ANALYSIS AND COMPARISON OF LEARNING AND CONTROL TOOLS OF VIRTUAL LEARNING APPLICATIONS MOODLE 1.6.1 AND BLACKBOARD LEARNING SYSTEM CE 6.1 ENTERPRISE

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The article analyses two distance learning environments – Moodle 1.6.1 and Blackboard Learning System CE 6.1 Enterprise. Moodle is the leading open source program while Blackboard is a leading commercial product. The article will analyse the properties and tools of these programs.

Keywords: student, instructor, technologies, virtual learning

Abbreviations

WebDAV is the abbreviation for Web-based Distributed Authoring and Versioning. It is an addition to the HTTP protocol that allows the users to simultaneously edit the files uploaded to the server, LDAP (light weight directory access protocol) is a protocol for creating and editing of large directory services, WYSIWYG is the abbreviation for What You See Is What You Get. It is a type of editor that enables to create text and images that will not change their appearance when printed or viewed through a different browser, VLA is a virtual learning application, MathML – Mathematical Markup Language, IP – Internet protocol address, URL – Uniform Resource Locator.

1. Introduction

The establishment of information society is determined by the fast development of informational and communication technologies that provide the new possibilities in the development of social, cultural, economic and educational areas of life. Using the opportunities provided by the informational and communication technologies to improve the process of general education in colleges and universities is crucial. The technologies can be used in professional development, extramural studies and especially the development of distance learning. Several different virtual learner environments can be used in distance learning.

2. Analysis of the Tools of Virtual Learning Applications Moodle and Blackboard

Virtual learning applications (abbr. VLA) for the first time appeared in institutions of higher education. Later they were also introduced in secondary schools. In colleges and Universities VLAs are used mostly when the instructor and the student cannot meet on a regular basis.

Moodle and Blackboard are two of the most popular VLAs in Lithuania. Moodle was created by Martin Dougiamas from Australia. The application is used by Vilnius Pedagogical University, Klaipeda University, Business College of West Lithuania, some secondary schools and other academic institutions of Lithuania. In December 2006 there were over 150 000 users of Moodle in 160 countries. The application is now available in 75 languages (Moodle VLA see on Fig. 2.1).

Blackboard Inc. Worldwide Headquarters is located in Washington, DC. The company also has offices in Asia, Australia, and Europe. The company claims to be the worldwide leading provider of enterprise software applications and related services to the education industry. It is a traditional VLA with a main focus on the educational materials and testing. This application is currently used by Kaunas University of Technology (Lithuania), Vilnius University (Lithuania), and other educational institutions (colleges and secondary schools). In 2006 the user community of Blackboard was spread in over 75 countries. (Blackboard VLA, see on Fig. 2.2).
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2.1. Learning Tools

Discussion forum. **Moodle** discussion forum advances collaboration and critical thinking and promotes social constructionist pedagogy. Discussions can be sorted by date, subject, or author. The instructor can expand a topic into sub-topics. The instructor can set (limit) the level of participation (reading, posting or private messaging) for the students. The application allows uploading mail attachments, video and audio materials, PowerPoint slides and URL addresses. When posting to the forum the students can use the user-friendly text editor that is also equipped with a spellchecker. Students can sign up for discussions. Students can also subscribe to receive the posts by e-mail. Students can choose to review posts as daily digests of subject lines or as whole posts.
Blackboard allows sorting the discussions by date, type, topic, and author. The instructor can determine the level of students’ involvement to reading, posting or private messaging. The instructor can create special environments for small-group discussions. File attachments, URL addresses, and HTML formatting can be included into the posts. A formatting text editor is available for more effective posting. The threads can be expanded or collapsed to enable viewing a topic in one screen. The selected discussion can be saved and printed for further reference.

File Exchange (Upload). In Moodle students can submit files using drop boxes. With Blackboard students can use the drop boxes or upload a file to a sharing folder.

Internal E-mail (used within the VLA). Moodle. Students can use the internal e-mail to communicate with other users. They can attach and archive catalogues and forward the messages to external e-mail accounts. The internal e-mail inbox is searchable. Several search criteria can be used. The outgoing messages can be spell-checked. Blackboard. Students can use the internal e-mail to communicate with other users. They can attach and archive catalogues and forward the messages to external e-mail accounts. The internal e-mail inbox is searchable. Several search criteria can be used. The outgoing messages can be spell-checked.

Real-time Chat. Moodle chat allows image upload. The system generates an archive for all chat rooms. The instructor can check the archive logs for all chat rooms. The chat time can be restricted by the instructor. Students can see what users are also participating in the chat. Blackboard chat is powered by Java. It allows personal messaging and creation of private chat rooms. The registration log is generated for all chat rooms. Simultaneous participation in several chat rooms is possible.

Online Journal/Notes. Moodle. Students can add notes using the WYSIWYG editor or the regular textbox. Notes can be added to the personal journal or shared with the instructor. Blackboard. Students can add notes to any page. Notes can be added to the course material to create a personalized printable study guide.

Whiteboard. Moodle. The whiteboard is not available. Blackboard. The software allows the instructor to create and control the whiteboard. The whiteboard supports image and PowerPoint uploading. The whiteboard sessions can be recorded and archived for future viewing.

Video Services. Moodle – none. Blackboard – none. Productivity Tools. Calendar/Progress Review. Moodle. Students can see the assignments and the progress report of completed tasks. The progress report includes grades on completed assignments, total points possible, and the course grade. Blackboard. The instructor as well as the students can post events in the online course calendar. Students can see their progress report and the course grades. Each student has a personal home page that lists all courses in which the student is enrolled. It also shows if there is new mail as well as all course and system-wide events from their personal calendar.

Orientation/Help (tools that help students to learn how to use the course management system). Moodle. The context sensitive help tool – that has not yet been translated into Lithuanian. Blackboard. The context sensitive help tool is available in Lithuanian.

Searching Within the Course. Moodle. The course content, discussions and e-mail are searchable. Blackboard. The course content, discussions and e-mail are searchable.

Working Offline/Synchronization. Moodle. Working offline is possible if Moodle applications are installed on the computer and the necessary course has been downloaded. Blackboard. The instructor can create a downloadable CD-ROM for offline viewing.

Group work. Moodle. The instructor can divide students into groups. Groups can be defined by course level, assignments, or level of involvement and individual participation. Blackboard. The instructor can either assign groups manually or allow the system to randomly create groups of a certain size. Each group can have a discussion forum, chat or whiteboard.

Student Portfolio. Moodle. Every student can have a homepage. The page may include the lists of all the student’s posts, a student’s photo and personal information. Blackboard. A student can have a homepage for every course he/she is registered for. The student can use the homepage to display the course work. Students can export their homepage information.

2.2. Control Tools

Translation Tools. Moodle. This tool allows translating certain modules of the learning environment into most languages or improving the existing module translations. Blackboard learner environment does not have such a tool therefore Kaunas Technological University (Lithuania) uses different technologies for translating their Blackboard Learning System CE 6.1 Enterprise version into Lithuanian.
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**Authentication. Moodle.** The system uses the main username and password for user authentication. The system can verify the existing user against an external database. **Blackboard.** The administrator can secure individual courses by requesting username and password. Connection can also be limited by IP address. The system is equipped with a password reminder function. The login information can be secured with SSL. The system can authenticate against the external LDAP server. The administrator can create authentication against a secondary source (e.g. the system's own database) in the event that the primary source (e.g. LDAP server) fails.

**Course Authorization. Moodle.** The software provides the administrator with the tools to assign roles to different user groups: administrators, instructors, students and guests. The exclusive rights of a group can also be assigned to a subgroup. Students and instructors can have different roles in different courses. The system has access to information stored in external catalogues including the paid services. **Blackboard.** The administrator can set different levels of system and course material access based on the set roles such as instructor, student, designer, associate instructor, and system administrator. Students and instructors can have different roles in different courses.

**Hosted Services. Moodle** has the following systems: software installation management, multi level operations in a safe UNICS server, wide span of control, 10 GB bandwidth with a night-time backup, allowing unlimited usage of the course materials. **Blackboard.** The product is accompanied by a host system that includes service agreements with guaranteed system efficiency. The network is capable to service massive amounts of users without breakdowns. The product has a modern security system with non-stop monitoring, a direct T3 connection with a second redundant connection and daily external backups. Users can access the courses and the system from any computer that has Internet connectivity and a web browser. The system can also be accessed from Embanet that provides daily sites, selected programs, and system block for a limited number of users.

**Registration Integration. Moodle.** The instructors can add students to the course or the students can register themselves. The software supports integration with external information systems through its own program interface. **Blackboard.** The administrator can add a list of students to a system using a delimited text file. The instructor can then add students to courses himself or herself or he/she can also allow the students to register themselves. The administrator can import and export student information to and from the system using IMS Enterprise Specification v1.1 XML files via web services.

**Automated Testing and Test Management. Moodle.** The instructors can do the following:

- create self-assessment tests with true/false, multiple choice, short answer questions, the questions can include images, video and links to every answer;
- create mathematical equations;
- create specific or general tests for a certain course or for general use in the system;
- include questions from other databases. The system can automatically select questions and create alternatives for multiple choice question answers;
- require students to enter a special password and set a time when the tests are to be accessed;
- set a time limit for completion of a test; limit access from certain IP addresses;
- differentiate between easy and the more difficult questions and create rules for grading;
- allow students to re-take tests and enable the display of results; discard the automatically calculated points; add necessary questions.

The system provides test materials for every part of the course. **Blackboard.**

The instructor can enable the system to automatically score multiple choice, true/false, and short answer type questions; select the most relevant questions from existing test banks; set a time limit for completion of a test; choose to use the MathML editor that would allow students to include mathematical formulas in their answers; limit access from certain IP addresses. The system also allows observing (proctoring) tests.

**Course Management. Moodle.** The instructor can set the materials and discussions to appear on certain dates. The system can synchronize course dates set on the course calendar. **Blackboard.** The instructor can provide guidelines on how to use specific resources that are available for group members set the overall course schedule as well as assign individual tasks to students. The instructors can upload specific assignment to check if the students know the course content. The assignments may include filling in the missing terms. The instructors can create additional course materials to make the course less complicated and be more applicable for self-studies.

**Online Grade book. Moodle.** The instructor can disable the automated scoring. The instructor can also give partial credit for certain answers. The student can review individual grade books or the combined group grade book. The grades can be exported to an external spreadsheet. The grades can be recorded as percentages using decimal points. Instructors can have a two-way communication in all course communication tools.
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**Blackboard.** The instructor can add grades for assignments that were completed offline. The instructor can indicate key words based on which the program will determine if the answer in the fill-in field is correct. The instructor can add additional columns to the grade book to account for the assignments that were completed offline so that the grade in the online grade book is the actual course grade. The instructors can export the grade book to external spreadsheets. The instructors can review the grade book and edit all grade book entries. The instructor can be responsible for the evaluation of offline assignments. The instructor can create custom columns to add additional information to the grade book. When the instructor adds an assignment to the course, it automatically appears in the grade book.

**Student Tracking. Moodle.** Instructors can receive messages that show how often every student accessed the system. It shows on what particular dates and from what IP address the student connected. The instructor can make notes about every student. The instructor can also receive messages on individual student activity. The instructor can control the students that are registering for his/her course. **Blackboard.** The instructor can receive a report on how an individual student, a group of students or all students used the course materials, specific topics and discussion forums, when and how often they accessed it and for how long. The instructor can see how much time a particular student spent on a particular task. The instructor can share these observations with the students.

**Course Templates. Moodle** supports 10 course templates: activities arranged by week, activities sorted by topic, and a social discussion format. The instructor can create a new course on the basis of an existing course or use a course content template. The instructor can then use the templates for discussions, links, course content and resources. All the templates are created using WYSIWYG editor that is also equipped with a spellchecker. **Blackboard** offers to create new courses using the existing templates. The templates are created using WYSIWYG editor. The instructor can use templates to create the courses, course descriptions, topics, discussion forums, list the infrequent words, calendars, chat rooms and other resources. The system provides the course project with a step-by-step tutorial on how to create a course homepage, outline the schedule, discussions, set up e-mail, calendar and the chat room. The instructor can divide the course content into course topics, discussion forums, programs, types, resources and infrequent words. The course content can be uploaded by using a form or through WebDAV. It is possible to export the course content for students that enter the course later.

**Curriculum management. Moodle.** The instructor can identify difficult tasks across different course levels or course functions. **Blackboard.** The instructor can identify difficult tasks across different course levels or course functions.

**Instructional Standards Compliance.** Performing to standards to enable using course materials in different VLAs (these standards include features that make it easy to transfer the course between different applications). **Moodle** supports SCORM 1.2 and SCORM 1.3 standards. **Blackboard** supports IMS Content Packaging 1.1.3, IMS QTI 1.2.1, Microsoft LRN, and SCORM 1.2.

**Teaching Tools. Moodle.** The instructor can arrange the topics in either linear or non-linear sequence by using the library. The instructor can have series of lectures. The software provides constructive ways to solve the main problems and improve the learning experience. The instructors can include the context to accompany the educational projects and advance the interactive learning environment. The instructor can link the regular assignments with the tests and use it as a model for future lessons. **Blackboard.** The instructors can expand the courses. They can create additional study objects and course materials that would benefit the quality of the course. The instructor can upload the documents to the system through WebDAV. The instructors can create grade books for specific courses.

### 3. Additional Moodle Features

When analysing **Moodle** I have noticed that it has additional management and teaching modules that are not included in the main package. These modules need to be installed separately. The installation is rather simple: once you copy the file to the designated catalogue the program activates it automatically. There are over 100 modules and plug-ins that can be used to adjust the system to the individual needs.

#### 3.1. Main Extra Moodle Learning and Control Tools

**Certificate Creation Module** can be used to create professional looking certificates for students, who successfully complete the course. The certificates can be issued online within the learning environment.

**Gallery Module** allows the students to create an album by uploading photos to the homepage (Fig. 3.1).
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Figure 3.1. Moodle Gallery Module

Advanced Grade book enables every student to have a custom grade book (see Fig. 3.2).

Figure 3.2. Moodle Advanced Grade book

Internal Mail Module allows for electronic mail exchange within the system. This module has all features typical to any electronic mail system. One can send, receive, delete letters, and attach files. There is also an address book with the contact list of students enrolled in the same course.

Java Molecule Editor allows the instructor to create visualized chemical molecule systems for testing purposes (see Fig. 3.3).

Jmol Filter Module allows the instructor to create interactive 3D molecule structures (see Fig. 3.4).

Figure 3.3. Java Molecule Editor

Figure 3.4. Jmol Filter Module

Questionnaire Module provides an essential tool for testing. It can be used creatively in a variety of situations. For example, to test students’ knowledge about the course material before the course starts, to see how fast students are learning, or to check their motivation, computer proficiency, etc. The questionnaire format is flexible. The instructor can set the desired number of questions with a certain type of answers. The answer types could be one out of many, more than one out of many, other, or a blank field where the student could enter the correct answer. A drawing field can also be selected. The module collects and analyses the responses and scores them.

Registration Module enables the students to register for exams.
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Table 1. Moodle and Blackboard Feature Comparison

<table>
<thead>
<tr>
<th>Learning Tools</th>
<th>Moodle 1.6.1</th>
<th>Blackboard Learning System CE 6.1 Enterprise</th>
<th>Control Tools</th>
<th>Moodle 1.6.1</th>
<th>Blackboard Learning System CE 6.1 Enterprise</th>
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</thead>
<tbody>
<tr>
<td>Discussion Forum</td>
<td>+</td>
<td>Authentication</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>File Exchange (Upload)</td>
<td>+</td>
<td>Course Authorization</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>Internal E-mail</td>
<td>+</td>
<td>Course Management</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>Online Journal/Notes</td>
<td>+</td>
<td>User Registration</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>Real-time Chat</td>
<td>+</td>
<td>Automated Testing and Scoring</td>
<td>+</td>
<td>+</td>
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<tr>
<td>Whiteboard</td>
<td>–</td>
<td>Curriculum Management</td>
<td>+</td>
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<tr>
<td>Video Services</td>
<td>–</td>
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<tr>
<td>Bookmarks – (allows the students to emphasize the important information that they can come back to later)</td>
<td>–</td>
<td>–</td>
<td>Teaching Tools</td>
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<td>+</td>
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<tr>
<td>Calendar/Progress Review</td>
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<td>Grade book</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>Orientation/Help</td>
<td>+</td>
<td>Student Tracking</td>
<td>+</td>
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<td>Searching Within the Course</td>
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<td>Course Templates</td>
<td>+</td>
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<tr>
<td>Working Offline/ Synchronization</td>
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<td>Translation Tool</td>
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Conclusions

Two virtual learning applications Moodle and Blackboard are analysed. Both of them are similar in many ways. Blackboard is a commercial product while Moodle is distributed free of charge. These remote programs have a wide spectrum of services: Discussion Forums, File Exchange, Internal E-mail, Online Journal/Notes, Real-time Chat, Video Services, Bookmarks, Calendar/Progress Review, Orientation/Help, Searching within Course, Group work, Self-assessment, Student Portfolios and other functions mentioned in Table 1. Its architecture can be integrated into the structure of a portal. The authors believe that it is very important for the institutions that would choose VLA Moodle to have the methodology that would provide the instructors and students with the guidelines on how to use this particular environment.

References


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