Open Source Collaborative: Moodle Assessment Report Executive Summary

Abstract

Moodle open source course management system (CMS) has been found to be a viable alternative to Blackboard; the proprietary CMS used by the majority of North Carolina Community College System (NCCCS) institutions. This conclusion was reached by a team of NCCCS staff using three independent research techniques - each of which verified the findings. The three techniques included functionality comparisons, end-of-term survey results by both instructors and students, and case studies of four NCCCS institutions that have migrated from Blackboard to Moodle. The study reports that the CMSs had similar overall application functionality and the faculty and students seem equally satisfied with the CMSs ease of use. The case studies indicated that migration from Blackboard to Moodle is challenging and resource intensive at the college level but the four Moodle colleges are uniformly satisfied with the results and report reduction in overall costs once the migration is completed. The study identified lack of "instructor comfort" with both CMSs suggesting more effective instructor training is needed. However, this study did not fully address the issues of technology and funding framed in terms of scalability, compatibility, and interoperability of all learning technology applications used in the NCCCS. The team recommends a determination of the technical and financial solutions required for the next stage of CMS utilization within the North Carolina Community College System.

Rationale for Report

At the meeting in May, 2008, the North Carolina State Board of Community Colleges' Finance and Capital Needs Committee requested a Moodle Assessment Report to determine the status of "Moodle as a viable open-source alternative to the proprietary Blackboard online course management system (CMS)." M.O.O.D.L.E., or Modular Object Oriented Dynamic Learning Environment, is an open source online course management system. The North Carolina Community College System Office currently funds the license fees for the proprietary Blackboard Enterprise CMS for a minimum annual cost of $1,400,764 for service to 52 colleges across the state (see Attachment B: NCCCS CMS Contract History in full report).

Currently, four NCCCS institutions use Moodle exclusively: Isothermal Community College, Blue Ridge Community College, Guilford Technical Community College, and Southeastern Community College. Each of these four community colleges selected Moodle CMS for various reasons, cognizant of the challenges and expenses that would be involved in such a migration. At the writing of this report, four additional NCCCS institutions are actively pursuing Moodle as their primary CMS for the future. The Report compares the specific functionality, utility, ease-of-use, and total cost of ownership between both Moodle and Blackboard CMSs in these categories. While there are existing Moodle/Blackboard comparison studies across the nation, they do not specifically reflect the needs, capabilities, and unique culture of the NCCCS.

Moodle Assessment Approach

The study targeted academic concerns such as course navigation, ease of use, communication and collaboration tools, course content, assessment, and upload capabilities. To this end, a triangulated study was created to fully investigate Moodle as an effective learning/teaching platform through (1)

student and instructor surveys, (2) functionality comparisons between Moodle and Blackboard, and (3) case studies from institutions which have fully switched to Moodle as their CMS. In each case, academic considerations were the top priorities, however, as the study evolved, the team discovered a need for more technical and total cost of ownership information. Thus the scope of the study expanded to accommodate these areas.

Background

In May 2008, the State Board of Community Colleges approved a contract with the University of North Carolina General Administration (UNC-GA) to establish the joint Systems Open Source Collaborative Moodle Assessment. Open source collaboration was attractive to both the NCCCS and the UNC-GA. Moodle was selected as the first CMS software for pilot use by institutions in both Systems. Emphasis was placed on assessment of Moodle to discover if "Moodle is a viable open source alternative to Blackboard," the proprietary online CMS used by the vast majority of all North Carolina public institutions of higher education. Open source describes software distributed under licenses guaranteeing anyone the rights to freely use, modify and redistribute the source code. The open source paradigm allows concurrent input of different functions, approaches and priorities which differ from the more closed, centralized models of proprietary software development. Moodle is supported by a trust that consolidates the contributions of many e-learning professionals and programmers.

The North Carolina Moodle Users Group (NCMUG) was established in 2006-07 by funding provided from Senate Bill 622- 2+2 UNC/NCCCS Initiative for the express purpose of finding a cost effective alternative to proprietary CMS products, as several NCCCS institutions were actively experimenting with Moodle at the time. NCMUG was formed to consolidate the efforts of those colleges. NCMUG provided administrator and instructor training, hosted courses and system administration services through a contract with Remote-Learner, a Moodle partner. NCMUG eventually provided Moodle services to a total of 15 community colleges and 2 UNC institutions. Successes of NCMUG were the catalyst for the Open Source Collaborative Moodle Assessment.

The first stage of the Moodle Assessment began in May 2008 when funds were approved to provide hosted hardware, application administration, training, and customized programming in critical areas to support a centralized Moodle implementation project capable of supporting 100,000 online students and providing a testing platform for multiple community colleges. At the time of this Report, 25 NCCCS institutions have Moodle instances hosted at the Microcomputing Center of North Carolina (MCNC).

This second and final stage of the Moodle Assessment was to formally determine the viability of Moodle through end-of-semester surveys, Blackboard/Moodle CMS functionality comparison surveys and college case studies. The full Moodle Assessment Report and this Executive Summary complete the second stage.

Methodology

End-of-Term Survey Methodology **-** In April 2009, the Assessment Team delivered two end-of-term evaluation surveys to participating colleges. Six Blackboard NCCCS institutions were selected to participate in the study: Caldwell, Edgecombe, Montgomery, Robeson, Rockingham, and Southwestern community colleges had comparable Distance Learning curriculum enrollments to the four Moodle colleges. These colleges used Blackboard exclusively and had no experience with Moodle, and as such were considered Blackboard colleges to prevent any crossover of Moodle influences; thereby reducing the potential for bias. The survey was administered to all distance learning students and instructors at the 10 participating colleges.

There were Instructor and Student end-of-term evaluations for both Moodle and Blackboard users. The two surveys were identical with the exception of differences in terminology and functionality particular to each CMS. Only students and instructors who had at least one semester of experience using the CMS in a "hybrid/blended or completely online course" were invited to participate. Participation was voluntary and anonymous.

Data from both the student and instructor surveys were analyzed using a descriptive statistic and a t-Test comparison of means analysis. These types of analyses are appropriate when comparing the means of two groups.

Case Study Methodology

In March 2009, a questionnaire was sent to the four Moodle colleges. Follow-up responses were collected through email, phone conversations and Word documents pertaining to:

- Reasons and decision making for the migration
- Implementation strategy for the migration
- Training and orientation of students and faculty
- Courses and resources of migration strategy
- Current status of college CMS
- Total cost of ownership involved for migration

Moodle colleges provided the Assessment Team with additional data which had been utilized throughout the transition(s) such as PowerPoint presentations, meeting agendas, minutes, etc. to give a more expansive view of the migration process. This presented some challenges in collating the data, however, the additional information proved invaluable in presenting a comprehensive view of the transition process.

Functionality Comparison Methodology

In March 2009, a CMS Functionality Comparison Matrix questionnaire was provided to online instructors and distance learning (DL) administrators at all 58 community colleges. Both online instructors and DL administrators were invited to participate, as the assessment team sought the differing perspective provided by the "back-end" users, i.e.: DL administrators and the "front-end" users i.e.: instructors. Participation in the comparison was voluntary. The objective was to compare functionality of the current versions of Moodle and Blackboard. Respondents were requested to answer only questions pertaining to their college's current CMS, either Moodle or Blackboard.

Results and Analysis

End-of-Term Survey Results

The Student End-of-Term Survey recorded 1,127 student responses from the 10 participating NCCCS institutions. Two hundred forty-eight students were from the Moodle institutions and 879 students were from the six Blackboard institutions.

The Instructor End-of-Term Survey recorded 199 instructor responses from the 10 participating institutions - 93 from Moodle institutions and 106 from the Blackboard institutions.

The Assessment Team completed a descriptive statistical analysis for the Student End-of-Term Survey using a t-Test comparison of means analysis. Additionally, the Assessment Team consulted with researchers from the William and Ida Friday Institute for Educational Innovation, affiliated with NC State University, who performed an exploratory factor analysis (EFA) and multivariate analysis of variance (MANOVA). These tests allowed researchers to examine the internal reliability of the survey.

The Assessment Team completed a descriptive statistical analysis and a t-Test comparison of means analysis for the Instructor End-of-Term survey. No underlying trends were identified as requiring additional analysis from the Friday Institute.

The survey analysis shows no real difference between Blackboard and Moodle, however, students' perceptions of instructor comfort levels with either CMS were significant. Also significant was whether students received an orientation in the CMS. Supporting this finding was the Friday Institute's statement, "Blackboard and Moodle are not that different. The real difference is found in students' perception of their teachers' comfort level with the application. There exists a significant correlation between student survey scores of both Blackboard and Moodle with the perceived comfort level of instructors using either application."

Thus, student perceptions are most influenced by instructor experience (training and staff development) and the students' own experience using the application and/or receiving an orientation to the CMS.

These findings were verified by the initial t-Test analysis, completed by the Assessment Team, which revealed that only three questions were statistically significant out of 38 in the data set. The findings were also verified by the EFA and MANOVA analyses completed by the Friday Institute.

Case Study Results

Results of the case study questionnaires were compiled by the Assessment Team. Follow-up information was needed in the areas of total cost of ownership and the current status of the Moodle CMS at those colleges. The Assessment Team reviewed and compared the information reported from the four Moodle colleges for the case study analysis.

Moodle Assessment case studies reveal that migration from an established proprietary course management system presents major challenges; however, all four case study institutions willingly took on this challenge with reported success and satisfaction with the migration.

Challenges

Migration to Moodle requires considerable time, funding and resources. Migration disrupts existing processes, systems, and people. Comprehensive planning must precede implementation. Both Blackboard and Moodle CMS solutions must be operating at production levels simultaneously throughout the transition period. This requires additional funding for the transition period. Open source cost savings won't be realized until transition is complete and the college is supporting only one CMS. Case studies provide a means to document critically important, in-depth experiences and best practices derived from actual community college migrations from Blackboard to Moodle. Migration away from an established, mission-critical application is a serious undertaking. Every aspect of training, support and instructional methodology, as well as application and finance is affected.

The case studies provide insight into how very unique institutions as defined by size, location, specific needs, and skill sets of staff and faculty accomplished such a challenging undertaking. Details of the migration strategies follow.

Reasons and Decisions for the Migration

Each of the four colleges reported independently that dissatisfaction with Blackboard in the form of application problems, server performance, technical help desk delays, unacceptable hosting solutions, and increasing costs were the primary reasons for seeking an open source CMS solution. Frustrations with these recurring problems were sufficient incentive for college support and academic staff to seek alternatives. Isothermal Community College expressed difficulty training faculty with vendor resources without additional costs. Isothermal questioned the total value of Blackboard software. Guilford Technical Community College reported failing upgrades, lost content, and weekly system crashes. Faculty and students were frustrated.

Implementation Strategy for the Migration

NCMUG institutions had a distinct advantage as they benefited from uniform training, support, and hosting. Each had received a turn-key Moodle installation that was supported for the duration of the NCMUG pilot. At each of these institutions a Moodle administrator was trained and available as were five instructors. Currently, of the 15 NCMUG community colleges, all but two are actively using Moodle for instruction. Case studies indicated that migration strategies are composed of the following steps:

1. Create a leadership team charged with creating a migration plan and oversee its implementation. This team would generally consist of IT and distance learning staff, academic leadership, representatives from the business office, and skilled instructors.
2. Establish first a pilot and then production Moodle environments.
3. Develop orientation and training resources for instructors.
4. Enroll early adopters for using Moodle in classroom instruction.
5. Phase in instructors from each department.
6. Generate feedback, performance measures and assessment resources to measure progress and success.

7. Create orientation and support resources for students.
8. Select a transition period.
9. Implement the plan and include continuous improvement strategies.

Training and Orientation of Students and Faculty

The case study indicated that robust orientation and training resources are critical to the success of any CMS. Online instruction has been used extensively in all NCCCS institutions for nearly a decade, and introducing a new CMS allows colleges to capitalize on the extensively skilled faculty and staff needed to develop innovative and appropriate orientations to the remaining faculty, staff and students who will need training in the new CMS. Moodle, as a world-wide open source application, does lend itself to collaboration. Moodle.org provides a tremendous collection of resources readily available to administrators and instructors. NCMUG and case study institutions freely shared Moodle orientation and training resources.

Courses and Resources Migration Strategy

Case studies report that course migration represents a major drain on college resources. There is no one-to-one migration tool for converting Blackboard courses to Moodle. Estimates for purchasing services for course conversion varied from college to college. Converting extremely sophisticated courses with large and numerous files often costs more. Course migration is a one-time fee and costs can be shared across departments and institutions. Professional assistance in course conversion was also available from Moodle partners, and some colleges contracted with vendors to provide course migration assistance and training. In most cases, however, community college staff attained the skills to migrate their own courses via Moodle partners. Overall, migration to Moodle was successful as indicated by the following comments provided by case study institutions.

"Moodle allows us to explore more team teaching than ever before....in Moodle, faculty can work together to create content while keeping their individual sections apart....after using Moodle for a year, many of the faculty members who were negative about the switch have since changed their minds. Having their content intact made them more confident about Moodle....overall, we consider the move to Moodle a success." *Guilford Technical Community College*

"[Moodle] has all of the features we need to develop and deliver high-quality online courses. Students like the interface and find it easy to use...we are very satisfied with Moodle and look forward to expanded features and uses as time goes on." *Blue Ridge Community College*

"After the initial migration, a stable, easy to use Moodle platform made subsequent distance learning [enrollment] growth...by reducing barriers and providing a smooth platform for distance learning instructors. Moodle was found to be less complex and more usable by faculty. Compared to the Vendor CMS, Moodle has proven to be a more user-friendly system resulting in increased use by the majority of college faculty and more satisfaction [reported] from both faculty and students." *Isothermal Community College*

"The Moodle implementation was successful. Students like the interface and require very little assistance with course navigation. Faculty who have spent time working with Moodle are very satisfied with it." *Southeastern Community College*

Total Cost of Ownership

The Total Cost of Ownership analysis for the Moodle migration was organized into three one-year reporting periods. The first year being the pre-transition year or "Blackboard Only" year; the second year being the transition year when the colleges use both CMS applications at the same time; and the third year being the post-transition year when the college is completely migrated to Moodle. The Assessment Team categorized the college's migration costs into four main expenditure areas: CMS License Fees; Self or Vendor Server Hosting and Administration Fees; Faculty or Staff Training Fees; and Blackboard to Moodle Course Conversion Fees.

The analysis revealed the total pre-transition year cost for all four case study colleges totaled $184,410. There was a 35% increase in total cost in the transition year to $248,300, due to supporting two CMSs simultaneously. Lastly, the post-transition year cost of ownership was $52,296, which accounted for a 72% decrease in total cost compared to that of the pre-transition year. The total cost savings from pre- to post-transition years for all of the case study colleges was $132,114.

Functionality Comparison Results

One hundred thirty-seven online Instructors from 28 of the 58 community colleges participated in the CMS Instructor Functionality Comparison. Thirty-six DL administrators from 27 of the 58 colleges participated in the CMS Administrator Functionality Comparison.

A modified frequency count was utilized to determine the highest level of perceived functionality of the CMSs. Moodle 1.9.x had the highest instructor perceived functionally rating with a yes vote total of 220. The instructors believed that Moodle had better functionality in 220 of the 283 total functionality questions. Blackboard 7.x/8.x Academic Suite came in second with 203 yes votes. Blackboard 7x Learning System finished last with 173 yes votes. There was not enough data reported on the Blackboard 8.x Learning System to compare the functionality. Moodle 1.9.x had the highest administrator perceived functionally rating with a yes vote total of 89. The administrators believed that Moodle had the better functionality in 89 of the 111 total functionality questions. Blackboard 7.x/8.x Academic Suite came in a close second place with 87 yes votes. Blackboard 8.x Learning System was evaluated to have 70 yes votes. Blackboard 7.x Learning System finished last with 54 yes votes. Blackboard version 9.0 was not in use by any NCCCS institutions at the time this study was conducted. Blackboard 9.0 is currently undergoing evaluation by several community colleges.

Conclusions

The Assessment Team concludes that Moodle is a viable option to Blackboard. This conclusion is supported by the following findings:

1. The end-of-term student and instructor surveys showed that Blackboard and Moodle are not that different. The real difference is found in student perception of their teachers' comfort level with the application. There exists a significant correlation between student survey scores of

both Blackboard and Moodle with the perceived comfort level of instructors using either application. Thus, student perceptions of both CMSs were influenced by instructor experience, training, and skills.

2. The CMS application functionality comparison by online administrators (application and network) and online instructors indicated that Moodle 1.9x has a higher perceived functionality than any version of Blackboard evaluated. The large number of "did not use" responses suggested that neither CMS platform was utilized to full capacity.

3. Case studies of four exclusively Moodle institutions indicated that while transition to Moodle was challenging, ultimately the case study students and faculty preferred Moodle over Blackboard. The case studies also indicated that during transition, because Blackboard and Moodle CMS solutions needed to be simultaneously operable, more funds were required for the transition year before open source solution savings could be realized. A successful migration transition strategy was required in which:

    - Appropriate administration, technical support, and academic leaders/representatives were involved and empowered to design a transition plan.
    - Moodle first was established at a testing and training level.
    - Production-level solutions were verified.
    - College-wide training was planned, scheduled and implemented.
    - An assessment strategy was created in parallel.
    - Migration to Moodle was accomplished.

4. The Assessment Team concludes that this study has only addressed the academic considerations of Moodle as a viable alternative to Blackboard. This study did not fully address the issues of technology and funding as framed in compatibility and interoperability of all learning technology applications.

5. NCCCS currently contracts with Blackboard to provide Online Help Desk technical support for students taking both Blackboard and Moodle courses. Cost for expansion of online help desk support is likely to increase during transition periods – periods with dual CMSs are required.

Recommendations

Academic considerations regarding Moodle/Blackboard functionality and usability have been thoroughly addressed in this study. The Assessment Team finds that Moodle and Blackboard now represent a "binary CMS" situation in the NCCCS. Moodle is now and will remain the primary CMS for a growing number of NCCCS institutions. This is due to the functionality, flexibility, performance, and cost-effectiveness of Moodle. Thus, Moodle deserves continuing support and promotion by the NCCCS Office. Therefore, an exclusive Blackboard solution is no longer practical, given the progress/interest of Moodle at NCCCS institutions. There does exist the possibility of a hybrid of Moodle/Blackboard CMS as demonstrated by Blackboard to NCCCS staff in the March 2009 presentation of Blackboard version 9.0 and subsequent planned Blackboard version 9 series.

The Assessment Team recommends determination of the technical and fiscal criteria required for the next stage of CMS utilization within the North Carolina Community College System. Options to consider include:

- Status quo (obvious short term solution).
    - Adoption of Moodle as a secondary CMS.
    - Continuation of Blackboard as the primary CMS.
- Adoption of Moodle as the primary CMS.
- Development of an interoperable hybrid or blended use of both Moodle and Blackboard.
- Selection of a suitable future CMS solution via Request for Proposal.

Thus the next issues to be addressed are technical and financial – framed in a feasibility study to answer the question: "What is the best CMS solution for the NCCCS?" Technical and financial issues to be addressed to answer this research question include:

- Projected expansion of hardware/hosting needs required as NCCCS institutions adopt more robust applications, use of integrated software solutions, and increased use of existing functionality.
- Technical training for instructors and administrators.
- Interoperability and compatibility with all learning technology applications
- Centralization of applications to reduce overall costs to NCCCS - realization of economies-of-scale in all regards - System-wide hosting solution.
- Support for dual production environments during migration periods.

The Assessment Team recommends that the proposed Study Group be composed of representative stakeholders in the NCCCS, and that a "feasibility plan" providing guidance regarding the future CMS in the NCCCS should be developed by the end of fiscal year 2010.

Final note: Currently the NCCCS Office only provides funding for (1) the current Blackboard contract providing Learning System software for 52 clients and (2) the Open Source Collaborative Moodle installation hosted through a contract with UNC. One major concern is the future role of the NCCCS Office in supporting any decision that requires more funding and staff support than is currently available.