

North Carolina Community College System Office: Learning Technology
Systems

Open Source Collaborative: Moodle Assessment Report

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I 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 functionality 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 functionality 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.

II Rationale for the 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. Four additional NCCCS institutions are actively pursuing Moodle as their primary CMS for the future.

NCCCS has evolved into a “two-CMS” System, underscoring the gravity of this assessment and requiring the researchers to include complete utilization and total cost of ownership pertaining to both Moodle and Blackboard. This Report compares the specific functionality, utility, ease-of-use, and total cost of ownership between both Moodle and Blackboard CMSs. The Assessment Team determined that a study of Moodle and Blackboard utilization in North Carolina Community Colleges was of critical interest to the future of online learning in the state and worth the expense of conducting this study. While there are existing Moodle/Blackboard comparison studies, they do not specifically reflect the needs, capabilities and unique culture of NCCCS.

Learning Technology Systems Business Requirements

The NCCCS Learning Technology Systems staff developed a set of Business Requirements (see Attachment A) to employ when selecting and procuring all new learning technologies. The requirements support (1) the academic, technical, and financial goals and objectives of the NCCCS and (2) comply with the recommendations of the North Carolina e-Learning Commission.

The Assessment Team was charged with identifying if and how the implementation and utilization of each learning platform, Moodle and Blackboard, conformed to these business requirements. As such, the study was framed in terms of satisfying these requirements.

Moodle Assessment Team Approach

Three NCCCS colleagues conducted the Moodle Assessment and wrote this report: , Dr. Bill Randall, Associate Vice President of Learning Technology Systems; Mr. Jonathon Sweetin, Applicator Integrator of Learning Technology Systems and lead investigator, and Ms. Diane Steinbeiser, Assessment Coordinator, Learning Technology Systems. Faith Jelley, formerly with the University of North Carolina Teaching and Learning with Technology (TLT) Collaborative provided assistance in the development of the end-of-term surveys and training coordination. 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.

III 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 software for pilot use by institutions in both Systems. Emphasis was placed on assessment of Moodle to discover if "Moodle is a viable 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 users 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. This report investigates the viability and scalability of online teaching utilizing the open source course management system (CMS), Moodle, as opposed to the proprietary CMS Blackboard which the NCCCS and UNC-GA have utilized since 1998.

The North Carolina Moodle Users Group (NCMUG), was established in 2006-07 and provided administrator and instructor training, hosted courses, and system administration through a contract with Remote-Learner, a Moodle Partner. NCMUG was extended an additional two years eventually providing Moodle services to a total of 15 community colleges and 2 UNC institutions. Successes of NCMUG directly lead to the establishment of the Open Source Collaborative: Moodle Assessment.

May 2008, the first stage of the Moodle Assessment, funds were approved to provide hosted hardware, application administration, training, and customized programming in critical areas to support a centralized Moodle implementation capable of supporting 100,000 online students and to provide a testing platform for multiple community colleges. There are currently 25 community college Moodle instances hosted at the Microcomputing Center of North Carolina (MCNC) and supported by Remote-Learner.

The following NCCCS institutions are piloting Moodle:

- Alamance Community College
- Asheville-Buncombe Technical Community College
- Bladen Community College
- Brunswick Community College
- Cape Fear Community College
- Carteret Community College
- Catawba Valley Community College
- Fayetteville Technical Community College
- Haywood Community College
- James Sprunt Community College
- Johnston Community College

- Lenoir Community College
- Pitt Community College
- Randolph Community College
- Rowan-Cabarrus Community College
- Sandhills Community College
- South Piedmont Community College
- Southwestern Community College
- Surry Community College
- Vance-Granville Community College
- Wake Technical Community College
- Wayne Community College

Blue Ridge Community College, Guilford Technical Community College, and Isothermal Community College have their production Moodle installations hosted at MCNC.

This second and final stage of the Moodle Assessment was to formally determine the viability of Moodle through end-of-term surveys, college case studies and the Blackboard/Moodle CMS Functionality comparison survey. This full Moodle Assessment Report completes the second stage.

The NC 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 clients (51 colleges and the NCCCS Office) across the state (see Attachment B : NCCCS CMS Contract History).

Considerations

- Blackboard is in current use by 51 NCCCS institutions.
- Blackboard has been in use by the vast majority of NCCCS institutions for a decade.
- The NCCCS Office currently provides license funding for Blackboard's "Learning System" software for all Blackboard clients at a cost of \$1.4 million for fiscal year 2009-10.
- Select individual community colleges pay an additional \$1 million to Blackboard for hosting and services – total costs to NCCCS will be a minimum of \$2.4 million for 2009-10.
- Four community colleges are exclusively Moodle, one community college officially supports both CMSs, and four additional community colleges have announced migration to Moodle by fall 2010.
- The NCCCS Office has, as a goal, to provide uniform and robust learning technology services to all 58 institutions and has created the Learning Technology Systems Business Requirements that outline how current and emerging commercial and open source solutions will be designed, integrated, and contracted in the future.
- Moodle, if found to be a viable alternative as a learning/teaching platform could be provided, as a System-wide service, within the current enterprise-course management system line-item allocation of \$1.37 million.

- Perceived benefits of an open source CMS to the NCCCS could be:
 - Increased flexibility of functionality at the institutional level.
 - Options for institutions to have multiple instances of open source CMS. (Curriculum and Occupational and Continuing Education, for example)
 - Substantial monetary savings each year.
 - Guarantee that a CMS provider would never jeopardize such a large-scale mission-critical service through disruptive acquisition.
 - Expansion of the current Open Source Collaborative to cooperate in creating and maintaining effective state-wide enterprise-solutions that provide the most cost-effective learning technology possible and realize all possible economies-of-scale.

IV Methodology

The Moodle Assessment research methodology utilized a triangulated study to investigate Moodle as an effective learning/teaching platform which focused on academic considerations such as course navigation, ease of use, communication and collaboration tools, course content, assessment, and upload capabilities through the following instruments:

1. Student and instructor end-of-term surveys developed to document user perceptions of both Moodle and Blackboard (independently) in areas of ease of use, communication, and functionality.
2. Case studies of four community colleges which have migrated to Moodle from Blackboard. These community colleges were asked to contribute information about the migration in the following areas:
 - 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
3. Functionality comparison of Moodle and Blackboard by instructors and IT/application administrators. Two unique functionality survey instruments were developed targeting instructor use and software administration.

End-of-Term Survey Methodology

The study team delivered two end-of-term evaluation surveys to the 10 participating colleges - six Blackboard and four Moodle institutions. Candidates for the Blackboard colleges were considered if they used Blackboard exclusively and had no experience with Moodle. This was important criteria as the researchers' intent was to prevent any crossover of Moodle influences, thereby reducing the potential for bias. An additional consideration was online student enrollment numbers at the colleges.

Blackboard institutions selected were Caldwell, Edgecombe, Montgomery, Robeson, Rockingham, and Southwestern community colleges, as these institutions' total distance learning enrollment was comparable to the distance learning enrollments of the four Moodle colleges. Moodle colleges selected for the study were Blue Ridge, Guilford, Isothermal and Southeastern community colleges. Surveys were administered to all distance learning students and instructors at the 10 participating colleges.

End-of-term evaluations were developed for instructor and student users of both Moodle and Blackboard. 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 ¹hybrid/blended or completely online course were invited to participate. Participation was voluntary and anonymous. Students were informed that participation in the survey would not affect their grades and collected data would only be used in aggregated form.

Item Selection

The majority of the questions selected for the surveys were vetted through the UNC Teaching and Learning with Technology (TLT) Collaborative CMS evaluation project in 2007. Questions pertaining to pedagogy were incorporated into the adapted TLT survey. Questions in the student end-of-term survey focused on general usability, course content, collaboration and end user's perception and assessment of the overall experience within the applications. Questions in the instructor end-of-term survey focused on usability, student management, functionality flexibility, content creation/management, communication, collaboration, assessments, and overall experience with the application.

Audience Selection

Initially, Edgecombe, Caldwell, Rockingham and Gaston community colleges were selected to represent the Blackboard colleges. Gaston College was unable to participate in the study. Unfortunately, there was not another exclusively Blackboard college similar in size to Gaston without a Moodle instance, so three Blackboard colleges were added to make up the FTE difference: Montgomery, Robeson and Southwestern Community colleges. The survey was administered to all distance learning students and instructors at the ten participating colleges.

<u>Moodle</u>	<u>Blackboard</u>
Blue Ridge FTE - 378	Edgecombe FTE - 373
Guilford Tech FTE - 1,824	Caldwell FTE - 1,671
Isothermal FTE - 205	Rockingham FTE - 237
Southeastern FTE - 976	Montgomery FTE - 176
	Robeson FTE 278
	Southwestern FTE - 463
	Gaston FTE - 986

Survey Delivery Methods

Distance Learning (DL) administrators at the participating colleges received the links to the online surveys and forwarded the survey links to the appropriate audiences.

¹ Hybrid/Blended courses were defined as courses where the majority of instruction is delivered face-to-face but have an online component required.

Survey Analysis Methods

Data from both the student and instructor surveys were analyzed using a descriptive statistic and a t-Test comparison of means analysis. Descriptive statistics aims to quantitatively summarize a data set rather than to support statements pertaining to the population that the data is thought to represent. The t-Test assesses whether the means of the two groups are statistically different from one another. This type of analysis is appropriate to utilize when comparing the means of two groups. A question was considered statistically significant if its p-value was lower than .050 (the accepted standard in t-Test analysis).

Case Study Methodology

Case Study Methodology - Case study research was utilized to gain an understanding of the issues the four colleges encountered during migration to Moodle. The case studies provided the contextual analysis of migration, thus the real-life situations encountered could provide the basis for the application of ideas and an extension of methods utilized to the other NCCCS institutions considering a migration as well. In March 2009, a questionnaire was sent to the four Moodle colleges. Community colleges were asked to contribute information about the migration in the following areas:

- 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

Follow-up responses were collected through email, phone conversations and documentation. Moodle colleges also provided researchers with additional data which had been utilized throughout their transition(s) such as PowerPoint presentations, meeting agendas, minutes, etc. to give a more expansive view of the migration process. This additional data presented some challenges in collation, however, the additional information provided valuable insights for presenting a comprehensive view of the transition process.

Item Selection

The Assessment Team expanded the categorical questions to create comprehensive profiles of complete Moodle migrations to determine the specific challenges the North Carolina community colleges faced. Questions were added to collect detailed information about information technology efforts, business requirements and ongoing CMS strategies.

Audience Selection

At the time of this study, only four community colleges exclusively used Moodle as the primary CMS, and as such, were the participants of the case study.

Questionnaire Delivery Methods:

The questionnaire was sent electronically as a Word document to the DL administrator at each of the colleges. The DL administrator was to act as a liaison between the college's CMS migration team and the Moodle Assessment team.

Case Study Analysis Methods:

The Assessment Team reviewed the data looking for any underlying trends in the Moodle migration process. Researchers compared and contrasted the different approaches utilized by the colleges for a successful Moodle migration.

CMS Functionality Comparison Methodology

Two unique functionality survey instruments were developed targeting instructor use and software administration. Questionnaires were provided to online instructors and DL administrators at all 58 community colleges, 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. Mayland, Pamlico and Stanly community colleges did not participate as each used a CMS other than Blackboard or Moodle. Participation in the survey was voluntary. Respondents answered only questions which pertained to their college's current CMS - which was either Moodle 1.9.x, Blackboard 7.x Learning System (LS), Blackboard 8.x Learning System or Blackboard 7 or 8 Academic Suite (AS).

The functionality comparison was an important component of the study, as the researchers were interested not only in what features were offered in the various versions but also in learning the knowledge base of the end users. In March 2009, the questionnaire was provided to online instructors and D L administrators at all the community colleges. Possible answers were: Yes, No, Back-end, 3rd party (free), 3rd party (\$), Dev, and N/A. Respondents could also leave the answer blank (which was not scored).

- "Yes" meant that the CMS had the corresponding functionality.
- "No" meant that the CMS did not have the corresponding functionality.
- "Back-end" meant that the CMS had the corresponding functionality but was only available on the server's database back end. (Administrator survey only).
- "3rd Party free" meant that the CMS did not have the corresponding functionality, but was available as an add-on from a 3rd party at no cost.
- "3rd Party \$" meant that the CMS did not have the corresponding functionality, but was available as an add-on from a 3rd party with an associated cost.
- "Dev" meant that the CMS did not have the corresponding functionality but was under development and was expected to be released within the next 6 months.
- "N/A" meant not applicable.
- A blank answer equaled a non-response.

Item Selection

The functionality questions had been vetted through the North Carolina University System's TLT Collaborative evaluation.

The instructor comparison matrix included questions on the following topics:

- Authoring Tools & Internal / External Resource Management
- Content Use, Navigation & Viewing
- Assignments/Drop box
- Quizzes & Tests
- Collaborative & Universal Design/Access Support
- Grade book
- Asynchronous Discussion
- Course Content Contribution and Quiz Taking
- Group Collaboration & Support & Synchronous Communication
- Student Tracking, Student Portfolios/Course Assessment
- Customization and Instructional Design Tools
- User Management, Course Administration & Statistics
- Student Communication
- Navigation & Tools
- Assignment Submission and Peer Communication
- Communication with instructors & Discussions

The CMS administrator comparison matrix included questions on the following topics:

- Course Management
- User Management
- Add-on Management & Admin Communications
- Database Management, Security, Scalability & High Server Availability
- Installation & Upgrade, Backups & Programming Language(s)
- Authentication & Enrollment Management
- Reporting, Interface Customizations
- Integration & Operating Systems
- Infrastructure and Accessibility

Audience Selection

Distance Learning Administrators in the 58 colleges were asked to invite their staff and faculty to participate in both Functionality Comparison questionnaires.

Functionality Comparison Delivery Method

D L administrators at the participating colleges received the links to Functionality Comparison questionnaire and forwarded the survey links to the appropriate audiences.

Functionality Comparison Analysis Method

A modified descriptive statistic analysis was employed for both the Instructor and the Administrator matrices - "yes" answers were counted if the instructor or administrators agreed that the CMS had the given functionality. The answers were then calculated by summing each of the possible answers for each of the questions. The sums of the answers were divided by the total number of responses (excluding

N/A) for each of the questions. Lastly, the totals were multiplied by 100 to get a percent of the whole. If the yes percentage was equal to 50.1% or greater and the yes responses were not equal with any other answer, the corresponding CMS would be declared to have the functionality and given one yes vote. The yes votes of each question was then summed to find an overall CMS winner based on instructor yes totals.

V Results and Analysis

Student End-of-Term Survey Results

Population Sample Information

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 four Moodle institutions and 879 students were from the six Blackboard institutions.

Student End-of-Term Survey Population Breakdown Table:

The table below illustrates the breakdown of responses by institution.

Moodle Institutions	N of responses	% of sample population
Blue Ridge Community College	69	27.8%
Guilford Tech Community College	9	*3.6%
Isothermal Community College	125	**50.4%
Southeastern Community College	45	18.1%
Totals	248	100%
Blackboard Institutions	N of responses	% of sample population
Caldwell Community College	115	13.08%
Southwestern Community College	106	12.06%
Edgecombe Community College	383	***43.57%
Montgomery Community College	8	0.91%
Robeson Community College	167	19%
Rockingham Community College	100	11.38%
Totals	879	100%

*The relatively small number of student responses from Guilford Technical Community College was due to the fact that only a few students were sent the survey.

** Researchers determined that the higher than average response from Isothermal Community College was due to the highly interactive culture that exists between students and employees of the institution.

***Researchers determined that the higher than average response from Edgcombe Community College was due to instructors not following the survey instructions and offering bonus points for student participation.

Course Usage Information

The table below reveals the breakdown of reported courses by subject area for both CMSs.

Student End-of-Term Survey: Course Enrollment at Time of Survey

Blackboard Student by %			Moodle Student by %		
course prefix	n	% of total	course prefix	n	% of total
Education	106	11.065%	Information Systems	41	15.356%
Information Systems	82	8.559%	English	30	11.236%
Business	75	7.829%	Business	24	8.989%
English	65	6.785%	History	13	4.869%
Psychology	63	6.576%	Education	12	4.494%
Medical Assisting	59	6.159%	Academic Related	11	4.120%
Biology	53	5.532%	Art	10	3.745%
Sociology	45	4.697%	Psychology	10	3.745%
Office Systems Technology	44	4.593%	Humanities	9	3.371%
Health Information Tech	34	3.549%	Nursing	9	3.371%
Spanish	33	3.445%	Sociology	9	3.371%
Computer Information	27	2.818%	Biology	7	2.622%
Humanities	21	2.192%	Math	7	2.622%
Religion	21	2.192%	Reading	7	2.622%
Accounting	19	1.983%	Accounting	5	1.873%
Health	19	1.983%	Chemistry	5	1.873%
History	19	1.983%	Marketing	4	1.498%
Math	18	1.879%	Web Technologies	4	1.498%
Nursing	17	1.775%	Criminal Justice	3	1.124%
Criminal Justice	14	1.461%	Computer Information	3	1.124%
Economics	14	1.461%	Office Systems Technology	3	1.124%
Communications	10	1.044%	Information Systems Security	3	1.124%
Music	10	1.044%	American Institute of Banking	2	0.749%
Marketing	8	0.835%	Banking and Finance	2	0.749%
Reading	8	0.835%	Blueprint Reading	2	0.749%
Human Services	7	0.731%	Communications	2	0.749%
Academic Related	6	0.626%	Computer Science	2	0.749%
Art	6	0.626%	Drafting	2	0.749%
Network Operation Systems	6	0.626%	Economics	2	0.749%
Chemistry	4	0.418%	Interpreter Preparation	2	0.749%
Cooperative Education	4	0.418%	Network Operation Systems	2	0.749%
Political Science	4	0.418%	Philosophy	2	0.749%

Speech-Language Pathology	4	0.418%	Physical Education	2	0.749%
Database Management	3	0.313%	Religion	2	0.749%
Emergency Medical Tech.	3	0.313%	Spanish	2	0.749%
Information Systems Security	3	0.313%	Database Management	1	0.375%
Web Technology	3	0.313%	Environmental Science	1	0.375%
Geography	2	0.209%	Geography	1	0.375%
Legal Education	2	0.209%	Health Information Tech	1	0.375%
Physics	2	0.209%	Horticulture	1	0.375%
Computed Tomography	1	0.104%	Hydraulics and Pneumatics	1	0.375%
Cyber Crime Technology	1	0.104%	Industrial Science	1	0.375%
CEU	1	0.104%	Machining	1	0.375%
Culinary	1	0.104%	Medical Assisting	1	0.375%
EOC	1	0.104%	Networking Technology	1	0.375%
Gerontology	1	0.104%	Physical Education	1	0.375%
Medical Laboratory Technology	1	0.104%	Political Science	1	0.375%
Magnetic Resonance Imaging	1	0.104%			
Therapeutic Massage	1	0.104%			
Networking Technology	1	0.104%			
Nutrition	1	0.104%			
Physical Education	1	0.104%			
Physical Therapist	1	0.104%			
Radiography	1	0.104%			
Substance Abuse	1	0.104%			

Student Experience and Orientation

Thirty-seven percent (90 of the 242) Moodle students answered yes to the question, "*Was this the first semester you have used Moodle for a hybrid/blended or completely Internet course?*" and 63% (152) answered no. Thirty-one percent (270 of the 871) Blackboard students answered yes to the question, "*Was this the first semester you have used Blackboard for a hybrid/blended or completely Internet course?*" and 69% (601) responded no.

Sixty-six percent (156 out of 235) of the students answered yes to the question, "*Did you receive an orientation to Moodle of any type before beginning your course?*" and 34% (79) answered no. Out of the 838 Blackboard students that answered the same question pertaining to orientation in Blackboard, 72% (604) answered yes and 28% (234) said no.

Students were asked, "*If you received an orientation to Moodle, do you feel it was adequate for your needs?*" Out of 162 responses, 91% (147) responded yes and 9% (15) responded no. Of 626 Blackboard students responding to the comparable question pertaining to Blackboard orientation, 94% (586) said yes and 6% (40) said no.

Student Perceived Instructor Comfort with CMS

When Moodle students were asked the question, "*Did your instructor seem comfortable using Moodle as a learning platform for the course?*" out of 235 responses, 92% (216) said yes and 8% (19) said no. Eight hundred thirty-three Blackboard students answered the same question and 96% (797) responded yes and 4% (39) said no.

The results for the Ease of Use, Course Content, Collaboration, Assessment and Overall Experience question sets will be discussed in the analysis section of this report.

Student End-of-Term Analysis

Initial Descriptive Statistic Analysis:

Upon review of the initial data, the descriptive statistics revealed an eight percent difference in the number of students who received no orientation on how to use Moodle versus students who received no orientation on how to use Blackboard. Thirty-four percent of the Moodle students reported they had no orientation compared to 28% of Blackboard students.

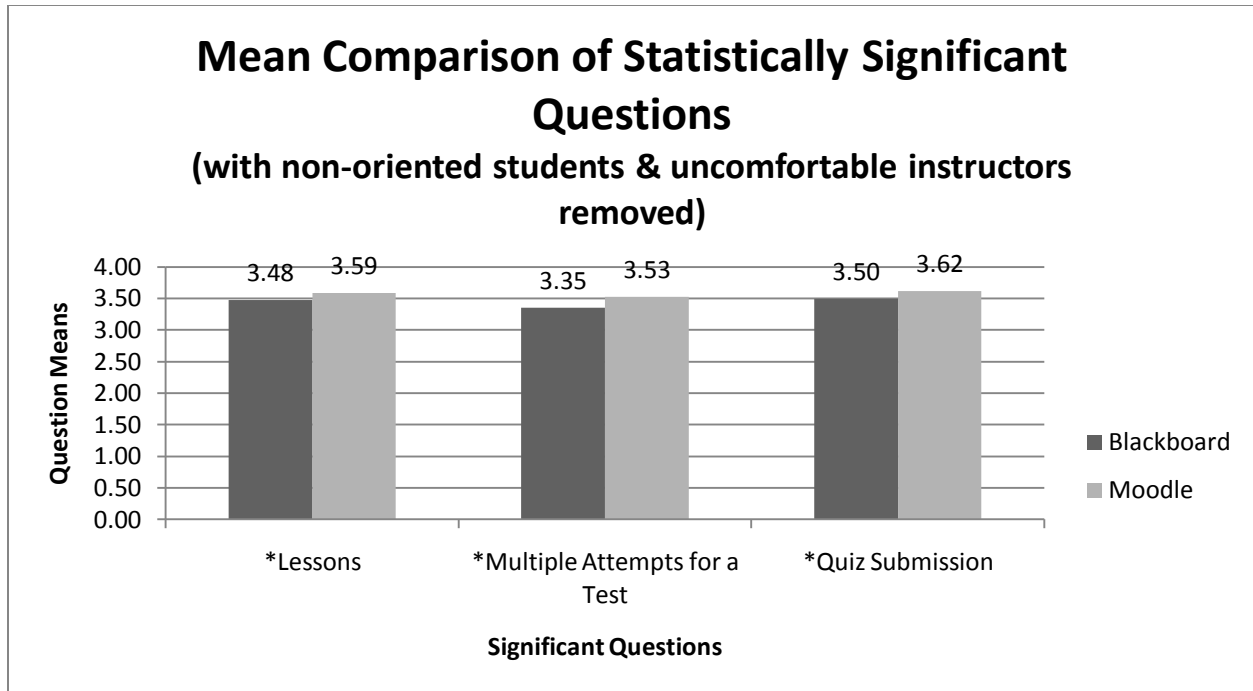
The statistics also revealed a four percent difference in the number of students who perceived their instructors as not being comfortable using Moodle versus Blackboard. Eight percent of Moodle students perceived their instructors as not being comfortable using the CMS versus only four percent for Blackboard.

These preceding factors were removed to determine if they were affecting total survey outcomes and for researchers to complete a t-Test mean comparison analysis. Therefore student surveys reporting "no orientation" and "instructors were not comfortable using the CMS" were removed from the dataset.

t-Test Mean Comparison Analysis

The t-test assesses whether the means of two groups are statistically different from one another. This analysis is appropriate when comparing the means of two groups. A question was classified as statistically significant if its p-value was lower than .050, the accepted standard to use in t-Test analysis.

The t-Test revealed that of the 38 questions in the data set, only three questions were statistically significant with Moodle having the higher means.



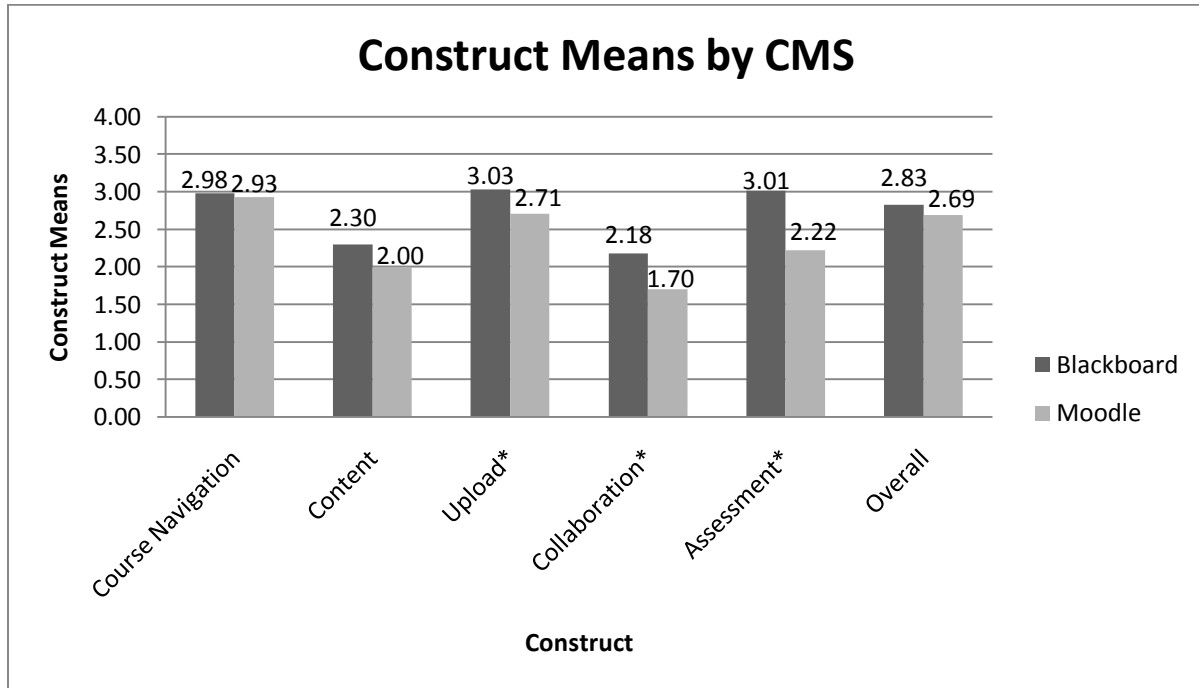
Exploratory Factor and MANOVA Analyses

Due to the perceived inconsistent results from the descriptive statistic analysis and t-Test analysis, the Assessment Team consulted researchers Dr. Jennifer Corn and Dr. Kristen Corbell at NC State University's William and Ida Friday Institute for Educational Innovation. The Assessment Team was concerned about the validity of including data from participants who were not familiar or comfortable with the learning platform. The unfiltered raw data was delivered to Drs. Corn and Corbell who conducted an exploratory factor analysis (EFA) on the student survey data to identify trends in the data that might not be readily apparent. An EFA is often used to investigate and examine the internal reliability of theoretical constructs, or factors, represented by a set of survey items. The EFA revealed that some of the questions in the constructs were not a good fit. As a result, some questions were eliminated from the analysis. The remaining questions were then reorganized into six (6) constructs. The new question constructs were Course Navigation, Content, Upload, Collaboration, Assessment, and Overall.

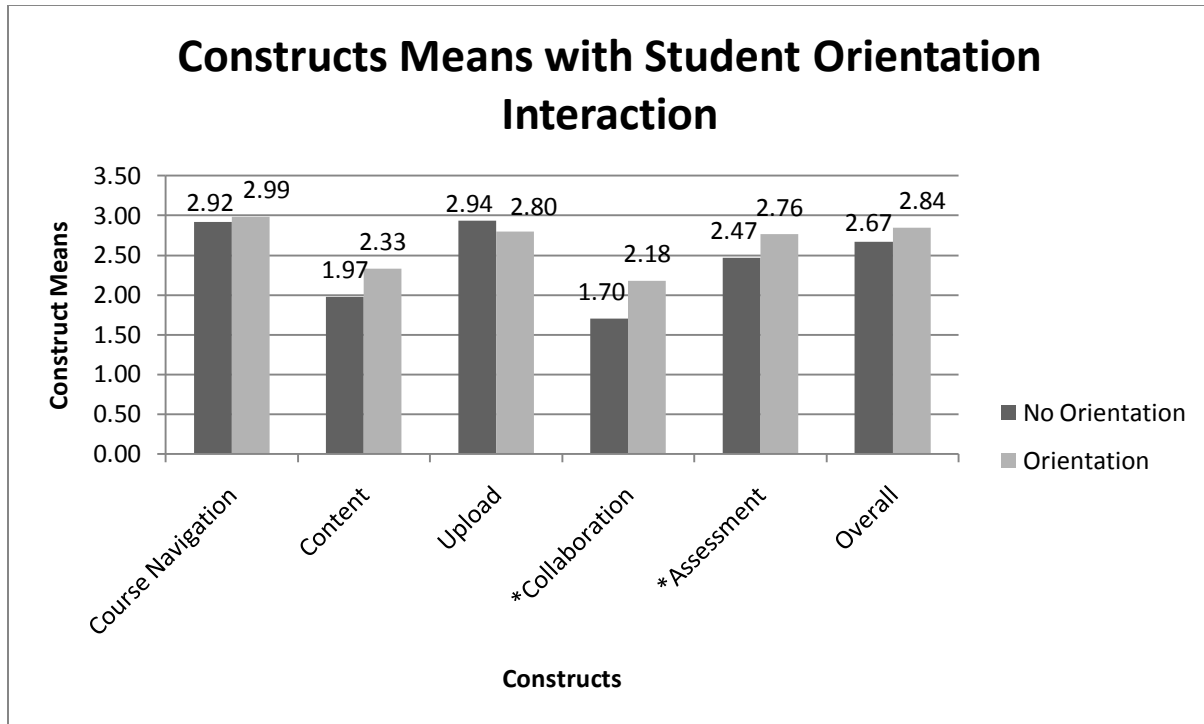
Once the constructs were reorganized, a Multivariate Analysis of Variance (MANOVA) was performed. The MANOVA is an analysis used to analyze data that involves more than one dependent variable at a time. Using the MANOVA, the Friday Institute researchers could verify the Assessment Team's hypothesis of the non-oriented students and student's perception of instructor discomfort variables were indeed significant factors in the data analysis.

The MANOVA analysis showed a statistical significance in the following areas:

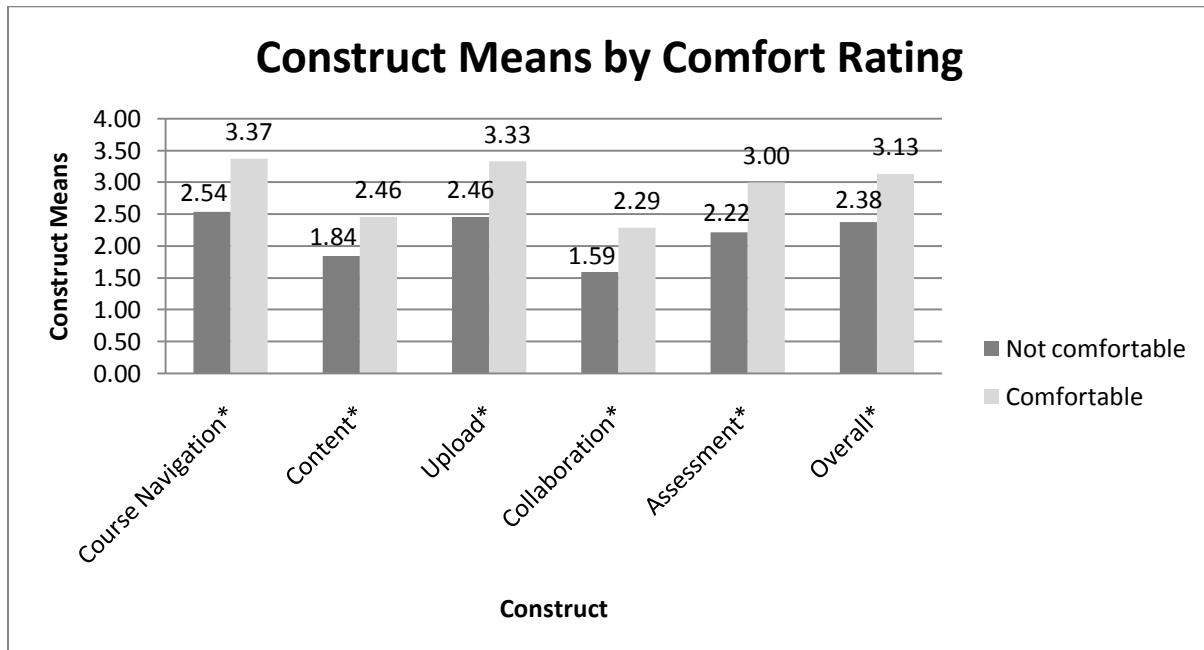
When comparing construct means by CMS only, there was a statistical significance in three of the six constructs. The Upload, Collaboration and Assessment constructs received higher ratings for Blackboard, which is statistically significant. However, the students who did not receive an orientation and those who perceived their instructor was not comfortable using the platform *were included* in the analysis.



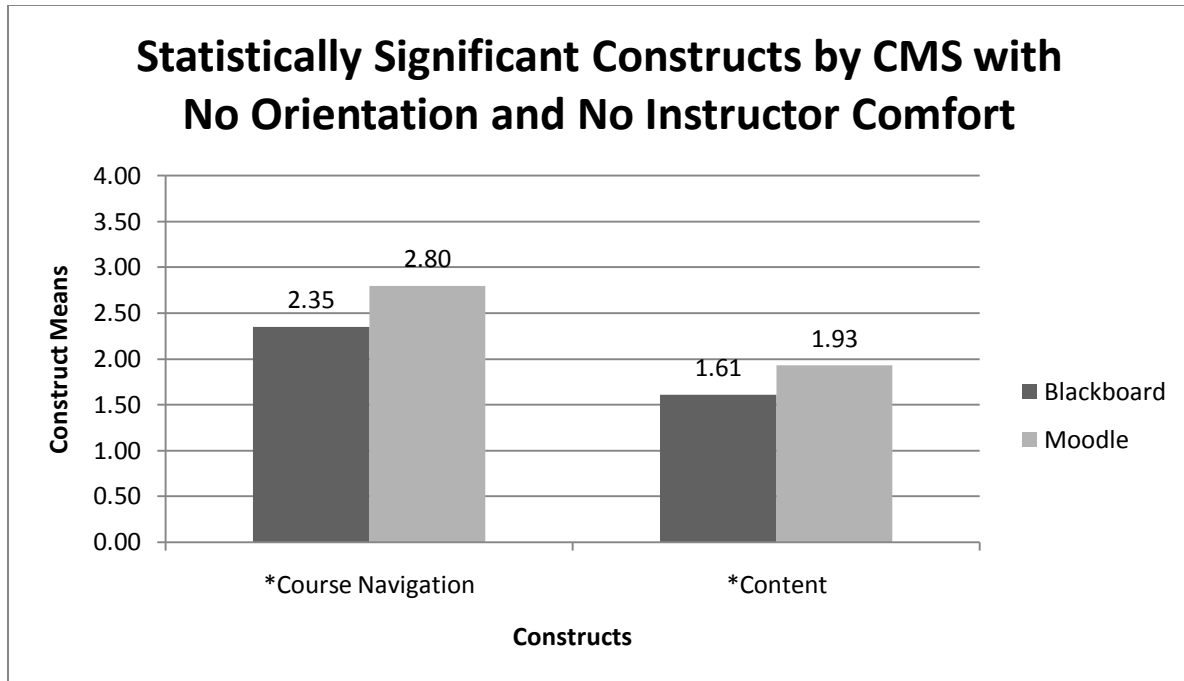
Students who received an orientation ranked their CMS higher in the Collaboration and Assessment constructs than those students who did not receive an orientation, regardless if the CMS was Moodle or Blackboard.



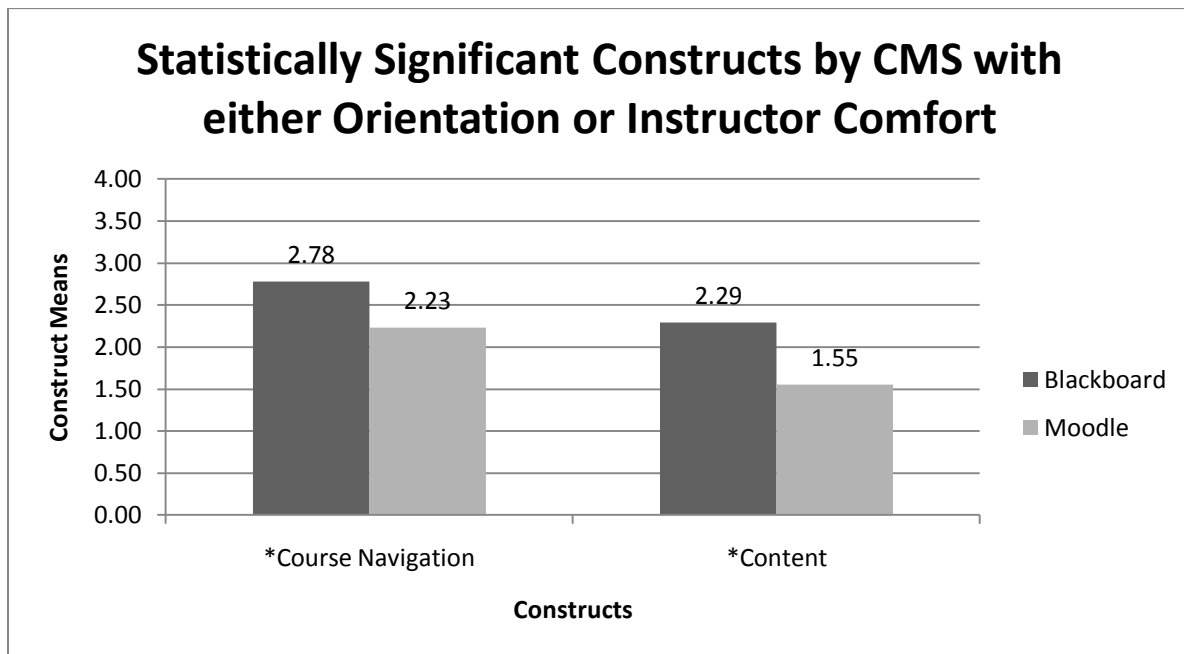
When instructors were perceived as being comfortable using the CMS, students gave higher marks in all six (6) constructs, compared to students who indicated that their instructor seemed uncomfortable.



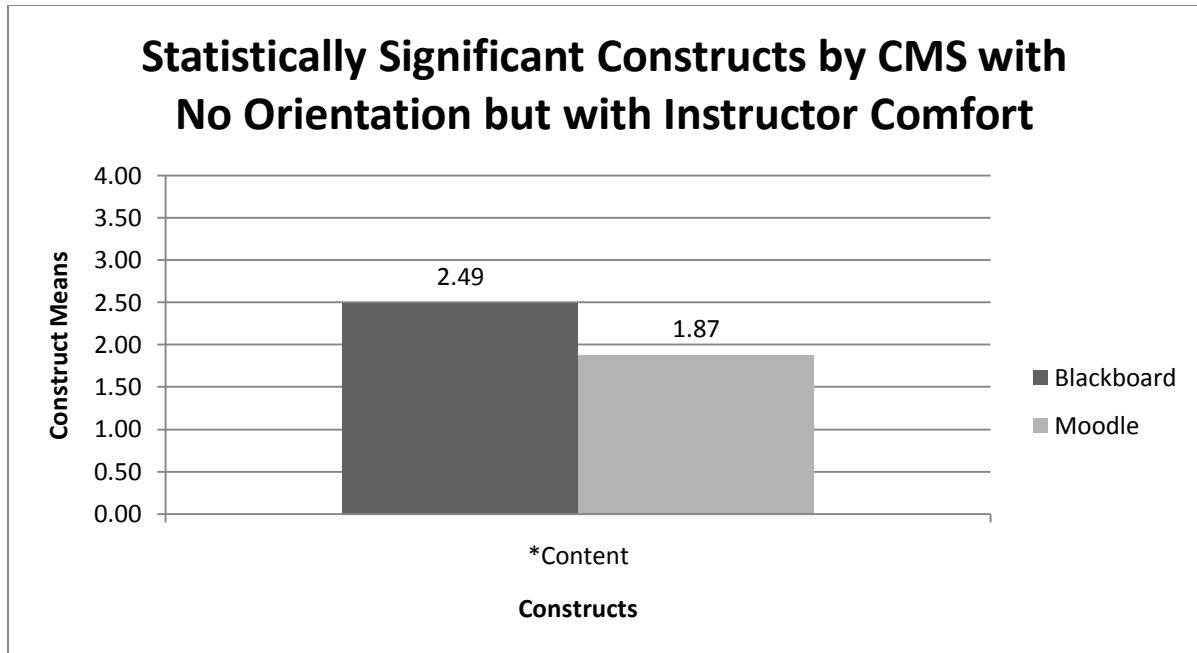
In the Course Navigation and Content constructs, the MANOVA revealed that when there was no student orientation or no instructor comfort, Moodle ranked higher than Blackboard. Thus, one possible conclusion is that Moodle is more intuitive to the untrained user.



When there was either a student orientation or the instructor was comfortable; Blackboard was ranked higher than Moodle in Course Navigation and Content constructs.



Lastly, in the Content construct only, the analysis showed a statistical significance in the construct means when the students had no orientation but the instructors were comfortable.



Instructor End-of-Term Survey Results

Population Sample Information

One hundred ninety-nine instructors from 10 NCCCS institutions participated in an end-of-term online course evaluation. Ninety-three instructors were from exclusively Moodle institutions, and 106 instructors were from exclusively Blackboard institutions.

Instructor End-of-Term Survey Population Breakdown Table:

The table below reveals the population breakdown of responses by institution.

Moodle Institutions	N of responses	% of sample population
Blue Ridge Community College	19	20.4%
Guilford Tech Community College	37	39.8%
Isothermal Community College	24	25.8%
Southeastern Community College	13	14.0%
Totals	93	100%
Blackboard Institutions	N of responses	% of sample population
Caldwell Community College	51	48.1%
Southwestern Community College	26	24.5%
Edgecombe Community College	6	5.7%
Montgomery Community College	6	5.7%
Robeson Community College	8	7.5%
Rockingham Community College	9	8.5%
Totals	106	100%

Course Usage Information

The table below illustrates the breakdown of courses instructors were teaching during the survey period for both CMSs.

Instructor End-of-Term Survey Course Breakdown Table:

Blackboard Instructor by %			Moodle Instructor by %		
Subject Area	n	% of total	Subject Area	n	% of total
Education	15	14.286%	Computer Information Tech	13	14.130%
Computer Information Tech	10	9.524%	English	8	8.696%
Psychology	9	8.571%	Mathematics	7	7.609%
Nursing	8	7.619%	Business Sciences	5	5.435%
Religion	8	7.619%	Communication	5	5.435%
Mathematics	8	7.619%	Nursing	5	5.435%
Art	5	4.762%	Criminal Justice	4	4.348%
Accounting	4	3.810%	Education	4	4.348%
Biology	3	2.857%	Sociology	4	4.348%
Business Technologies	3	2.857%	Biology	3	3.261%
English	3	2.857%	Human Services	3	3.261%
Communications	3	2.857%	Accounting	2	2.174%
Criminal Justice	2	1.905%	Construction	2	2.174%
Health Sciences Physical Therapy	2	1.905%	Fire Rescue	2	2.174%
History	2	1.905%	History	2	2.174%
Humanities/English	2	1.905%	Music	2	2.174%
Music	2	1.905%	Physical Education	2	2.174%
Spanish	2	1.905%	Religion	2	2.174%
Adult High School	1	0.952%	Architectural Technology	1	1.087%
Anthropology	1	0.952%	Art	1	1.087%
Chemistry	1	0.952%	Aviation	1	1.087%
Cosmetology	1	0.952%	College Transfer	1	1.087%
economics	1	0.952%	Corporate security	1	1.087%
Emergency Preparedness	1	0.952%	Economics	1	1.087%
Film Studies	1	0.952%	Electronics Engineering Technology	1	1.087%
Literature	1	0.952%	Emergency Preparedness Technology	1	1.087%
Massage Therapy	1	0.952%	Global Logistics	1	1.087%
Nuclear Medicine	1	0.952%	Health	1	1.087%
Occupational Therapy	1	0.952%	Hospitality Management	1	1.087%
Philosophy	1	0.952%	Machining Technology	1	1.087%
Physics	1	0.952%	Mechanical Engineering Technology	1	1.087%
Respiratory Therapy	1	0.952%	Medical Laboratory Technology	1	1.087%
			Psychology	1	1.087%
			Science	1	1.087%
			Spanish	1	1.087%

Instructor End-of-Term Analysis

The instructors answered 8 ease of use, 44 performance, and 4 general overall questions pertaining to various features of the CMS. These performance features were rated accordingly: Excellent (5), Good (4), Satisfactory (3), Unsatisfactory (2), Poor (1) and Did not use (0).

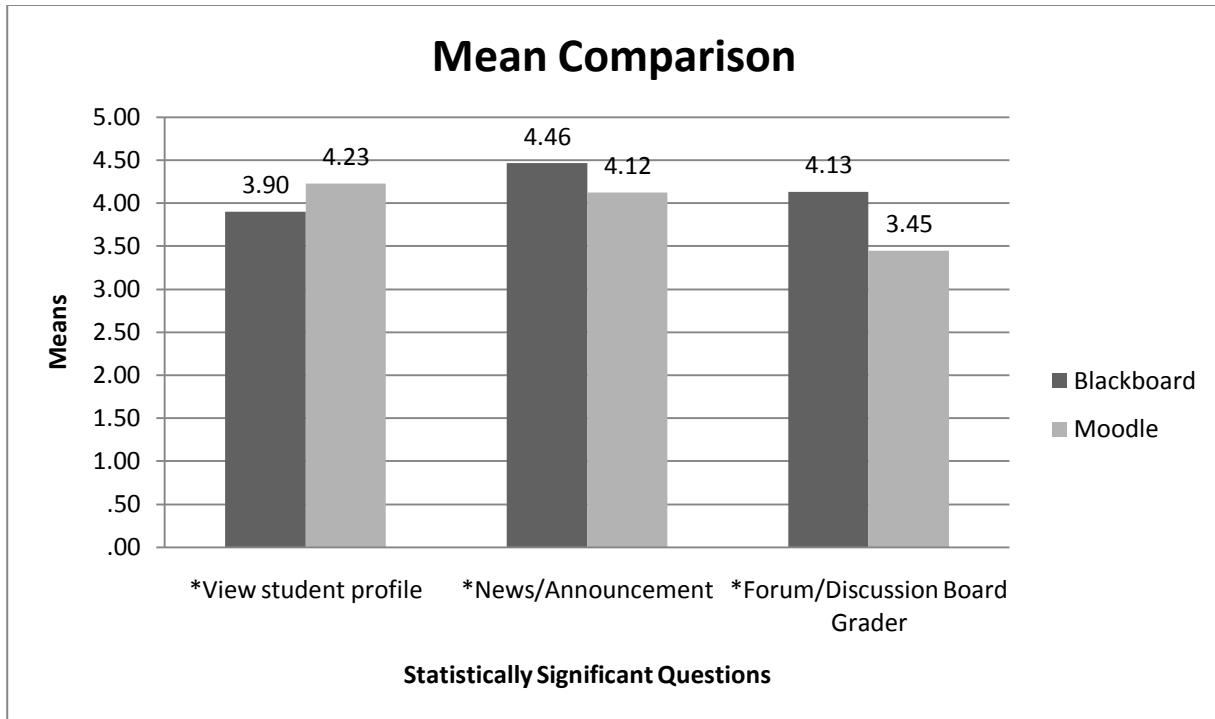
Instructors were also asked to rate the level of importance of 44 CMS features in regards to their teaching using the following scale: Highest Importance (5), Strong Importance (4), Important (3), Low Importance (2), Not of Importance (1) and No opinion/Did not use (0).

Initial Descriptive Statistic Analysis

One hundred and ninety-nine (199) instructors from ten NCCCS institutions participated in an “end-of-term” online course evaluation. Ninety-three (93) instructors were from exclusively Moodle institutions and one 106 from exclusively Blackboard institutions. Upon review of the initial data, the descriptive statistics showed no unusual trends in either CMS data sets.

t-Test Mean Comparison Analysis

After completing a t-Test analysis of means on the eight ease of use, 44 performance and four general overall questions, there were only three questions with any statistical significance: Viewing Student Profile, News/Announcements and Forum/Discussion Board, and Grader. Although Moodle rated significantly higher in the use of the Viewing Student Profile feature; Blackboard rated higher in the News/Announcements and Forum/Discussion Board Grader features.



Since there were no perceived underlying trends in the data, it was not necessary to complete an Exploratory Factor and MANOVA Analysis on the Instructor End-of-Term Survey.

To verify the level of importance of the statistically significant questions, the means of all of the 44 importance questions for both CMS applications were combined and ranked from highest to lowest.

The chart below shows the combined mean rankings of the 44 questions. The three statistically significant questions were ranked as follows: News/Announcements was sixth, the Forum Grader/ Discussion Board Tool was eleventh and the View Student Profile question was ranked thirty-second.

Question Name	Mean	Rank
Uploading Files	4.388	1
Grade book	4.335	2
Ability to Organize Course	4.316	3
Discussion Boards	4.293	4
Grade book Integrates with	4.291	5
News/Announcements	4.242	6
Ability to access content with the shortest amount of clicks	4.201	7
Messages	4.198	8
Randomize Test Questions	4.112	9

Question Name	Mean	Rank
Question Pools/Categories	4.091	10
Forum Grader/ Discussion Board	4.048	11
Randomize Answers	4.026	12
Timed Release of Content	4.013	13
Import Outside Content	4.013	14
Organizational Structure	3.994	15
Ability to Change Course Format	3.882	16
Learning Units	3.799	17
Sub Question Pools/Categories	3.797	18
Password Protection	3.718	19
Adaptive Release (The ability to release course content based on criteria.)	3.628	20
Multiple Attempts for a Test	3.617	21
HTML Editor for creating course content	3.615	22
Ability to Add/Remove Tools	3.612	23
Assign Roles/Enroll Users	3.581	24
Groups	3.553	25
Create Sections In an Exam	3.500	26
Ability to Search Course Content	3.494	27
Set Course Entry Point	3.472	28
Book	3.415	29
Surveys	3.356	30
Calendar	3.321	31
View Student Profile	3.320	32
Templates (Themes) to Customize	3.294	33
Course Statistics	3.232	34
Ability to Apply	3.217	35
Database	3.217	36
RSS Feeds	3.216	37
Wiki	3.091	38
Chat	3.028	39
Ability to Add instructors to Class	2.993	40
Create Groups	2.934	41
Glossary	2.823	42
Blog	2.788	43
Ability to Supports Multiple Languages	2.478	44

The **News/Announcements question** ranked the highest of the statistically significant questions which ranking sixth in importance. This ranking may be misleading because of the difference in the way Blackboard and Moodle handle announcements. In Blackboard, the course announcements are shown on an announcements page and are usually the entry point for the course. In Moodle, course announcements are referred to as "News" and are listed in the forums area of the course. All course "News" items in Moodle are by default automatically emailed to all students once they've been posted by the instructor. Since Moodle's announcement handling is through email some DL administrators have turned off this feature to cut down on the email traffic. This may have been a factor in the lower ratings for Moodle compared to Blackboard.

The next highest significant question was the **Forum/Discussion Board Grader** question, which was ranked 11th in importance. This ranking is probably the most important feature difference in the two CMS applications in regards to the instructor. The discussion board feature in Blackboard is more straight forward to use than Moodle and the "collect all entries" for a single student is a feature not currently available in Moodle.

The last significant question was the **Viewing the Student Profile** question, which was ranked 32nd in importance. This ranking has to do with the social constructivism of Moodle. The student profile page in Moodle gives the instructor more information about the student and provides students access to a personal blog.

Non-use of Features

In examining the responses to the 44 CMS performance questions, the researchers discovered a high number of "Did Not Use" answers regarding some areas of functionality. Clearly not all functionality is being utilized in either Moodle or Blackboard.

The table below reports the top ten features **NOT** being used in either CMS. The table shows the name of the unused feature, the percent of the respondents indicating they did not use the feature and the rank of the non-use compared to all of the features.

Name of CMS Feature:	% of non-use	Rank
Ability to Support Multiple Languages	89%	1
Chat	71%	2
Glossary	67%	3
Surveys	66%	4
Groups	64%	5
Sub Question Pools/Categories	60%	6
Create Groups	54%	7
Adaptive Release (The ability to release course content based on criteria.)	48%	8
Password Protection	43%	9
Calendar	42%	10

The exact reason these features are not being utilized is unknown. The “Ability to Support Multiple Languages” feature is not surprising to be ranked the highest un-used feature, but many of the other features do raise questions about their non-use. Many of these high ranking functions are not customarily included in textbook publisher’s CMS online resources used by many of community colleges. Finally, many of the functions that require student interaction are not being using.

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 state of the Moodle CMS at the colleges. Follow up information was collected by phone interview and by email.

Case Study Analysis

Moodle Assessment case studies revealed that migration from a proprietary to an open source CMS was a major challenge at the local level. In effect, each community college was responsible for conducting its own study that paralleled the functions of this NCCCS Moodle Assessment. The same fundamentals were applied.

Each college had to determine if Moodle would be a viable CMS alternative in:

- Functionality
- Learning/teaching platform, including ease of use
- Support for instructors and students
- Hosting, support, upgrades, redundancy/backups, memory, and maintenance
- Total cost of ownership

In addition, migration to Moodle required considerable time, funding, resources, and disrupted processes, systems, and people during the actual migration. Comprehensive planning preceded implementation.

One challenge to migration is that both Blackboard and Moodle CMS solutions must be operating at production levels simultaneously throughout the transition period. This requires additional funds and must be factored into the migration plan before any open source solution savings can be realized. Thus a transition strategy is required in which:

- Appropriate administration, technical, support, and academic leaders/representatives are involved and empowered to design a transition plan
- Moodle is established at a testing and training level

- Production-level solutions are verified
- College-wide training is planned, scheduled, and implemented
- Assessment strategy is created in parallel
- Migration to Moodle is accomplished

The Case Studies provided a means to document the critically important, in-depth experiences and best practices derived from community college migrations from Blackboard to Moodle. Four NCCCS institutions, Isothermal Community College, Blue Ridge Community College, Guilford Technical Community College, and Southeastern Community College each migrated to Moodle beginning with Isothermal in the fall of 2006. Migration away from an established, mission-critical application is a serious undertaking, and every aspect of training, support, instructional methodology, application and finance were affected.

Given the awareness of the scope of work, time and expense required, these four community colleges elected to migrate away from Blackboard to Moodle.

Moodle Migration Dates

- Isothermal Community College, Fall 2006
- Blue Ridge Community College, Fall 2007
- Southeastern Community College, Fall 2008
- Guilford Technical Community College, Spring 2009

These four institutions provided insight into how very unique the institutions were as defined by size, location, specific needs, and skill sets of staff and faculty in order to accomplish such a challenging undertaking. Moodle was introduced to these institutions long before an official migration was possible. For example, Isothermal piloted Moodle with assistance from Central Piedmont Community College staff that has been using Moodle at departmental levels since 2004. Central Piedmont Community College officially supported both Blackboard and Moodle and was able to contribute valuable experience and best practices. Likewise, Blue Ridge Community College, Guilford Technical Community College, and Southeastern Community College were recipients of North Carolina Moodle Users Group (NCMUG) Moodle training, administration support, and hosting prior to their adoption of Moodle.

Four case studies detailing migration strategies of these Moodle institutions are included in this portion of the Moodle Assessment. Data was collected questionnaires and follow-up emails and telephone conversations 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

All quotes in the following sections were taken directly from the four case study college responses.

Note: A questionnaire was designed to assist in collection of information regarding the migration.

Reasons and decision making for the migration

The four Moodle institutions indicated that reasons for migration included dissatisfaction with Blackboard in the form of application problems, server performance, technical help desk delays, unacceptable hosting solutions, and increasing costs. 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 available 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.

All four case study institutions eventually came to a "point-of-pain," as described by Blue Ridge Community College, in which migration from Blackboard was necessary. Moodle provided a logical alternative for all four. Each decision point was unique. But, all four came to the same conclusions. Migration to Moodle was their decision, reached independently, at different times.

Southeastern Community College fundamentally made a business decision to migrate to Moodle. "Blackboard hosting on site was becoming problematic as online enrollments increased and hosting solutions off-campus were prohibitively expensive." Moodle had gained a following through involvement with NCMUG. "Moreover, the features, capabilities, and user-friendliness of the Moodle interface were important considerations... as well as the available and reasonably effective processes for converting courses from Blackboard to Moodle."

Southeastern, Blue Ridge, and Guilford Technical community colleges participated in the North Carolina Moodle Users Group (NCMUG) created in 2006 to provide Moodle pilot resources to NC community colleges and universities. NCMUG ran for three years. These three case study institutions received their Moodle training, system administration, and hosting via NCMUG. A Moodle Partner (www.moodle.com) was contracted to provide these services. Thus, these three institutions realized that professional services were available, were effective, and reasonably priced.

Isothermal Community College engaged a Moodle Partner independently after consulting with an experienced Moodle instructor employed by a sister institution. The results were the same. Isothermal was able to contract for the training, course migration, hosting, and other start-up services required for migration to Moodle.

Guilford Technical Community College's "eLearning Team" presented their findings to the GTCC Academic Leadership Team consisting of curriculum Division Chairs and Vice President of Instruction before making their final decision. During the summer of 2007, eLearning staff first investigated several CMS alternatives before eventually deciding on Moodle. The eLearning team "suggested a fall Moodle pilot based on faculty feedback from training, presence of stable tools that are used heavily in Blackboard and flexibility with other systems."

Isothermal Community College established a Core Team composed of two faculty members, the webmaster, and the college's student information system administrator. The Core Team was joined by the Distance Learning Advising Team consisting of 17 faculty members. Two senior-level college administrators were fully involved with all planning and decision-making processes throughout the transition.

Blue Ridge Community College engaged decision makers in a progression starting with their most experienced power users expanding to include their college Management Team (Deans and the President), Faculty Council, and eventually culminating in a "unanimous acceptance of the Moodle migration option" by all faculty.

At Southeastern Community College the "the decision to move to Moodle was made by the Learning Technologies Department with the consent and support of the Vice President and Deans."

Implementation strategy for the migration

NCMUG institutions had a distinct advantage as they benefited from uniform training, support, and hosting. They had received a turn key Moodle installation supported for up to three years. At each of these institutions, a Moodle administrator was trained and as were five instructors. Of the 15 NCMUG community colleges, all but 2 are actively using Moodle for instruction.

Case studies indicated migration strategies are typically composed of steps in a chronological order:

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.

Blue Ridge Community College created and implemented a project management plan to guide them through the migration. The objective of the plan was to see Blue Ridge through the implementation phase of Moodle migration in preparation for full production. In addition, Blue Ridge Community College established "migration workflow" and "migration mechanics." Migration workflow organized the college Moodle pilot as it established a development server; created course templates; located trainers and organized Moodle boot camps; and created a Moodle development course to assist training. Migration mechanics installed, configured, and created course frameworks (matrix); selected courses for migration; determined roles and responsibilities of staff/faculty; and confirmed training and marketing schedules.

"Isothermal Community College made the decision to transition to Moodle in the spring of 2006. Isothermal contracted with a Moodle partner to assist with migration efforts. "The college planned to run dual systems [Blackboard and Moodle] during the 2006 year to give faculty a full year to learn Moodle, convert their online offerings and be prepared for a total transition."

Guilford Technical Community College's Moodle transition strategy was an extension of their decision-making process. "During the fall 2007, faculty and students shared their feedback on the system [Moodle]. All faculty members including adjuncts received access to the system. Our online degree students took classes in both Blackboard and Moodle to give us feedback on the difference of the two systems. Disability services reviewed the CMS for ADA compliance. MIS provided feedback on the functionality of Moodle with other systems."

All four community colleges relied on the expertise and services of Moodle Partners - perhaps no more so than at Southeastern Community College. Already a NCMUG institution, with a core of trained staff and faculty, Southeastern continued a strong collaboration with a Moodle Partner selected through a RFP (request for proposal). Southeastern's RFP reflected "a similar set of Moodle services to those of NCMUG. Administrator and instructor training, system administration and help desk, and full hosting services [were requested]." Southeastern's course management system secured administrative support for migration funds, selected a time-table, and began expanding Moodle training and support.

Training and orientation of students and faculty

Case study colleges indicated that robust orientation and training resources were critical to the success of any CMS. Fortunately, online instruction has been used extensively in all NCCCS institutions for nearly a decade. Each community college has on staff experienced CMS administrators, IT support staff with knowledge of CMS applications, and experienced online

instructors in most curriculum areas. Accommodating a different CMS requires less training than developing online instructors with no background or appropriate skills.

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 institutions freely shared Moodle orientation and training resources. Staff at Pitt Community College, created an excellent Moodle training manual for instructors which was adopted by two of the case study institutions. Similar resources were shared among NCMUG and case study institutions. Thus, basic resources were readily available.

Isothermal Community College, and all of the Moodle institutions, placed great emphasis on faculty and student orientation and training. Isothermal was the first NCCCS institution to migrate (exclusively) to Moodle and staff there had to rely on their own ingenuity and resources. The college benefited from a dynamic team of collaborators that operated within an "organic" framework - freely communicating and sharing, unencumbered by strict institutional protocol. Thus Isothermal's Core Team was able to generate energy among its members, streamline work, and generate results relatively quickly. The college reports that "developing from scratch also afforded training opportunities and a familiarization process with direct results." Isothermal included faculty in all aspects of their decision, planning, and implementation. Faculty training was the primary issue throughout the implementation phase of their migration. Isothermal first sought expertise from an experienced Moodle instructor, at a sister institution, as their initial step in Moodle investigation. With this assistance, the college established their own trainers - one becoming Moodle certified. Isothermal's metacourse was created to assist students with Moodle. Additional print and non-print were also made available to students. Most of these were developed by Isothermal's faculty trainer.

Training at Blue Ridge Community College was an essential component of their workflow and mechanics plans. Their overall focus was at the departmental level seeking to establish a critical mass of trained faculty in each department. This also supported a mid-range strategy that targeted departmental course development, in which each department first consolidated the best of each instructor's section into a single, standard course before the course was migrated to Moodle. This strategy cut down on the sheer number of courses to be migrated, and provided departments an opportunity to assess and improve their departmental course templates.

Guilford Technical Community College "provided access to ALL faculty, full-time and adjuncts. Massive, on-going re-training program of faculty and staff [took place]" such that "by the end of spring 2008, almost 300 people at GTCC were Moodle proficient."

Southeastern Community College provided a vendor-delivered two-day on-site training workshop for full-time and adjunct instructors. A core group of Moodle-proficient instructors and staff had been previously trained via NCMUG.

Courses and resources migration strategy

Case studies report that course migration represented a major drain on college resources. There is no one-to-one migration tool for converting Blackboard courses to Moodle. Estimates for purchasing migrated courses vary from a low of \$200 per course to \$500 per course. Costs for migrating extremely sophisticated courses with large and numerous files can cost considerably more, however, this is a one-time expense that can be shared across departments and institutions.

Migration strategies varied among the case study institutions. Isothermal contracted with an experienced Moodle instructor from a sister institution who assisted with course conversion. D.I. von Briesen, department head at Central Piedmont Community College, provided much needed expertise in the course conversion component for Isothermal Community College. Mr. von Briesen also assisted Blue Ridge Community College during the planning and migration process.

Professional assistance in course conversion was also available from Moodle Partners. These vendors provided course migration assistance and training. In most cases, community college staff attained the skills to migrate their own courses via Moodle partners.

Blue Ridge Community College first consolidated/updated one course section for Moodle migration instead of migrating several sections of the same course. Thus, far fewer courses were migrated while the courses that were migrated were improved through the collaborative upgrade process. Blue Ridge recorded a total of 188.75 hours involved by faculty and staff engaged in Blackboard to Moodle course migration. At a mean of \$25/hour for community college staff/faculty compensation, the dollar value of total course migration would be approximately \$4,719. This figure includes migration of 48 Occupational and Continuing Education courses. Curriculum course migration was configured by the number of hours faculty was engaged, rather than completed courses. However curriculum faculty migration time represented \$3,250 of total migration costs.

Guilford Technical Community College elected to concentrate on migration of courses by a trained group of faculty to reduce this burden on rank-and-file faculty. "One of best decisions was hiring faculty to move courses. Over a three-month period, six faculty members plus members of the eLearning staff moved content of courses. Team members often talked directly to faculty members about their courses and how they wanted migration handled. In the end, our faculty felt like we had respected their time since we did ask them to move their content and gave them time to learn the system."

Southeastern Community College evolved a satisfactory course migration process using a variety of tools and processes. The overall processes continued to evolve as staff discovered emerging best practices through their Moodle Partner and Moodle.org and sister institutions. Mechanics of Blackboard-to-Moodle conversion are not simple and continue to take time and effort.

Current status of college CMS

The four case study institutions are now fully migrated and satisfied with Moodle. All four have online and hybrid online course growth rates at the average rate of all NCCCS institutions. In the case of Isothermal Community College, after a relative flat line growth during the migration, college online enrollments rebounded substantially, regaining and exceeding the original growth curve prior to migration.

Guilford Technical Community College reported:

"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." And "...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."

Blue Ridge Community College reported:

"A little more than a year ago, BRCC made the decision to move from Blackboard to Moodle for our learning management system. The decision was made with full involvement and support of our faculty, administration and support staff. Over the summer of 2008, we conducted training sessions for the online faculty, converted all of our online courses for fall and prepared to venture in to the world of open source distance learning. In a nutshell, it has been a very positive experience. The capital investment that the College made to host the system was modest and significantly less complex than the commercial product. The IT staff was able to install and set up multiple instances of Moodle in a short period of time. The Instructional Technology staff were able to learn the new processes associated with Moodle quickly with minor heartburn. The international users group has proven to be an excellent source for technical information, tips, and support. As an instructional delivery platform, Moodle has worked very well. It 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. New faculty to distance learning find the program very user-friendly and powerful. Experienced Blackboard users took a bit longer to adjust to Moodle simply because features were located in different places and process for creating content differ. After a short period of adjustment, the veterans came on board with enthusiasm."

Isothermal Community College reported:

"After the initial adoption, our College has found multiple uses for the platform. We developed an online Technology Handbook completely in Moodle. We are also using it for our student organization website, advisory committee websites and more. A statewide Nursing Advisory Committee has raved about Moodle as a viable web tool for

collaborative efforts. In conclusion, we are very satisfied with Moodle and look forward to expanded features and uses as time goes on."

Southeastern Community College summed up their migration:

"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. The former Blackboard, and current Moodle, Administrator was opposed to the change because of the amount of experience he had with Blackboard. Now the Moodle Administrator is a positive supporter of Moodle."

Case studies indicated that Moodle colleges reported far fewer problems and easier semester start-ups using Moodle. Fewer student help desk tickets were created and colleges reported less need for IT support in general with Moodle.

Total Cost of Ownership Analysis

When analyzing financial data it is important to remember that the colleges, like most businesses, have a yearly operating budget. That being the case, the financial data was organized into one-year periods. The first year of the migration process was the pre-transition year or Blackboard Only year. The second year was the transition year when the colleges used both CMS applications simultaneously. Finally, in the third year or the post-transition year, colleges were completely migrated to Moodle.

Four categories of expenditures:

- **License Fees**
 - The license fee category included any fees associated with software licenses. Since Moodle is an open source application, there is no license fee associated with the application.
- **Self or Vendor Server Hosting and Administration Fees**
 - The Self or Vendor Hosting Fees category included any cost associated with the server hosting the application. If the college was vendor-hosted, a flat rate was usually given by the vendor which would include server hardware, software and administration costs. If the college was self-hosted, the server hardware, software and administration costs were also factored in. The server hardware, software and administration costs were based on a variety of formulas such as server hardware depreciation, percentage of server administrative salaries, etc.
- **Faculty or Staff Training Fees**
 - Faculty or Staff Training Fees category included any fees associated with training personnel on the use of Moodle.
- **Blackboard to Moodle Course Conversion Fees**
 - Lastly, the Blackboard to Moodle Course Conversion Fees included any fees associated with the process of converting or migrating current Blackboard courses for their use with Moodle.

Note: The researchers sought to include as many expenditures as possible but concede there may be unidentified costs not included in this analysis.

The tables below illustrate the Total Cost of Ownership (TCO) summary for each of the case study colleges.

Guilford Tech Summary TCO

Guilford Technical CC was a vendor-hosted Blackboard college and it moved to a vendor-hosted Moodle college.

	Pre-Transition	Transition Year		Post-Transition Year
	BB	Moodle	BB	Moodle
Migration Years:	FA07-SP08	FA08-SP09		FA09-SP10
License Fee:	\$24,360.00	N/A	\$34,104.00	N/A
Vendor Hosting Fees (hardware, OS & Admin fees):	\$50,000.00	\$19,000.00	\$50,000.00	\$19,000.00
Training:	Not Reported	\$3,000.00	N/A	Not Reported
Course Conversion:	N/A	\$21,000.00	N/A	N/A
sub-totals:	\$74,360.00	\$43,000.00	\$84,104.00	\$19,000.00
CMS TCO/year:	\$ 74,360.00	\$127,104.00		\$19,000.00

Isothermal Summary TCO

Isothermal CC was a self-hosted Blackboard college and it moved to a vendor-hosted Moodle college.

	Pre-Transition	Transition Year		Post-Transition Year
	BB	Moodle	BB	Moodle
Migration Years:	FA04-SP05	FA05-SP06		FA06-SP07
License Fee:	\$11,000.00	N/A	\$9,500.00	N/A
Self/Vendor Hosting: Fees (hardware & OS)	\$2,500.00	\$6,996.00	\$2,500.00	\$8,996.00
Admin Fee:	\$8,750.00	\$3,500.00	\$8,750.00	\$3,500.00
Training:	Not Reported	\$1,250.00	N/A	Not Reported
Course Conversion:	N/A	Not Reported	N/A	N/A
sub-totals:	\$22,250.00	\$11,746.00	\$20,750.00	\$12,496.00
CMS TCO/year:	\$ 22,250.00	\$32,496.00		\$12,496.00

Blue Ridge Community College TCO

Blue Ridge CC was a self-hosted Blackboard college and it moved to a self-hosted Moodle college.

	Pre-Transition	Transition Year		Post-Transition Year
	BB	Moodle	BB	Moodle
Migration Years:	FA06-SP07	FA07-SP08		FA08-SP09
License Fee:	\$18,000.00	N/A	\$ 21,000.00	N/A
Self Hosting Fees (hardware & OS):	\$ 2,800.00	\$2,800.00	\$2,800.00	\$ 2,800.00
Admin Fee:	\$ 9,000.00	\$ 9,000.00	\$ 9,000.00	\$ 9,000.00
Training & Course	Not Reported	\$ 6,100.00	N/A	N/A
sub-totals:	\$29,800.00	\$17,900.00	\$ 32,800.00	\$11,800.00
CMS TCO/year:	\$29,800.00	\$ 50,700.00		\$11,800.00

Southeastern Community College Summary TCO

Southeastern CC was a vendor-hosted Blackboard college and it moved to a vendor-hosted Moodle college.

	Pre-Transition Year	Transition Year		Post-Transition Year
	BB	Moodle	BB	Moodle
Migration Years:	FA06-SP07	FA07-SP08		FA08-SP09
License Fee:	\$ 18,000.00	N/A	\$ 21,000.00	N/A
Vendor Hosting Fees (hardware, OS & Admin fees):	\$ 40,000.00	\$ 9,000.00	\$ 40,000.00	\$ 9,000.00
Training:	Not Reported	Not Reported	N/A	Not Reported
Course Conversion:	N/A	\$4,000.00	N/A	N/A
sub-totals:	\$58,000.00	\$ 13,000.00	\$ 61,000.00	\$ 9,000.00
CMS TCO/year:	\$58,000.00	\$74,000.00		\$ 9,000.00

Total cost by CMS for case study colleges:

Blackboard Costs:

- Pre-Transition Year Bb Cost \$184,410.00
- Transition Year Bb Cost \$198,654.00

Moodle Costs:

- Transition Year Moodle Cost \$85,646.00
- Post-Transition Year Moodle Cost \$52,296.00

Total cost by Transition year for all case study colleges:

- Pre-transition Year \$184,410.00
- Transition Year \$284,300.00 (*equals a 35% increase from Pre-transition year to Transition year*)
- Post-Transition Year \$52,296.00 (*equals a 72% decrease from Pre-transition year to Post-Transition year*)
- Pre to Post-Transition year savings to the NCCCS and colleges \$132,114.00

Refer to **Attachment B: NCCCS CMS Contract History**

CMS 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.

CMS Functionality Comparison Analysis

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 functionality 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 functionality 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.

VI 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 are involved and empowered to design a transition plan.
 - Moodle is first established at a testing and training level.
 - Production-level solutions are verified.
 - College-wide training is planned, scheduled and implemented.
 - An assessment strategy is created in parallel.
 - Migration to Moodle is 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 when dual CMSs are required.

VII 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 our 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 and 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.

Attachments

Attachment A: Learning Technology Systems Business Requirements

North Carolina Community College System

Learning Technology Systems Business Requirements

Dr. Bill Randall
Associate Vice President
May 20, 2009

Overview

The North Carolina Community College System (NCCCS) Learning Technology Systems (LTS) Department provides e-learning infrastructure, resources, and support for 427,018 curriculum course enrollments and 63,406 occupational and continuing education enrollments across the state (2007-08 academic year, duplicated head count). Efforts of the LTS are based on

1. Innovative business requirements that have evolved over the past five years as the NCCCS has accommodated student demand for e-learning instruction;
2. Recommendations of the NC e-Learning Commission; and
3. The assumption that only through collaboration and realization of economies-of-scale solutions, can the NCCCS provide uniform, robust learning opportunities to all adult learners across North Carolina.

Goals of Business Requirements for the Learning Technology Systems Department

- Enhance “opportunity and access” of learning to NC adult learners
- Improve quality of instruction, learning content & delivery tools
- Ensure that NCCCS is a good steward of public money
- Network the 58 NCCCS institutions to realize economies-of-scale solutions

Responsibilities of the NCCCS

- Support community colleges
- Provide for community colleges what they cannot provide themselves
- Promote quality and assessment
- Maximize number/quality of flexible resources to colleges – establish a menu of compatible, integrated resources
- Establish a protocol that inexorably improves resources over time

Learning Technology Infrastructure Objectives

- Establish robust/uniform learning/teaching tools and resources state-wide
- Realize economies-of-scale in all investment of new public allocations
- Reduce duplication of development costs, networking, & effort
- Establish a culture of collaboration; Connect & integrate NCCCS with K-12 & UNC
- Adopt protocols that utilize an “alignment strategy” and “integrated functionality” to fully realize economies of scale while simultaneously upgrading learning/teaching technology System wide

Business Requirements

- Provide a basis for planning and resource management
- Comply with State and System visions & missions
- Provide a template for integration, coordination, and cost savings
- Collectively and over time serve to transform independent components into an integrated system of services/resources
- Provide NCCCS advantages in vendor contract negotiations by:
 - Improving efficiency of vendor/client relationships & communications
 - Fostering a culture of assessment
 - Streamlining business processes
- Provide appropriate language for business analysts, legislators, and administrators
- All e-learning infrastructure, content development, and support components must support and/or be in alignment with
 - Recommendations of the NC e-Learning Commission & PreK-20 focus
 - An Alignment Strategy that places emerging e-learning infrastructure and support services of different educational entities on converging paths
 - Integrated Functionality concept
 - Good stewardship of public funds – reduce duplication of development costs
 - Spirit of collaboration and resource sharing
 - A Culture of Assessment

Goals of an Alignment Strategy

- To replace institutional-centric (silo effect) instructional technology with System-centric instructional technology solutions
- To evolve procurement strategies that place institutions (and Systems) on converging technical paths utilizing the "best of breed" and/or best value technologies based on common standards and volume purchases/discounts; Contracts reflect true consortium solutions
- Emphasis placed on technology that promotes collaboration and sharing of resources while reducing duplication of time, effort, and cost
- Provide robust and uniform learning technology services to all community colleges
- Collaborate with PreK-20 North Carolina partners to establish technology platforms that support consistent, seamless instructional technology
- Establish partnerships with regional and national leaders in sharable instructional technology and systems

- Explore alternative solutions and economic models for mission critical technologies
- Transition from traditional proprietary to open source instructional technology and/or scalable, proprietary technology that accommodates consortium licensing & networked access
- Establish a state-wide Learning Object Repository for digital learning and teaching content
- Develop tracking of digital content use for ROI calculations
- Develop consistent policy and funding models that facilitate learning technology
- NCCCS staff will continuously evaluate current & emerging solutions
- Goal of single sign-on, permissions-based, ever improving array of applications
- All hosted applications to reside on the NC State “Backbone”

Integrated Functionality – process of migration to instructional technology solutions that

- Are standards-based
- Are scalable
- Are open source or licensed via aggregate FTE/enrollment basis
- Vendor interoperability
 - Open APIs, available to all NCCCS vendors
 - Avoid “vendor lock-in” situation in which a single vendor has exclusive contract with NCCCS
- Provide a menu of learning/teaching/sharing resources in which
 - All e-learning infrastructure/support components must be compatible
 - Collective components will form a menu of solutions to maximize flexibility and increase choices for colleges, departments, and instructors

Culture of Assessment

- All aspects/components of NCCCS e-learning/distance learning infrastructure will undergo an assessment process to ensure accountability and document performance
- A “culture of assessment” is now the goal of the LTS and will form the foundation of how e-learning/distance learning infrastructure, content development, and support services evolve over time – based on the effectiveness of existing assessment protocol of Library Automation and Cataloging Services

Balanced Learning Technology Infrastructure

Six resources are required by all comprehensive community colleges to fully support learning technology. Should any of the six not be present, support for learning technology is jeopardized. These resources must be “balanced” and compatible.

Six Resources Required at all Community Colleges

1. Data network and broadband connectivity
2. Instructional content

3. Ability to deliver content
4. Support services for students, instructors, and support staff
5. Means to collaborate and communicate at departmental, discipline, and college levels
6. Library automation and cataloging services

Six Resources Required to Support Community Colleges at a Systems Level

1. Broadband connectivity
 - a. Expanding NCCCS data network
 - b. Improved connectivity in local & regional service areas
 - c. Access to state backbone
2. Learning & teaching content
 - a. Capacity to develop and deliver digital learning content (VLC courses & Learning objects)
 - b. Use of commercial learning content (example: NROC)
 - c. Use of STEM supplements (example: LateNiteLabs)
3. Delivery vehicles
 - a. Course management system (Blackboard & Moodle) to conduct online teaching & learning
 - b. Learning object repository for cataloging, accessing, acquiring and sharing content
 - c. Collaboration tools – webinar & communication resources (Elluminate & Wimba)
4. Support services
 - a. Online help desk (students)
 - b. Professional development (VLC & NC-NET)
5. Collaboration
 - a. Establish best possible planning, support & infrastructure
 - b. Realize economies of scale (VLC Development and Support Centers)
 - c. Ensure proper spending of public allocations
6. Library resources
 - a. Library automation services – SIRSI/CCLINC
 - b. Cataloging services
 - i. Original cataloging
 - ii. Authority records
 - iii. Cataloging training
 - iv. Help desk services

Current Level of Six Resources System-wide

1. Upgraded broadband connectivity – base level 100Mbps per main campus
2. VLC development centers and purchase/adoption of commercial learning objects
3. NCLOR, Bb contract and Moodle initiative
4. Online Help Desk for students and faculty/staff professional development via NC-NET & VLC
5. Elluminate/Wimba & expanded NCIH sites & virtual conferences/meetings
6. Adjusted instructional resources budget

Basis for Change: A Dynamic Business Requirements Strategy

All learning technologies adopted now and in the future will be

- Compatible
- Standards based
- Scalable
- Open source or licensed through true consortium contracts, resulting in substantial cost reductions
- Hosted centrally or regionally on the NC backbone (via MCNC, ITS, or higher education hosting centers)
- Based on identified common needs & solutions & networks
- Established by workgroups, “People networks precede technical networks”
- Established with collaboration incentives
- Established with shared resources

Example: North Carolina Learning Object Repository

- Centralized on state backbone
- Economies of scale savings – hardware, software license, IT support
- System-wide, state-wide distribution
- Standards based – can “federate” with other state & regional LORs
- Developed by PreK-20 leadership group
- Contract and scope of project created for total PreK-20 expansion
- CMS independent learning content repository
- Reduces cost/effort of duplication
- Enables educators to share work
- Based on quality standards
- Supports individual, group, & commercial items and/or collections

Example: SIRS/CCLINC Consortium

- Fully functional, expandable Integrated Library System serving 46 community colleges
- Prototype for NCCCS consortium solutions – identified by ITS as “best legacy consortium” in NC
- Customized RFP vendor selection process progressing to consortium contract and organization
- Economies of scale savings – hardware, software license, IT support
- Integrates/supports Cataloging Services
- Streamlines library services
- Excellent example of vendor/client cooperation/collaboration
- 99.99% up time record
- Mature resource complete with assessment strategies and client-controlled governance

Funded Infrastructure Components 2008

Bandwidth	Content	Delivery	Support	Collaboration	Library Resources
³ Data capacity	² Learning objects	⁴ Blackboard	⁴ Online Help Desk	² VLC expansion	Books, e-books, journals
<i>Centralized services</i>	² Learning modules	¹ Moodle	² Online orientation	⁶ SIRSI/CCLINC	digital content & learning objects
<i>*LEA, CC & UNC partners</i>	² Online courses	¹ Elluminate	² VLC staff development	2+2	NCLIVE
<i>Satellite campuses</i>	¹ Curriculum Pathways	⁶ ITV Video services	⁵ NC-NET	⁵ NC-NET	Other Instructional resources
<i>*Regional networks</i>	¹ LateNiteLabs	¹ NCLOR	¹ LEARN NC	¹ NCLOR	Help Desk
<i>Uniform services</i>			<i>TLT (UNC) Collaborative</i>	¹ Open Source Collaborative	
<i>Future expansion at local level</i>			⁴ LTS Staff Positions	⁴ Virtual Computing Lab	
			2+2	¹ LEARN NC	

¹**2+2 Funding**

²**Virtual Learning Community Funding**

³**Broadband Connectivity Funding**

⁴**Expansion Budget Funding**

⁵**NC-NET (2+2) Funding**

⁶**Previously Funded**

North Carolina e-Learning Commission Phase Two Recommendations

- Recommendation #2: Provide comprehensive e-learning opportunities for all North Carolina Citizens...and ...ensure coordination and seamless access to all e-learning opportunities for all citizens
- Recommendation #9: Establish the NC Learning Object Repository (LOR) to support PreK-20 e-learning

- Recommendation #12: Identify and implement a common online learning platform LMS (CMS) statewide
 - Must contain multimedia, collaboration tools and assessment tools
 - Must support interactive learning objects, and have tracking capabilities
 - Must accommodate age appropriateness and be easy to use by all including developmentally and intellectually challenged users
- Recommendation #13: Exercise economies of scale purchasing to reduce the cost per student in all instructional technologies
 - Negotiate single contracts for all instructional and distance learning technologies with licensing determined by an FTE/enrollment formula encompassing all educational systems
 - More flexible procurement, including multi-year contracts to maximize cost effectiveness
 - Invest in appropriate “open source” learning technologies to eventually replace proprietary systems and avoid escalating costs

Attachment B : NCCCS CMS Contract History

NCCCS Course Management System Contract History

Blackboard

2004-2006

NCCCS began negotiating “master term” contracts with Blackboard in 2004. This effort was to reduce online course management system software costs to colleges through a consortium contract. This contract was renewed in May 2005 effectively generating a “cost avoidance” contractual solution for the second year. The NC State Board of Community Colleges approved “a uniform pricing contract” that included consortium discounts for Blackboard’s other software and hosting services. This contract was effective for 55 NCCCS institutions and the System Office.

2006-07

During the summer of 2006, the NC General Assembly appropriated \$1,370,850 an “enterprise (level) Course Management System” (e-CMS) which was used to pay Blackboard Learning System software license cost for all NCCCS Blackboard clients – 55 community colleges plus the System Office for a total of 56 clients.

E-CMS Blackboard software was licensed via a three FTE-level formula. The first level included colleges with FTE totals under 2,000. Level two from 2,001 – 4,000 FTE. Level three from 4,001 – 8,000 FTE.

The 2006 Blackboard contract specified

- Level one - \$18,000
- Level two - \$22,920
- Level three - \$27,840

Total Blackboard license costs for 2006-07 were \$1,152,360. \$126,480 of the unspent allocation was used for Blackboard administrator and instructor training to assist community colleges migrate from “college edition” to “learning system” software that provided significant functionality and capacity benefits. This migration placed all NCCCS Blackboard clients on the same software platform.

2007-08

The 2007-08 Blackboard contract renewal was approved May 2007 funded by the continued \$1,370,850 allocation.

The 2007-08 Blackboard contract specified an increase in license costs including

- Level one - \$21,000
- Level two - \$26,740
- Level three - \$32,480

2008-09 through 2010-11

The current NCCCS/Blackboard contract was approved June 2008, based on a three-year agreement and covered 52 community colleges and the System Office. The 2008-09 contract totaled only \$991,305 as the contract start date was changed from October 1 to July 1 to conform to the fiscal year.

Blackboard contract specified an increase of 5% for the second year and 10% for the third. Blackboard added a fourth level for colleges with FTE levels above 8,000. Thus, the adjusted costs per FTE level per year are

2008-09, total of \$991,305

- Level one - \$15,750
- Level two - \$20,055
- Level three - \$24,360
- Level four - \$29,768

2009-10, total of \$1,400,764

- Level one - \$25,125
- Level two - \$32,025
- Level three - \$38,925
- Level four - \$47,550

The second year of the three-year Blackboard contract was recently approved by the SBCC for a total of \$1,400,764.

2010-11, total of \$1,540,842

- Level one - \$28,475
- Level two - \$36,295
- Level three - \$44,115
- Level four - \$53,890

Note: The difference between the \$1,370,850 allocation and the 2009-10 Blackboard invoice will be paid from 2+2 funds.

Blackboard costs for Moodle institutions

Year	Community College			
	Isothermal	Blue Ridge	GTCC	Southeastern
2006-07	*\$9,500	\$18,000	\$27,840	\$18,000
2007-08	0	\$21,000	\$32,480	\$21,000
2008-09	0	0	\$24,360	0
2009-10	0	0	\$34,104	0

*License costs before NCCCS/Blackboard agreement signed October, 2006. Isothermal refuses free Blackboard license for remainder of year.

Note: Blue Ridge and Southeastern drop Blackboard prior to new 2008-09 contract.

Moodle

2006-07 through 2008-09

NCCCS supports the North Carolina Moodle Users Group (NCMUG) that establishes training for one administrator and five instructors, system administration, and Moodle hosting for five NCCCS institutions and one UNC institution. Participant institutions chosen via RFP process. Total costs are \$40,000 per year.

2008-09

NCCCS and UNC jointly establish the Open Source Collaborative: Moodle Assessment (OSC-M) with \$170,00 of 2+2 funds. OSC-M created to support a minimum of 100,000 students and 26 independent “virtual” Moodle instances. All NCMUG courses/programs migrated over to OSC-M. Funding for NCMUG discontinued.

2009-10

Second year of OSC-M approved by SBCC. OSC-M reduced in size due to budget constraints. OSC-M hosting and system administration/help desk supported with \$106,044. Training to be provided by in-house staff and participating community colleges.

- Moodle Migration Dates:
- Isothermal, Fall 2006
- Blue Ridge, Fall 2007
- Southeastern, Fall 2008
- GTCC, Spring 2009