A Pilot Study of CMS Usability Testing: Blackboard and Moodle

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EXECUTIVE SUMMARY

This report summarizes findings of a pilot study of two course management systems (CMS): Blackboard and Moodle. Twenty-four full-time faculty from Long Island University participated in the study in June 2009. Four usability goals were assessed: efficiency, effectiveness, ease of use, and satisfaction. Efficiency is measured by the amount of time participants take to complete a task. Effectiveness is measured by the percentage of participants who successfully completed a task. Efficiency and effectiveness are two performance measures, while ease of use and satisfaction are two subjective, self-reported measures. Finally preference of CMS was inquired.

Findings indicate there are no significant differences on performance measures between the two CMS's, but on the subjective measures, compared to Moodle, Blackboard is reported to be easier to use, provides greater satisfaction to the user, and overall, is more preferred.

INTRODUCTION

Long Island University is currently poised to select a new course management system to facilitate and support its initiatives in web-enhanced, blended and fully online course offerings. Two contending CMS candidates, Blackboard 9 and Moodle were identified by the Office of Academic Affairs. The purpose of this pilot study was to conduct a usability testing to compare them. Specifically, the proposed study focused on faculty perceptions of ease of use, satisfaction, efficiency and effectiveness of each CMS.

Essentially, a CMS is a software system that supports faculty and students in teaching and learning. CMS's have evolved to assist instruction by managing content, enabling asynchronous communication, and facilitate evaluation and assessment (Morgan 2003). Evaluating the usability of web-based e-learning systems has traditionally been analyzed through a confluence of tools, tasks to be accomplished, and users' expectations for those tools. Mehlenbacher et al (2005) attempt to simplify this evaluative process by designing testing that begins with understanding what users wish to do (tasks) within a learning environment (an instructional setting) while using a set of tools (the interface). They report the following qualities as indicative of a relevant e-learning environment: usefulness, effectiveness, learnability, flexibility and satisfaction. Traditionally, usability assessment has been conducted with experts conducting heuristic inspections. Ardito et al (2006) compared the results of similarly conducted evaluations in an unspecified web-based e-learning platform with results using abstract task evaluation (AT), and found the AT method a more efficient method for assessing usability.

Our literature review revealed several previous studies on CMS usability testing. They showed that task performance and user subjective experiences are two major measures in CMS usability evaluations. In addition, task performance evaluations should be evaluated within the context of user skill levels (Barnum 2002), be based on generalized instructional situations (Mehlenbacher

et al 2005), and be designed with real world scenarios a user would typically try to accomplish (Rubin 1994). Rosato et al's 2007 study of WebCT, Sakai and Moodle--measured from the perspective of a student using the system for the first time-- employed eight tasks across the system tools to evaluate effectiveness, efficiency and satisfaction,. Students reported similar usability issues across all three applications, namely with terminology for tools (e.g., "assessments" instead of quizzes, "schedule" for calendar, etc.) and placement of information. Links and lists were missed when their placement didn't conform to student mental models. While Morgan's 2003 study surveyed over 700 staff and faculty in their perceptions of WebCT and Blackboard, she measured tool usage and general satisfaction. Faculty in this study reported students had difficulty in adapting to CMS tools, despite their widespread reputation as being digitally fluent. Subjects in this study tended to use CMS's primarily in face-to-face courses and primarily as an administrative means for facilitating test taking and providing grades to students; 80% of whom reported the most important tools used are for announcements, the syllabus, and content dissemination.

While previous work has considered student perceptions, faculty perceptions, and faculty tool preferences within a CMS, there is a paucity of directly relevant study. Our study is unique in terms of its comparison of the faculty perspective of CMS usage and experiences.

METHODOLOGY

Participants:

All full-time faculty attending the 2009 Teaching with Technology Institute were invited to volunteer in this pilot study. Attendees were briefed during the institute's regular session with an overall description of the study design. Twenty-four out of nearly 70 attendees participated in the study at the Faculty Technology Resource Center on the C.W. Post Campus using the facility's desktop computers.

Tasks:

Two courses (Sandbox 1 and Sandbox 2) were developed in both Blackboard and Moodle with which participants interacted for the testing. Participants were instructed to log into a test environment for each CMS where they began their explorations. Five representative tasks were designed for the testing: logging in and logging out (Task 1); adding a syllabus (Task 2); posting a discussion topic (Task 3); creating a web link (Task 4); and finally, creating an assignment (Task 5).

Design:

This is a within-subject design study. All participants evaluated both Blackboard and Moodle, but half of the participants started with Blackboard, and half of them started with Moodle.

Procedure:

After exploring the interface and functionality of one CMS, participants followed instructions to complete 5 tasks. Then they were directed to duplicate those tasks in another CMS. After an identical set of tasks were completed in both CMS's, faculty were directed to answer a short set of questions on a web-based survey to gather participant demographic data and feedback. The

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CMS "sandbox" courses were routinely archived to capture evidence of task completion and to refresh the environment for newer participants.

To ensure impartial monitoring of the testing, a test protocol was established and distributed to FTRC staff who assisted with the testing administration. First and foremost, our predominant message to participants was that the CMS' were being tested, not the faculty. Suggestions and guidelines were also outlined for participant questions and behavior. For example, staff was asked not to voice any personal opinions about either system, and to gently and kindly redirect participations to the testing so as not to skew the timing results for task completion. First day results and anecdotal feedback from the participants alerted us to a significant amount of dissatisfaction with the task instructions. Faculty complained that the instructions were too detailed and required too much attention to the paper copies, distracting them from the CMS interfaces. After the first day and a half of testing, instructions were shortened to include only the task description, rather than the entire set of step-by-step instructions for that task. These two versions of task instructions are differentiated in the Results section simply as long and short instructions.

Measures:

There are two types of measures in the study: objective performance measure and subjective survey measure. Performance measure of task completion time and completion rate were recorded by Morae™, a screen capture software. The subjective measure includes participants' perception of ease of use, satisfaction, and preference of CMS. It is measured by a survey. The survey also collected information about participant background (campus, department affiliation), skill assessment (experience using technology and the Internet, preferences for using technology in their classrooms), and their previous experiences and impressions of CMS. (Please refer to Appendix for the Survey Questions)

RESULTS & DISCUSSIONS

Our results are divided into two major sections. Part 1 summarized the findings from background survey including participants' demographic information, skill assessment, and their previous experiences and impressions of CMS. Part 2 summarizes our findings from the usability testing including the analysis of both objective and subjective measures. At the end of this session, observation and qualitative notes are summarized and discussed.

Part 1: Background Survey Results

Demographics

As shown in Figure 1 and Table 1, our participants are mainly from C.W. Post (54%) and Brooklyn (42%) campuses, where our majority of faculty and students are from. They represent divers departments on the campus, making our findings representative.
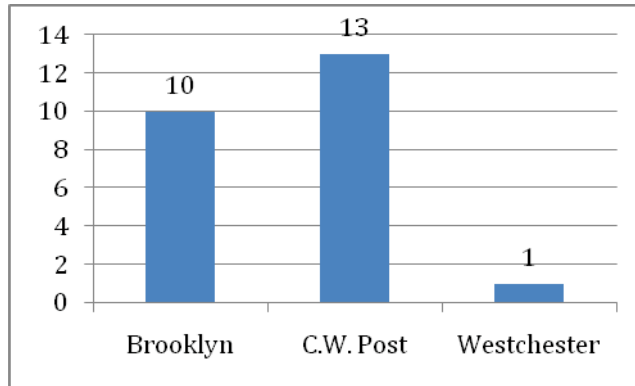
Figure 1: Number of Participants from Different Campuses (Question A1)

	N	Percent
Management/Business	3	12.5
Liberal Arts & Science	3	12.5
Education	7	29.2
Health Profession & Nursing	3	12.5
Pharmacy	2	8.3
Library, Academic Affair, FMRC	5	20.8
n/a	1	4.2
Total	24	100

Table 1: Number and Percentage of Participants by Department (Question A2)

Skill Assessment

Background survey results showed that our participants are heavy computer users. (Questions A3-A5)

- 75% of them have used a CMS before.
- 75% use computers for work for more than 20 hours a week and 21% for 10-20 hours a week.
- 83% have been using the Internet for more than 10 years.
- 92% multitask when using computers.

In terms of different computer application usage, our participants reported that: (Question A6)
- 100% check email daily
- 100% used word processing programs for work
- 92% used advanced word processing program
- 75% used spreadsheet for work, but advanced spreadsheet usage is relatively limited (50%).
- 79% used technology for class presentation

When asked about using technology in teaching, results are depicted in order of preference for faculty participants using different communication channels (Questions B1-B3). Responses were listed in a Likert scale (1=most disfavored, 5=most favored).

When communicating with students, it is interesting to note that university email is the most favored channel while personal email is the least favored. CMS channels (discussion, email, and chat) were also favored by our participants.
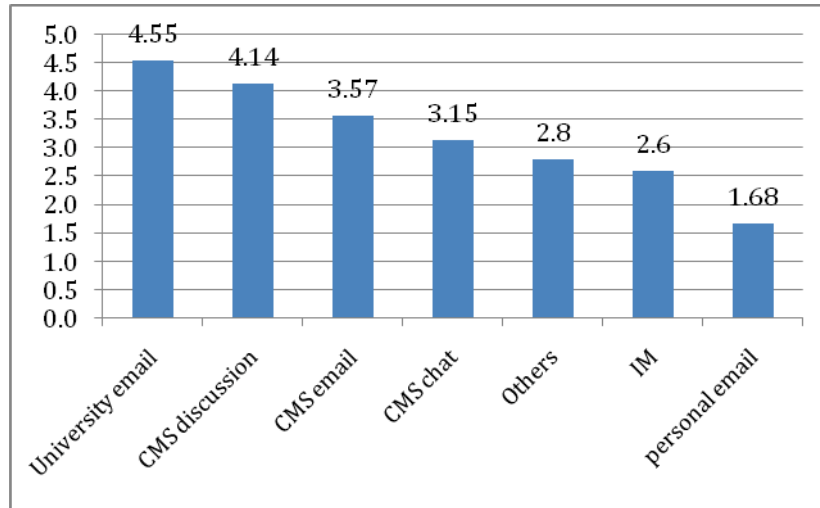

Figure 2: Faculty Preference for **Communicating with Students**

For exchanging documents with students, CMS channel (tools, email) were more preferred than university email and personal email.
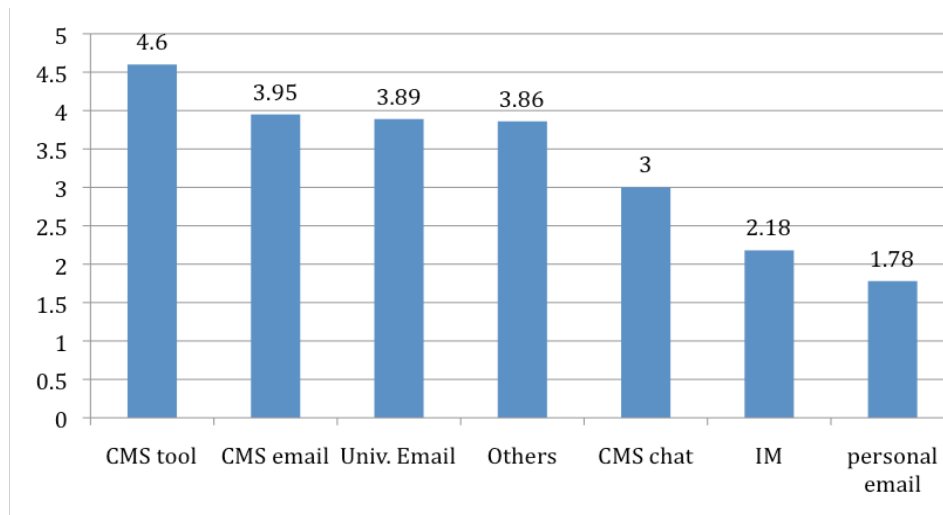

Figure 3: Faculty Preference for **Exchanging Documents with Students**

When providing feedback to students, a CMS gradebook, university email, and other (e.g. returning graded paper) are the top three preferred ways.
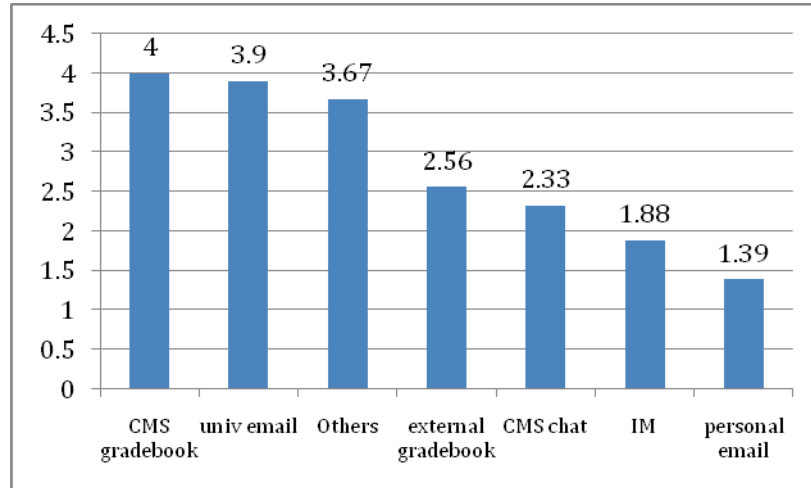

Figure 4: Faculty Preference for **Providing Feedback to Students**

Overall, a CMS tool and University email are preferred channels for faculty in communicating, exchanging documents, and providing feedback to students. Personal email is the least favored channel for all three activities.

Part 2: Usability Testing

Four usability goals were tested in our study: efficiency (task time), effectiveness (task completion rate), ease of use, and satisfaction. Five representative tasks were selected for the study: Task 1: log in and log out; Task 2: add a syllabus; Task 3: post a discussion topic; Task 4: add a weblink; and Task 5: create an assignment.

In the following, we will report our comparison of these four usability goals, as well as participants' preference between Blackboard and Moodle. In the end, we summarize the observation and qualitative comments collected in the usability testing.

Efficiency

Efficiency refers to how fast a user can complete a task. It is measured by the task completion time, converted to seconds.

As shown in Figure 5, it appears that participants took less time in Blackboard than in Moodle to complete tasks. However, paired t-test showed that actually Blackboard and Moodle reached similar levels of efficiency (p>.05) except in Task 4 (adding a web link), Blackboard is more efficient than Moodle (t(23)=1.96, p=.06).
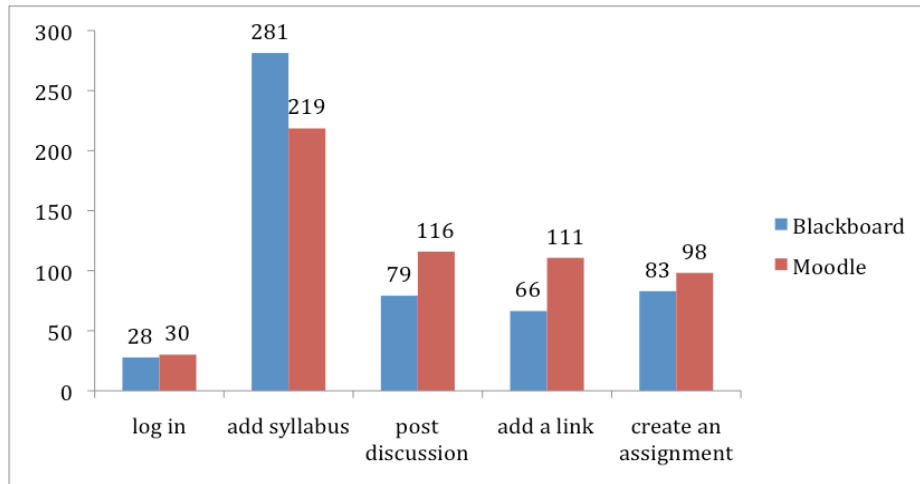
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Figure 5: Mean Task Time (seconds)

When we split the data by long instruction (Figure 6) and short instruction (Figure 7), similar results are obtained that both Blackboard and Moodle reached similar efficiency except in Task 3 of posting a discussion topic in long instruction condition, Blackboard is more efficient than in Moodle ($t(15)=2.65$, $p<.05$).
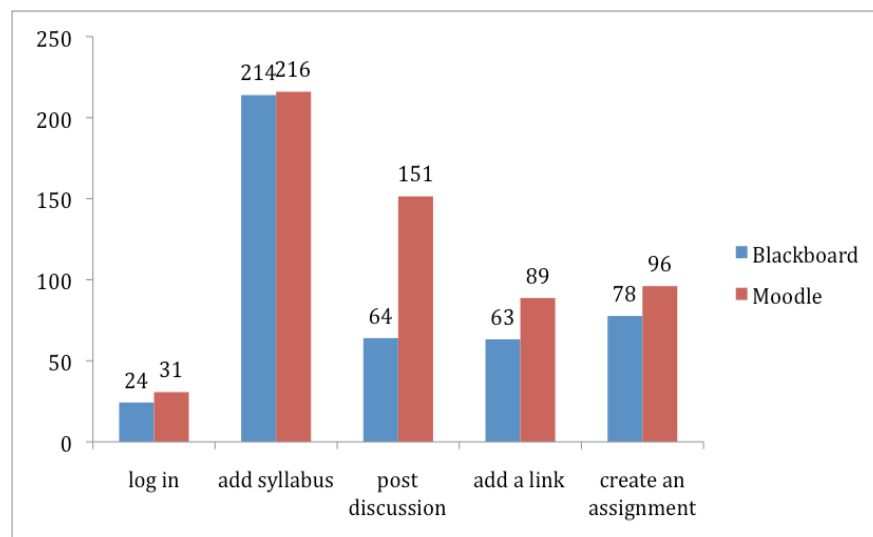

Figure 6: Mean Task Time (seconds) with long instructions

As shown in Figure 5-7, regardless whether the instructions was long or short, adding syllabus took longest time, and logging in took shortest time in both Blackboard and Moodle. For the rest of three tasks, the order of task time from longest to shortest varies between Blackboard and Moodle. With detailed step-by-step instruction (long instruction), overall all task time was reduced. In Blackboard, the order of task time changed from task 3-> task 5 -> task 4 (short instruction) to task 5-> task 3 -> task 4 (long instruction). In Moodle, the order changed from task 4-> task 5 -> task 3 (short instruction) task 3-> task 5 -> task 4(long instruction). In general, posting a discussion topic (task 3), adding a link (task 4) and creating an assignment (task 5) took similar amount of time for both Blackboard and Moodle.
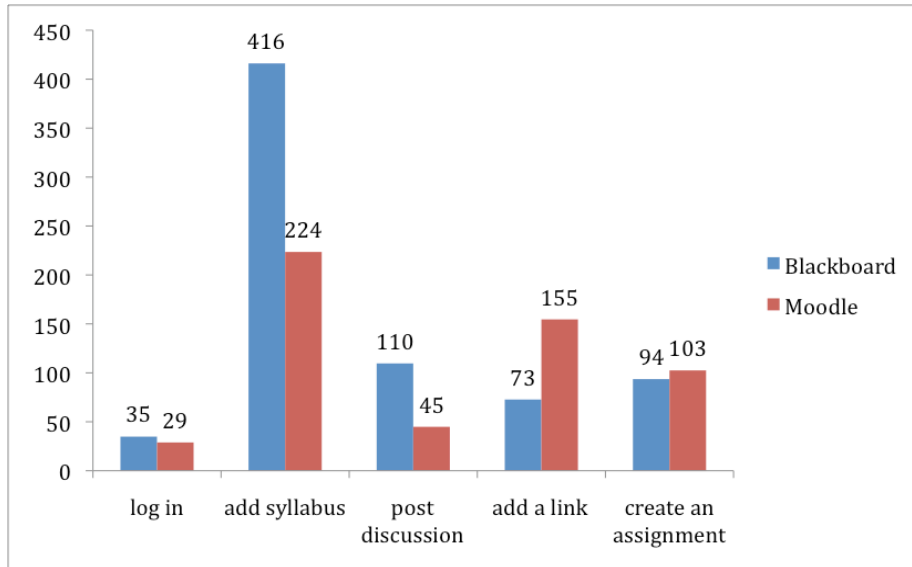
Figure 7: Mean Task Time (seconds) with short instructions

Effectiveness

Effectiveness refers to how successfully a user completes a task with the system. It is measured by the completion rate, the percentage of users who were able to complete the task by themselves.

As shown in Table 2, the easiest task is logging in, and the most difficult task is posting a discussion topic. All the rest of the three tasks are relatively easy to be completed in both Blackboard and Moodle (all between 79% and 96%).

Task	Blackboard		Moodle	
	N	%	N	%
Log in	24	100%	24	100%
Add syllabus	23	96%	21	88%
Create an assignment	20	83%	20	83%
Add a link	19	79%	20	83%
Post discussion	17	71%	19	79%

Table 2: Task Completion Rate

Ease of Use

This measure reflects users' subjective feeling when using the course management system (CMS). This can be an important factor for faculty in determining whether they would use a CMS, which can ultimately affect their performance in a CMS.
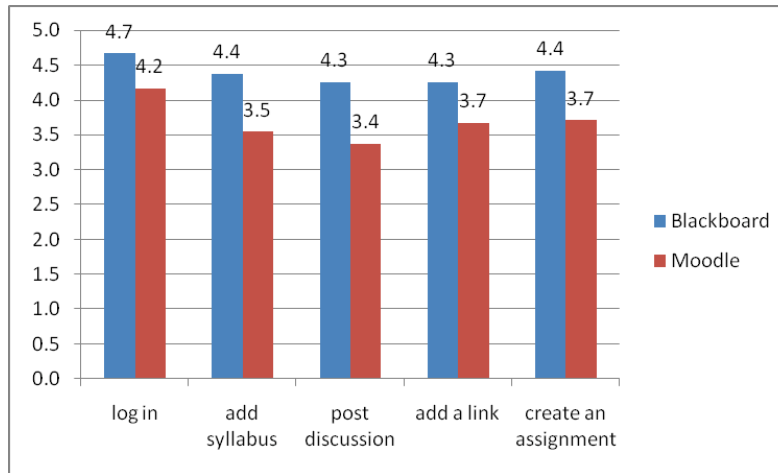
Figure 8: Ease of Use (1=very difficult; 5=very easy)

As shown in Figure 8, Blackboard is rated as easier to use than Moodle in all five tasks (Task 1: t(23)=2.02, *p* <.06; Task 2: t(23)=2.97, *p*<.01; Task 3: t(23)=3.08, *p*<.01; Task 4: t(23)=1.98, *p*< .06; Task 5: t(23)=2.43, *p*<.05).

Satisfaction

This measure also reflects users' subjective opinion on the CMS. This factor can be an important element related to users' motivation to use a CMS. If a user is highly dissatisfied with the system as a whole, they may give up on a task sooner than if they were highly satisfied.

	Blackboard	**Moodle**
Satisfaction aspects	Easy to use, edit (9) Easy to navigate (3) Well organized (2) More features (2) Similar to WebCT (2) User friendly interface (4) Easy to find information (1) Gradebook (1)	Easy to use (4) Easy to navigate (2) Well organized (2) Plenty of tools (1) Picture icon in user profile (1) Once learn it, love it (2)
Dissatisfaction aspects	Label not clear (1) Not enough time to explore (5)	Label not clear (1) Hard to navigate (3) Less intuitive interface (2) Bad gradebook (2) Not user friendly (2)

Table 3: Comparison of Satisfaction Comments between Blackboard and Moodle

In Table 3, we summarized participants' comments on satisfactory and dissatisfactory aspects of two CMS's. The common aspects between two CMS' as evidenced in faculty comments are underlined, and number of comments were quoted in () after each item. As shown in Table 3,

both Blackboard and Moodle were reported to be easy to use, easy to navigate, well organized and perceived as providing many tools. However, there are more positive comments for Blackboard than in Moodle and less negative comments for Blackboard than in Moodle. What distinguishes Blackboard from Moodle in terms of aspects of satisfaction are its similarity to WebCT, which will facilitate positive transfer of learning, nice gradebook, and user friendly interface. Unique to Moodle is its picture icon in the user profiles section. Two expert users of Moodle stated that once they learned how to use Moodle, they loved it very much.

Overall our participants tend to more be more satisfied with Blackboard than with Moodle.

CMS Preference

CMS preference is participant subjective opinion on which course management system is more favored. Similar to satisfaction factor, this factor may affect participants' future usage and interaction with the CMS. It is assumed that if people prefer one CMS to another, they will be more motivated to use the chosen CMS.

As shown in Figure 9, 54% (13 out of a total of 24) of our participants preferred Blackboard while only 25% (6 out of 24) preferred Moodle.
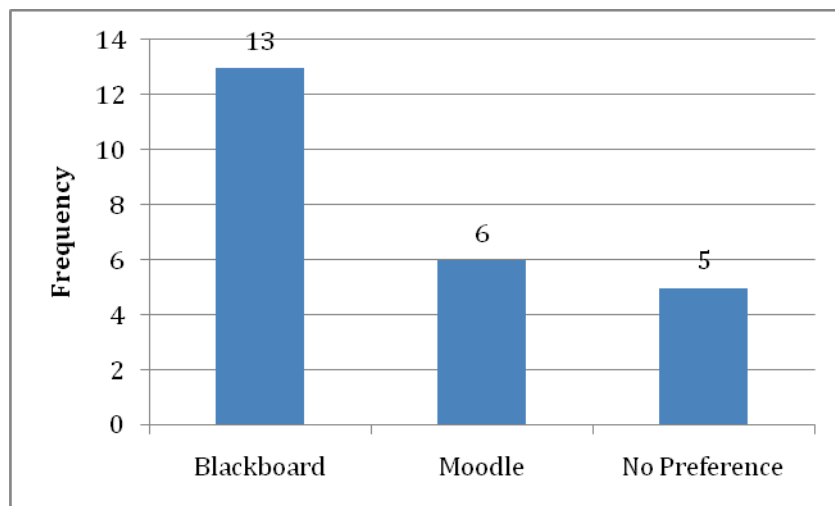

Figure 9: CMS Preference

Observation and Qualitative Notes:

Several usability problems were identified in our observation.

Firstly, common issues noted in observing the screen captures reveal the most common error or most difficult task in Blackboard was uploading a syllabus. After browsing for the file to upload as a syllabus, attaching it, and then submitting, a new window opens for editing modifications requiring the user to hit the submit button a second time. This obstacle contributed to some participants failing to complete Task 2 as they navigated away from the page, but is evidenced more strongly in the task time (Figures 6 and 7) for Task 2 rather than task completion (Table 2).

A second issue is interface consistency. Generally speaking for both systems, buttons and controls on the right-hand side of the screen were hardest for users to find. Both Moodle and Blackboard place nearly all controls on the left-hand side. However, Blackboard's editing button, an on/off toggle switch, is located in the upper right-hand corner of the interface, and some participants spent as long as 10 minutes searching for it (time between tasks was not recorded).

The third issue is visibility. Moodle's center column and the editing links which appear when its editing feature is turned on is problematic. To the right of each tool button, a series of 5 or 6 icons become visible when Moodle's editing is turned on, and this appeared to be unintuitive for our participants.

Finally, most faculty participants tended to use their browser's back button rather than the interface commands for returning to the page. While this aspect was not observed as contributing to negative task completion, it can demonstrate a lack of experience in using web applications, like CMS'.

As a result of these findings, we have made following changes to the study materials.
- We altered slightly the instructions guiding participants and questions in the survey.
- After an initial feedback of dissatisfaction with the longer, more detailed set of instructions, we have opted for a shorter version that describes the task to be completed without step-by-step guidance. It is our observation that while participants require much less time to complete the tasks using the longer version of instructions, the extended exposure to the interface and degree of unknowingness adds to the participant investment in the process.
- Based on feedback from this pilot study, we revised technology in teaching preference questions so they are better indicators of ranked preference, and we have added an agreement (or disagreement) of satisfaction indicator for Blackboard and Moodle each, to lend better continuity to the queries.

CONCLUSION

Twenty-four Long Island University faculty participated in a pilot study designed to elicit faculty preference among two course management systems: Blackboard and Moodle. Four usability goals were assessed: efficiency, effectiveness, ease of use, and satisfaction.

In conclusion, our usability study showed that there are virtually no significant differences on performance measures (efficiency-task time and effectiveness-completion rate) between the two CMS's (Blackboard and Moodle), but on the subjective measures, compared to Moodle

Blackboard is reported to be easier to use, provides greater satisfaction to the user, and overall, is more preferred.

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