative, and valuable information to the stakeholders.

Despite the lack of precision in the questions, this evaluation has successfully deepened our understanding of the effect Blackboard has had at BYU. Overall, instructors and students are moderately satisfied with the tool, but only when it is stable. We have learned that stability is a very major concern for instructors and students, and BYU must address it. We have discovered that for all of the extensive and innovative features Blackboard includes, instructors regularly use only four features: course documents, email, the gradebook, and class announcements, which they use primarily to efficiently transfer information to students. They do not heavily use online testing, but many are interested in learning more and experimenting with it. In addition, we learned that Blackboard supports teacher-centered styles of teaching but does not support other teaching styles.

It is possible that BYU could purchase, or develop, another tool to fulfill the four or five efficiency needs (course documents, gradebook, email, class announcements, and online testing) for much less money than we spend on Blackboard. However, many instructors, especially those who depend on

lecture-intensive, information-transfer styles of teaching, have invested a lot of time and energy integrating Blackboard tightly into their courses, and they would feel betrayed, lost, and upset if BYU switched to another set of tools. If the stakeholders make the decision to switch, it will be critical for BYU to provide extra support and training for instructors as they migrate to the new tool(s)—even to the extent of moving the instructors' materials over to this new system for them. In the meantime, it is important to not alienate those instructors who do not find Blackboard useful and who experiment with other types of online tools better suited to their teaching styles. BYU should support and train instructors exploring other possibilities, while still maintaining Blackboard support for the rest of the faculty.

We learned that the research of Hall & Hord (1987) and their Concerns-Based Adoption Model (CBAM) can add insight to instructors' experiences as they begin using Blackboard. The model describes the concerns teachers have at different stages as they adopt a new innovation (technology, new curriculum, etc.). Hall & Hord believe that instructors' concerns are first self-related (Am I capable of this? Do I want this? What would this do for my class?). They then progress to task-related concerns about technical issues (how to use a tool, what to do, and when). Finally, they arrive at concerns about the effects of the innovation (how it will improve their teaching or the learning for their students).

We learned that most instructors at BYU follow a similar model. When they begin to use Blackboard, they have self-related concerns as they experiment and decide whether or not to adopt Blackboard, and task-related concerns as they deal with the technical challenges of using it (see Figure 2).

Figure 2

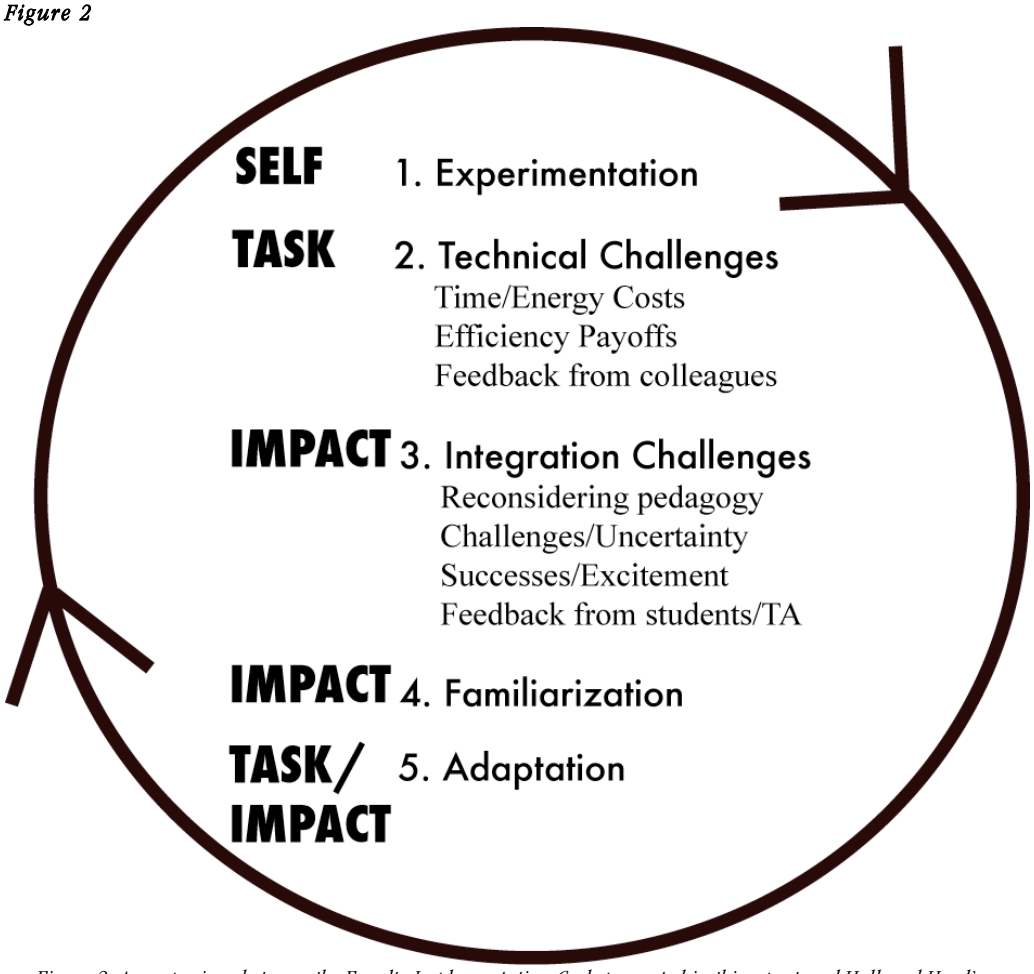


Figure 2. A comparison between the Faculty Implementation Cycle presented in this report and Hall and Hord's (1987) Concerns-Based Adoption Model.

Most instructors know how to use Blackboard on a technical level, so the technical challenges are no longer major concerns—when it is stable. As an institution, BYU is ready to focus more on the integration challenges. Hall and Hord explain that instructors must be "aroused" to impact-related concerns, or they will continue using the innovation on a very basic level. It seems that many BYU instructors are not yet thinking critically about the impacts from using Blackboard. If BYU decides to continue using Blackboard, stakeholders must provide more effort, training, marketing, and support to help instructors become more aware of impact-related concerns, then help instructors learn how to successfully use Blackboard to meet these concerns.

Recommendations

This list of recommendations is based on the evaluation findings, with suggestions grouped according to the main concerns of this evaluation. These recommendations are tailored to help BYU improve the integration of Blackboard into BYU courses. They do not address major issues, such as whether or not Blackboard is a good "return on investment" or whether BYU should continue to use it. However, the evaluation team hopes BYU stakeholders will consider the findings along with other issues and sources of information available when making decisions about continuing or discontinuing Blackboard support.

Knowledge

1. Future surveys and evaluation methods that measure how much instructors know about Blackboard should also focus on how much they know about effective methods for integrating Blackboard into their teaching.
2. Use the natural knowledge structures (e.g. from instructor to instructor) already in place within most departments on campus to disseminate knowledge about Blackboard. Encourage department members to share Blackboard knowledge within their department (or college).
3. Provide instructor training on both the technical aspects of Blackboard and on the integration aspects of how to use Blackboard in their own contexts.
4. Design the technical training to provide hands-on and (if needed) step-by-step support as instructors set up their first course or use a new feature. Many instructors indicate they would prefer this support to be "in-house"—from someone they know and who knows the context surrounding their course. It might be useful to have student employees who are trained in using Blackboard be available in every college to provide this support.
5. Make instructors more aware of the training and support services CID already provides.
6. Make instructors aware of the challenges and successes that come from using Blackboard so they can tolerate stability breakdowns and adapt accordingly.

Usage

1. To better understand usage, future surveys should ask instructors whether they use Blackboard themselves or whether their TAs are the primary users. The surveys should also seek more demographic information, such as class size, general education vs. department courses, instructor's technical experience, etc., and ask instructors whether they use Blackboard differently in different courses.
2. Future surveys should also ask instructors what other tools they use to provide online instruction (e.g. personal Web sites, instant messaging, outside email client, Tapped In, blogs, wikis, etc.)
3. BYU stakeholders should work towards a unified agreement and understanding about the goals and purposes for Blackboard, and the criteria for determining when these goals are met. This will help trainers/evaluators to know what levels of use the stakeholders want to see, and which features they want instructors to use.

Stability

1. Strongly encourage Blackboard Inc., to improve the stability of its product.

2. Increase Blackboard support during peak times of Blackboard instability, such as at the beginning and ending of semesters. Perhaps have "on-call" support people within each college who can quickly help an instructor.

Efficiency

1. Increase the training and communication about effective methods for using Blackboard to increase efficiency, and make instructors aware of potential pitfalls.

Learning

1. Create a searchable database, open to all instructors and training/support staff, of best practices ideas that lets a student or other BYU employee enter information about a teacher, department, and the idea for how the course effectively used Blackboard. This tool would also help future evaluators do case studies on best practices.
2. Promote using Blackboard as a learning tool, rather than exclusively as an efficiency tool.
3. CID needs to provide additional support for instructors wanting to use wikis or blogs and other interactive technology.
4. BYU should consider what kinds of teaching Blackboard does and does not support, and provide support and encouragement for innovative instructors who use other online tools.

Additional Recommendation:

BYU should find ways to support instructors exploring other options for online instruction, while still maintaining support for Blackboard for the many instructors who use this tool.

If BYU ever finds that Blackboard is no longer meeting the needs of the institution as a whole, it must provide ample resources and support to encourage instructors to use the new tool and help them transition to the new system, even creating and setting up their new courses and transferring all of their materials for them.

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Appendix A: Stakeholder Analysis

The evaluation team interviewed or surveyed a representative of each stakeholder group to learn the questions they wanted the evaluation to address. We continued this dialogue through emails, a mid-evaluation report, and personal conversations. Here we provide first a recommendation for BYU stakeholders to develop a thorough, shared understanding about Blackboard's mission at BYU. Following this is a description of each of the stakeholders we contacted for this study, how we contacted them, and the feedback they gave us about their interest in this evaluation.

Recommendation for a Better Understanding of Blackboard's Mission

We recommend that the stakeholders develop a clearly defined purpose for Blackboard, as well as criteria for evaluating the success of the current efforts to implement Blackboard. In analyzing the stakeholders' concerns and questions, we discovered that the stakeholders had different ideas about the purpose of implementing Blackboard at BYU. More importantly for the purposes of this evaluation, they had different opinions about what we need to know about the Blackboard implementation on campus. The question of "return on investment" often came up as we talked with stakeholders, but we found little agreement about what constituted a large enough benefit from using Blackboard to justify its price tag.

This lack of understanding Blackboard's purpose at BYU and the goals for implementing and using it has also affected the instructors and students, who disagreed about the purpose for using Blackboard and its role in the teaching/learning process. If the main stakeholders developed a clear mission for Blackboard, as well as standards and criteria for measuring its effects on campus, instructors and students could better understand its role in effective instruction.

	Relationship to Blackboard	*How did we analyze their concerns?*	*What are their concerns?*
Faculty	Faculty members are the main developers and users of Blackboard courses. Most stakeholders feel the main purpose of Blackboard is to help faculty improve their teaching.	Brief survey with the Faculty Advisory Board; ongoing surveys with other faculty members	1. Blackboard must be more reliable. 2. Blackboard must be more flexible to address their needs 3. How many faculty members are using Blackboard for their courses, what features do they use, and how "deeply" do faculty and students use Blackboard? 4. How are instructors using Blackboard to improve or enhance pedagogy? What novel teaching strategies do they use? How can I use it more effectively? 5. What kinds of productivity gains do faculty who use Blackboard experience? Can we quantify it? 6. What is confusing to students about Blackboard, what do they like/dislike about it, and how do they use it? Do they see it as a resource? Are students overwhelmed by all the material posted on Blackboard? 7. How many instructors use the testing functions in place of in-class or testing center exams? Do they see any difference in student performance, and to what do they attribute that difference? Are they seeing improved performance on students' other assessments? 8. Is Blackboard enhancing student learning? Does efficient use of Blackboard help faculty increase student learning more than it lets students avoid immersive learning?

Students	Students are the main consumers of Blackboard sites. According to the Winter 2005 survey, most students (60%) have 3-5 classes that use Blackboard.	Individual, group, and email interviews; ongoing surveys.	1. Most students' opinion of Blackboard was "I think it's a good concept, but not very reliable." Students want Blackboard to work. On the survey, 63% reported technical problems Fall 2004 semester. This jumped to 90% Winter semester. 2. Students like Blackboard features that improve communication with the professor, give class announcements, provide a resource for class material, and give them quick feedback on grades and completed quizzes. They want professors to do more of these things. 3. Students wonder how well professors using it. Do they know what features are available? Are there more effective choices available? Students were also concerned that some professors did not use Blackboard well.
Jon Mott	Jon Mott is the director of CID, responsible for Blackboard implementation on campus. He also represents the BYU administration in this evaluation.	Personal interview.	1. What Blackboard features do faculty and students use, like/dislike using and why? 2. What persuades faculty to use Blackboard? 3. How can CID improve Blackboard training, use and satisfaction? How can CID help faculty use Blackboard in creative ways to improve learning? 4. What do student and faculty need and want in a CMS?
Testing Center	Testing Services administers tests in the Testing Center and provides assessment support for instructors. Students take many Blackboard tests on laptops in the Testing Center.	Personal interview with Bud Wood, manager of Testing Services.	1. Blackboard is not stable, which means dropped quiz scores, students locked out of tests, grades lost. 2. Blackboard cannot export responses so instructors/Testing Center employees can test validity. 3. Blackboard doesn't have some features for good assessment, such as secure browsing capabilities, test rescoring, etc. 4. When we bring a problem to Blackboard's attention, they charge hefty price tags for fixes.
IP&T Department	Several instructors in the IP&T department are interested in how technology affects learning and the experiences of students and instructors. Dr. Charles Graham is especially interested in understanding how Blackboard can affect the learning/teaching process.	Several interviews and Delphi-style survey with Dr. Graham.	1. How many instructors can't think about best practices possibilities because they are "consumed" with day-to-day struggles with Blackboard? Why are they in this situation? 2. Where does the pressure/motivation to use Blackboard come from? Students? Departments? Other sources? 3. What percentage of faculty and students consistently use Blackboard? 4. Why do faculty members not use Blackboard features? 5. What types of faculty and students are using Blackboard? 6. What are the Blackboard functions instructors use most? How much of the total functions do they use?
IMC	The IMC helps faculty and students learn how to use technology effectively. Blackboard is perhaps the most widely used technology on campus, so much of IMC's efforts are spent supporting the use of Blackboard on campus.	Multiple interviews and discussions and Delphi-style survey with Mr. McDonald.	1. How many instructors can't think about best practices possibilities because they are "consumed" with day-to-day struggles with Blackboard? 2. What productivity and pedagogical value does using Blackboard in a course add? 3. Is Blackboard helpful for faculty, and is it meeting their needs? 4. What strategies could guide effective use of Blackboard and similar CMS tools? 5. What are the Blackboard functions instructors use most? How much of the total functions do they use? 6. What do "successful Blackboard teachers" do with Blackboard? 7. What is it like for professors to implement Blackboard into their practice?
Garin Granata	Granata oversees Blackboard technical support and manages BYU's Blackboard portfolio.	Multiple interviews.	1. What types of faculty and students are using Blackboard? 2. What percentage of faculty and students consistently use Blackboard? 3. What are the Blackboard functions instructors use most? How much of the total functions do they use? 4. Is Blackboard helpful for faculty, is it meeting their needs, and why do some instructors choose not to use it?

CID Consultants	CID consultants are assigned to specific colleges, where they assess instructional needs and recommend solutions. They frequently answer questions about Blackboard or recommend Blackboard to instructors.	Interviews with Nina Lewis and Joe Peabody, CID consultants.	1. Sharing best practices case studies and ideas with faculty that might help persuade them to use Blackboard in more effective ways.
Library	The library administration is interested in incorporating more library resources into Blackboard courses.	Interview with Allyson Washburn.	1. What library resources would faculty like to see incorporated into Blackboard courses? 2. How would faculty like the subject librarians to assist them to incorporate library resources in their Blackboard course? 3. Would faculty be receptive to adding a library discussion forum to their Blackboard course where subject librarians could respond to questions about assignments that require library resources or questions about library research? 4. How is e-reserve working in Blackboard courses? Any problems, suggestions for improvement of the process, etc? 5. What library resources would students like in their Blackboard course?

Stakeholder Questions for this Evaluation

After interviewing all of the stakeholders, we reviewed their concerns and questions for this evaluation, combined similar questions, and synthesized the issues into a manageable number. We then reviewed these questions and encouraged stakeholder feedback. These questions emerged as important to this evaluation:

1. How can we gather and communicate case studies and best practices to give instructors ideas for using Blackboard effectively and creatively
2. How can we better train faculty to effectively and creatively use Blackboard?
3. What Blackboard features do instructors and students use and like/dislike using, and why?
4. What persuades faculty members to use Blackboard?
5. What do student and faculty need and want in a CMS?
6. What types of faculty and students are using Blackboard?
7. Does Blackboard save time and increase efficiency?
8. What strategies could guide effective use of Blackboard and similar CMS tools?
9. How many instructors use the testing functions? Do they see any difference in student performance, and to what do they attribute that difference?
10. Does the way faculty uses Blackboard enhance student learning?
11. What about Blackboard confuses students? How do they use it? Do they see it as a resource? Are they overwhelmed by all the material posted on Blackboard? What do students like/dislike about Blackboard?
12. What library resources would faculty like to see in Blackboard courses?
13. How would faculty like the subject librarians to assist them to incorporate library resources into their Blackboard courses?

14. How is the Electronic Reserve working in Blackboard courses? Do faculty have any problems or suggestions for improvement of the process?

15. What library resources would students like in their Blackboard courses?

We further synthesized these questions into the seven main evaluation questions. We delivered answers to the questions about the library in a separate report.

Appendix B: Data Collection Methods

The evaluation team collected data mostly through administering open-ended/closed-ended survey questions to students and instructors, reviewing the calls about Blackboard difficulties to the IMC on campus, conducting semi-structured interviews with instructors, and conducting intercept interviews with students on campus.

Semester Surveys

Near the end of both the Fall 2004 and Winter 2005 semesters, we administered two surveys, one to a sample of students and another to a sample of instructors. The participants were sampled at random from the entire population of university instructors and the student body. These surveys asked participants both open- and closed-ended questions about their experiences using Blackboard. Our questions on the survey inquired about usage patterns, such as how much Blackboard is used and what features are used the most; the level of understanding on campus for how to use the tool; the stability of the program; instructors' and students' overall satisfaction in using the tool; and perceptions about positive or negative impacts from using Blackboard.

Review of IMC Data

Previously, the IMC was responsible for helping instructors and students with Blackboard support issues. The IMC employees note and categorize each call they receive. The evaluation team evaluated the call log, recording the number of calls in each category for each. This data provides a detailed picture of the need for continued Blackboard support on campus, and gives a good general idea about which Blackboard problems are most prevalent. However, this data shows only how many people called the IMC to report problems, not how many people actually experienced problems. There may be instructors or students who do not report their Blackboard problems (perhaps because they noticed the stoplight on the Blackboard log-in page and realized the IMC was already aware of a support issue).

Faculty Interviews

We designed the faculty interviews to provide feedback representing every college on campus and as many departments as possible. We used a mixture of random, network, and theoretical sampling on potential participants.

For the random sample, we selected faculty from every BYU department and inquired by email whether they were willing to participate in the interview. During every interview, we asked the instructors if they knew of someone in their college who used Blackboard in unusual, creative, or effective ways; in some cases, we asked if they knew of a colleague who did not use Blackboard at all. This is called "network sampling" (Merriam, 1998), as each interview becomes a source for a new sample of potential participants.

We also used some theoretical, or purposive, sampling (Glaser & Strauss, 1967) to develop the emerging evaluation theories, or to fill holes from a lack of participants in a specific demographical area. For example, we had not interviewed many female instructors, so we purposefully focused on increasing female representation. We also used theoretical sampling to add more non-users of Blackboard and more instructors from underrepresented colleges.

The interviews were semi-structured, giving the participant and interviewer freedom to explore issues in one case that may not appear in another. The interview protocol consisted of prompts we derived from the evaluation questions that we used to encourage more discussion during the interview; however, we did not ask all prompts in every interview. At first, the interviews elicited more descriptive, or substantive (Glaser, 1978) information, such as which features of Blackboard instructors used, what motivated them to adopt new features, and what impact they believed Blackboard had in their teaching. As the evaluation progressed, and we began to develop our theories, the interviews became more theoretical, and we spent more time exploring with the instructors the reasons why they used or did not use Blackboard features.

The interviews averaged about 30 minutes—we kept them short due to the instructors' busy schedules. We recorded the interviews, took notes, and transcribed the interviews.

Student Interviews

The majority of the evaluation questions were geared towards the instructor's perspective. Because obtaining the student perspective was an important, but minor, part of this evaluation, and because we didn't have any funding for providing incentives to students, we decided to conduct several short "intercept" interviews with students. Intercept interviews are brief encounters where the interviewer intercepts an individual, quickly explains the project, and asks for participation. The interview can usually include only a few questions because longer surveys would discourage the participants.

We designed the first student interviews to gather feedback about what the students, as stakeholders, would like an evaluation of Blackboard to focus on. We designed the second round of interviews to answer questions emerging from faculty interviews. During all of these interviews, the evaluator took brief notes, then immediately typed them up and wrote memos to indicate what he learned from the interviews. He entered these notes as data to code and consider along with the other interview data.

Appendix C: Data Analysis Methods

Quantitative Data Analysis

Quantitative data from the surveys and the IMC ticker records were entered into spreadsheets and reported as totals, averages, and percentages in tables or bar/line charts. When possible, the data from multiple semesters, or from both the instructors' and students' surveys, were combined into the same tables and charts to make comparisons more convenient.

Qualitative Data Analysis

Analysis of the qualitative data began during the data collection phase. As we collected data, we wrote down ideas for possible themes in an evaluation journal and in memos attached to interview transcripts. As we did this, data categories became more evident. We reported many of these categories with a very brief justification and explanation of each in a preliminary report. We then dispersed the report through email to the major stakeholders near the end of March, 2005, requesting their feedback.

After this preliminary report, we began using the qualitative research tool HyperResearch (http://www.researchware.com/) to help manage the data. We set up the major categories, which the stakeholders already predetermined. We then used a constant-comparison approach within these categories to determine the sub-categories, properties, and relationships in these categories. The constant comparison approach (Glaser & Strauss, 1967) is an analytical method in which the researcher/evaluator first compares a portion of the data with another portion, determines whether they are alike or different, and then creates categories to represent these differences. The evaluator then compares new data against existing categories until a complex coding structure emerges.

This process of constant comparison yielded a total of 142 codes, which we used to code all of the interview transcripts. Once we coded all of the transcripts, we re-analyzed each domain to synthesize and determine the relationships between the codes and identify the key findings relevant to each domain.

Establishing Trustworthiness of Qualitative Data

Evaluation differs from traditional research in many ways, but there are similarities, primarily in the methods of collecting, analyzing, and reporting the data. While evaluations traditionally are judged to be credible according to how closely they follow the 30 program standards of the American Evaluation Association (http://www.eval.org), qualitative research standards are helpful in judging the internal and external validity of qualitative evaluation data.

Internal validity

Sharan Merriam (1998) describes internal validity in qualitative data as pertaining to how closely the findings match reality. There are many ways to establish the internal validity of a study, but several

common methods include triangulation, peer debriefing, and negative case analysis. For this evaluation, we triangulated the findings using multiple sources of interviews (53) from multiple sites and contexts (28 BYU departments). We interviewed students and instructors, and triangulated the qualitative findings from the interviews with the results from the surveys. We used peer debriefing techniques, showing the qualitative findings and methods of analysis to colleagues and peers not involved in the project and asking for their feedback about the methods and conclusions. Dr. David Williams, an IP&T instructor specializing in evaluation, and Dr. Charles Graham, also of the IP&T department, frequently served as peer debriefers. Once we started developing theories about the data, we used negative case analysis, looking for ways to disprove the emerging theory. Through this negative case analysis, we rejected some theories and adapted others to better represent all of the data.

External validity

Merriam (1998) explains that external validity is "concerned with the extent to which the findings of one study can be applied to other situations" (p. 207). Merriam believes rich, thick description including descriptions of how typical cases in a case study are of the general population can increase external validity. Merriam also emphasizes the importance of multi-site designs, or research designs that require collecting data at multiple sites and in different situations.

In this evaluation, we attempted to provide as much thick description as possible while recognizing the limitations of answering many different questions in the same report. We designed this project as a multi-site evaluation, studying cases from as many departments and colleges as possible, and representing faculty differences in gender, teaching experience, technology proficiency, and other factors.

Evaluation Journal

The evaluation team made it a goal to be very clear about what methods we used for data collection and analysis so the results would be easy to interpret, and so future evaluators could easily replicate this study. Therefore, we have diligently maintained a journal of the interview portion of this evaluation, and will include it in the final report we deliver to CID. This journal describes our thoughts as an evaluation team, the steps we took to complete this evaluation, and our rationale for the decisions we made about methodology and interpretation. Those who would like a copy of this evaluation journal may contact a member of the evaluation team.

Appendix D: Suggestions for Future Projects

Even though CMSs in general and Blackboard in particular have grown very popular recently, there are surprisingly few published research studies investigating the effect these tools have in educational settings. The published research projects follow typical trends for other media studies. However, while completing this evaluation of the use of Blackboard at BYU, many of our findings unearthed new questions that neither we nor the stakeholders, had considered before. Our evaluation did not completely answer these questions, and the unanswered questions would be good ideas for future research/evaluation projects, such as:

1. What is the role of the Teacher's Assistant in the implementation process? Do instructors or undergraduate TAs make pedagogical decisions, especially during the integration of new technologies?

Surprisingly, for many courses, the TA was primarily responsible for setting up and using Blackboard, not the instructor. Sometimes the instructor was the one making decisions about how to use the technology, but these often hasty decisions were based on how everybody else in the department was using the tool. Sometimes, however, the TA made the pedagogical decisions in using Blackboard. If the TAs are involved in the actual Blackboard implementation, are their needs being met? Do we need to provide TA training, in addition to faculty training? Do TAs act as change agents to speed the adoption/implementation processes? In what ways?

2. Does technology reinforce old pedagogy or catalyze new pedagogies?

Sometimes we found that the instructors with the most innovative approaches to teaching also felt Blackboard constrained them most. In the literature, educational technologies are catalysts that pushing teachers to consider new pedagogical approaches. However, many instructors did not use Blackboard as an opportunity to reflect on their teaching styles; rather, they tried to make Blackboard support the style of teaching they already used. Also, sometimes instructors with innovative approaches seemed to be less creative when they used Blackboard. Technologies may not have as much power to prompt change as we might have supposed, and we need to focus more effort on training the instructors to consider changing their approaches.

3. What is the relationship between student wants/expectations/goals and faculty wants/expectations/goals in regards to technology. Who influences whom?

In this evaluation, students and instructors answers about what Blackboard features they liked using line up almost exactly with their goals and purposes for using Blackboard,. Why do instructors and students have such parallel ideas about how to use Blackboard? Do the methods instructors use predispose students to consider only one way of using the tool, or do students' ideas about the technology influence how instructors use it? The answer is probably both, but it would be interesting to study how the instructors and students influence each other in this regard.

4. What kinds of departmental characteristics facilitate effective use of Blackboard?

This evaluation showed the importance of colleagues, TAs, students, and even secretaries within a department in helping instructors choose to adopt and find effective ways to use Blackboard. Some departments encourage effective uses of Blackboard, while others discourage these efforts. What can departments do to foster innovation with educational technologies? What kinds of training can BYU provide to departments and department heads? What role does college administration play?

5. What kinds of tools do instructors use to replace Blackboard?

The Faculty Implementation Cycle shows that when Blackboard does not meet their instructional needs, instructors often discontinue using it and seek out other tools. It would be useful to investigate what kinds of tools these faculty members turn to. We believe some of them are MSN Messenger, blogs (but what kinds of blogging tools?), wikis (what kinds of wiki tools?), etc. We know many instructors choose to create their own Web sites as private course management systems, but we do not know how many are doing this, or what the characteristics of these Web sites are. We also do not believe instructors are looking into other CMS tools on their own, but we do not know that.

6. Are the ideas in the Faculty Implementation Cycle applicable to other technologies?

We propose that the ideas in the Faculty Implementation Cycle can help explain instructors' experience as they implement Blackboard into their courses However, we do not know how generalizable this model is to the implementation of other technologies or other CMS-like tools.

Appendix D: Case Study

Dr. Smith is dean of his college, and was one of the first professors in his college to adopt Blackboard. Dr. Smith teaches a large, introductory course with over 100 students. The course focuses on learning collaborative writing, so Dr. Smith wants to stimulate collaboration and student co-construction of knowledge and a written artifact through discussion and interaction with peers. He said that he has tried to use Blackboard for three purposes:

1) *A central location for information from the instructor about the class. He believes that Blackboard successfully fulfills this purpose.*
2) *A tool for facilitating chatting/discussion board/class conversation. He feels that Blackboard fulfills 60% of this need, but the group sites are "cumbersome" to set up and use.*
3) *A class gradebook for assessing performance on collaborative tasks. He believes Blackboard fails completely here, primarily because it does not let him easily grade collaborative work.*

In class, Dr. Smith wants his students to work in groups, but he also wants to frequently mix up these groups to give students new experiences. The difficulty is that Blackboard requires too many steps for creating groups. For example, to add a student to a group, he first must create the group through User Management>Manage Groups. Then he has to go to User Management>List/Modify Users to add users to the new group, entering each student by name or search for their initials. Many times, he does not know the student's name without the class roll, and the roll is available only through another area of Blackboard, which he cannot view while he creates groups. To compensate, Dr. Smith lists all potential users, which creates many pages of results. After locating a student, he adds the student to a group (which takes several mouse clicks). He then has to repeat the entire process. Even more frustrating, after adding one student, the student's name is deleted from the list of available users, which reorders the list order. He may have remembered that Suzy was on page 5 of the list of users, but now she may have been bumped up to page 4. It takes several mouse clicks and time to figure this out. As Dr. Smith explained, "It's really cumbersome. There's always a student that gets left out of a group."

The group-creation process is very time-consuming and inefficient. It also discourages Dr. Smith from reorganizing collaborative groups as often as he otherwise would, because once the groups are set, it takes a lot of time to reorganize them again. In offering suggestions to improve this process, Dr. Smith referred to the Macintosh operating system, and wondered why Blackboard could not let the instructor drag names from the class roll into different groups.

Another of Dr. Smith's frustrations is that Blackboard's gradebook focuses on individual scores and does not let him assign group grades. While viewing the gradebook, Blackboard also does not let him see which students are in which groups. This forces him to write down group members and their grade before opening the gradebook. Because this is inefficient, he uses Excel for grading instead. He wonders why Blackboard cannot have an option to organize the gradebook according to student groups. Dr. Smith used the term "liquid" to explain how the gradebook should function: "The gradebook is just not liquid enough for me for what I need to do. It's great to be

able to pull up an assignment and put all the grades in, that's pretty basic . . . but I need to be able to compare between assignments and go back and forth without having to pull up everybody in the entire class . . . it's just very cumbersome to use the gradebook. . . . Because of how it is, I simply use it to enter grades so students can look and see that they've got their grades. . . . I keep all my grades separate and figure them out separately."

Not only do Blackboard's limitations keep Dr. Smith from creating the collaborative environment he wants, he has basically given up on trying to find a way to use Blackboard to support his teaching methods and uses it only to disperse course documents (a teacher-centered teaching style). He no longer tries to use Blackboard for student-centered activities. "I've only thought of it as a bulletin board [to post up course documents, not for discussion], paper support system because all of the other areas that I wanted were so cumbersome that I didn't look at it for any other possibilities," he said.

After the interview with Dr. Smith, a member of the evaluation team reflected that, "Dr. Smith seemed more innovative than any I've met at trying to make Blackboard an interactive thing" (interview notes, February 16, 2005). It seems that Dr. Smith sincerely tries to find ways to improve student-centered learning with Blackboard, more so than any other professor we interviewed, but he struggles to find a way to do this effectively with Blackboard's limitations. He wants to use Blackboard because students are familiar with the tool, he is familiar with the tool, and there is better support for Blackboard on campus; however, he is learning that he needs to seek out different tools for the kinds of teaching he likes to do.