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## THE MOODLE PLATFORM'S LESSON MODULE AS AN EXAMPLE OF EFFECTIVE E-LEARNING

### MODUŁ „LEKCJA” PLATFORMY MOODLE JAKO PRZYKŁAD EFEKTYWNEGO NAUCZANIA NA ODLEGŁOŚĆ

#### Abstract

In the era of distance communication, areas such as education can try to find a place in the digital world. The possibility of distance learning, due to widespread access to the Internet, can provide valuable educational activities without the necessity for the student to leave their home. A perfect example of this approach is the module 'Lesson' contained within the Moodle platform. This allows not only the opportunity to present attractive knowledge but also the possibility for student evaluation on an ongoing basis whilst they are still learning. This functionality is one of the most dynamic components of the platform – it enables two-way interactivity between teacher and student.

*Keywords: e-learning, Moodle platform, blended learning*

#### Streszczenie

W dobie rozwoju komunikacji na odległość również taka dziedzina jak edukacja próbuje znaleźć swoje miejsce w cyfrowym świecie. Możliwości nauczania na odległość, ze względu na powszechny dostęp do Internetu, pozwalają na przeprowadzenie pełnowartościowych zajęć bez konieczności wychodzenia z domu. Idealnym przykładem takiego rozwiązania jest moduł „Lekcja” zawarty w platformie Moodle. Pozwala on nie tylko na przekazanie w sposób atrakcyjny wiedzy, ale również na jej weryfikowanie na bieżąco, w trakcie nauki. Opisany moduł należy do dynamicznych składowych platformy – umożliwia dwukierunkową interaktywność pomiędzy nauczycielem a uczniem.

*Słowa kluczowe: e-learning, platforma Moodle, blended learning*

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## 1. Introduction

Nowadays, e-learning is one of the most popular forms of online education. Its popularity is mainly connected with the fact that it provides the opportunity for distance education thanks to the use of processes and software that create online courses. That is an important technique that meets the expectations of present day students who want to gain knowledge in an attractive manner and manage their learning time efficiently. Online courses allow achieving this aim, they also let students broaden their knowledge in a manner which might provide an alternative to traditional learning techniques.

The construction of online courses is based on the conviction that the interaction and collaboration between educators and students is continuous. The quality of the information exchange is determined by the efficiency of that exchange between teachers and students. In order to make online education professional and effective, it is necessary to employ the right processes and software designed especially for that purpose [1]. This means modern e-learning systems that have well developed IT tools which aid the educational process. The lack of unity of place, and very often time, is characteristic of the participants of online education.

Specialist literature provides various definitions of e-learning, generally, the problem can be described as “a set of instructions for digital tools, such as computers or portables, that aid learning” [12]. It is also emphasised that e-learning covers the whole scope of processes connected with teaching and learning within an environment that uses modern information technologies, especially the Internet. Interactivity is a characteristic feature of the whole process which utilises technological tools and allows for the creation of a relationship between a teacher (the broadcaster) and a student (the recipient) or students (the recipients). E-learning also provides an opportunity to make the educational process more flexible – this is possible due to available access to knowledge at any time and from any place in the world. What is more, a student can adjust the pace of learning according to his or her subjective abilities or individual needs. E-learning also provides access to state-of-the-art laboratories and virtual experiments [8].

However, disregarding some of the terminology, it is worth noting that the idea of e-learning or distance learning is currently an important educational alternative, mainly because of the constant necessity to broaden one’s skills and professional competencies [6]. It is also extremely vital for enhancing the quality of education, primarily at the academic level. Involving the students in the educational process is the key to success in the case of online academic education. Students like the latest information technology, also learning platforms, designed to aid traditional classroom teaching [13]. Therefore, the quality of education is determined by the individualisation of the educational path. It is possible by the use of alternative online education.

## 2. Characteristics of the main e-learning platforms

Currently, common asynchronous teaching models are used in every day teaching practice. They lack the elements that are determined by the location and time of the classes carried out in the course of studies [5]. In that model, direct communication is replaced by electronic communication, e.g. creating newsgroups or exchanging e-mails. E-learning solutions, as

stated above, allow the learning place to be flexible and individual. In connection with the above, learning platforms (e.g. learning management system – LMS, or learning content management system – LCMS or virtual learning environment – VLE) give a chance not only to conduct classes and communicate with students within an online course but can also enhance regular classes run in university classrooms. This type of education is called blended learning [8] – it combines face-to-face education with e-learning. The system is typical for colleges and universities which more and more frequently begin to implement elements of online teaching and learning. Due to blended learning, it is possible to reduce the time spent by students at universities, and in this way, reduce the costs of studies as well as facilitate their organisation [9].

One of the solutions is the Moodle platform (modular object oriented distance learning environment) – the system that aids distance learning. It has over 65 million users all over the world and has been translated into 120 languages [11]. Martin Dougiamas, an Australian, is a founder and creator of Moodle who working on the platform believed in “(...) the importance of unrestricted education and empowered teaching, and Moodle is the main way I can contribute to the realisation of these ideals. I also know a lot of people in schools and smaller institutions (and some big ones!) who want to make better use of the Internet but don’t know where to start in the maze of technologies and pedagogies that are out there. I’ve always hoped there would be a free alternative that such people could use to help them move their teaching skills into the online environment. It is crucial to me that this software be easy to use – in fact, it should be as intuitive as possible” [11].

Moodle enables creating educational pages that allow for distance teaching and learning. It is popular because it is widely available and free for use under the GNU GPL licence [4]. It offers an easy and user friendly interface that is characterised by customisable management features – this is possible thanks to setting the options that are connected with the following elements [7]:

- course availability – allows for attributing determined roles and authorisations (e.g. administrator, visitor, student, teacher, leader) and creating access for a particular group of users;
- course enrolment – users can enrol for courses unassisted (optional use of an access key – a password) or can be enrolled by the lecturer;
- course syllabus – the possibility of setting order, e.g. subject order or time order.

Moodle users have their own fully modifiable accounts which means that they have authorised access to the platform. It is also worth mentioning that Moodle is compatible with various software packages thus making it possible to publish educational materials in different formats, e.g. ‘.doc’, ‘.ppt’, or ‘.pdf’. It also has important features for use with other specific systems that allow educators to present learning materials to students and also check their knowledge using different testing tools (e.g. homework, quiz, survey) [7].

Other free learning platforms also exist, e.g. Caroline [2]. According to the platform’s creators, it is used by over 500 organisations in 68 countries. It allows the management of documents and resources available to the learners. Collaboration among course participants is possible thanks to the use of the calendar and other tools designed for the purpose of cooperative work.

Apart from the free platforms, there are also commercial options – MS Windows Server Training [14] and Lotus Learning Space [10] are among the most common examples; however, their popularity is limited.

Bearing in mind the versatility, popularity and availability of Moodle, the following part of this article will focus on Moodle itself, or more precisely, one of its modules called The Moodle Lesson Activity. This is the basis for one of the dynamic elements of courses. It enables educators to provide information to learners and to simultaneously check their knowledge. The Lesson Activity consists some part called “lesson”, built as a collection of HTML slides, designed by a course creator. All of them contains educational content and some questions tools to check the knowledge. Generally, there are two basic methods of content presentation, these are pages presenting educational content and pages designed for testing. What makes the Moodle Lesson Activity different is its ability to adapt to the learner’s progress.

### 3. The use of The Lesson Activity in educational practice

In order to create a lesson, firstly click the ‘Add an activity’ drop-down menu and select ‘Lesson’, give the lesson a name and save it. You are then directed to a page with four tabs: ‘Preview Lesson’, ‘Edit’, ‘Reports’, ‘Grade Essays’. The first tab enables students to view the lesson. The ‘Edit’ tab enables the creator to add new elements to the lesson, the ‘Reports’ tab shows statistical information about students’ progress. The last tab enables the educator to grade students’ essays. During the lesson creation process, the second tab is most important.

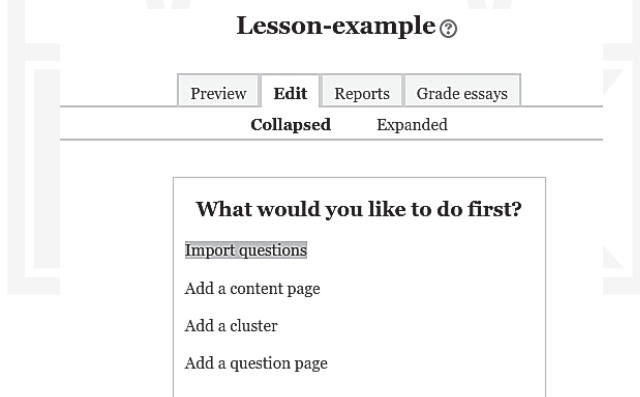


Fig. 1. Creating an example lesson

The easiest way of creating a lesson is by choosing the “Add a question page” option – this allows the insertion of teaching material and testing tools. Fig. 2 shows exemplary teaching content while Fig. 3 shows testing tools. Each question page should include a testing tools for checking students’ progress. Exemplary multiple choice test (with only one correct answer) is presented in Fig. 3. It is possible to use other testing tools, of course.

A good example of multiple choice test is a strategy where the educator asks a question that has a number of possible correct answers and assign a different score to each one.

### Methods based on the energy principle to calculate deformation of beams

Castigliano theorem is the method based on the strain energy principle as follows:

The deformation at some point of linear elastic beam is equal the partial derivative of the strain energy with respect to an applied force at this point.

The angle of bending twist at some of linear elastic beam is equal the partial derivative of the strain energy with respect to an applied moment at this point.

Aforementioned theorem can be described by the equations as follows:

$$w_A = \frac{\partial L}{\partial H} = \int_{(l)} \frac{M_g(x) \partial M_g(x)}{EI} \frac{\partial M_g(x)}{\partial H} dx$$

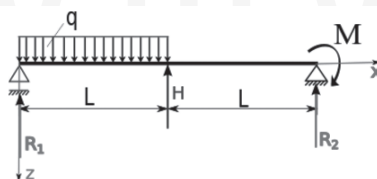
$$\varphi_A = \frac{\partial L}{\partial M_H} = \int_{(l)} \frac{M_g(x) \partial M_g(x)}{EI} \frac{\partial M_g(x)}{\partial M_H} dx$$

where:

- $M_g$  is the bending moment
- $EI$  is a stiffness of beam
- symbol  $(l)$  means the integration along the beam.

#### Checking questions

Fig. 2. Example page with teaching content



The second part stands for:  $L \leq x \leq 2L$ . The equation describing the bending moment in this part of beam is as follows (checked the correct answer):

$M_{g_2} = R_1 x - qL \left( x - \frac{L}{2} \right) + H(x-l)$

$M_{g_2} = R_1 x + qL \left( x - \frac{L}{2} \right) + H(x-l)$

$M_{g_2} = R_1 x - \frac{1}{2} qL^2 + H(x-l)$

$M_{g_2} = R_1 x - qL \left( x - \frac{L}{2} \right) - H(x-l)$

Fig. 3. Example page with multiple choice question

A true or false quiz, as presented in Fig.4, is another testing tool – here, the learner has to answer ‘yes’ or ‘no’ to questions. In cases of choosing the option ‘Short answer’, the learner

needs to write the correct answer in an appropriate window. However, this should not be longer than a few words. ‘Match the answer’ is another type of question.

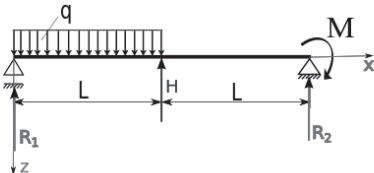
The bending moment for beams can be calculate by use of The Castigliano theroem.

- True  
 False

Fig. 4. A page with a ‘True’ or ‘False’ quiz

Here, the learner needs to pick one of the given answers and match it to the question asked, in such cases, more than one answer can be correct. There are also numerical questions where the answer is a number that has a certain tolerance. A short essay is another form of testing.

The student is informed about a correct answer (Fig. 5) and directed to the next page after pressing the ‘continue’ button.



The second part stands for:  $L \leq x \leq 2L$ . The equation describing the bending moment in this part of beam is as follows (checked the correct answer):

Your answer:

$$M g_2 = R_1 x - qL \left( x - \frac{L}{2} \right) + H(x - l)$$

Congratulations! Your answer is correct.

Continue

Fig. 5. Example question with choosing good answer

If the student answers the question incorrectly or gives no answer to the question, the educator can transfer the student to the content page for further study, or back to the question that was answered incorrectly. It is also possible to set an option where each additional answer has a lower score.

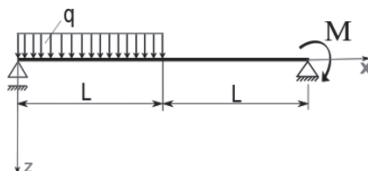
Branch tables and clusters are more advanced forms of lesson construction. Branch tables are used for dividing question pages into sections that create the basic structure of the page. Creating a branch starts with the insertion of a branch table, and finishes with the insertion of an ‘End of branch’ page; upon completion, you are directed to branch table page. Fig. 6 presents an example of a branch table page as seen by the course participant.

Clusters are groups of question pages that form is similar to the multiple questions test page. When we have a lots of lessons (lots of educational data) we can input one page with only educational content, and next input many pages with questions to check the knowledge

### Exercise

Estimate the magnitude of the deflection at a half of length of the beam below and the value of bending angle at the end of beam.

**Given:**  $q = 10$  kN/m,  $L = 1$  m,  $E = 210$  GPa,  $I = 2 \cdot 10^{-7}$  m<sup>4</sup>,  $M = \frac{1}{2}qL^2$ .



Estimate magnitude of deflection

Estimate value of bending angle

Fig. 6. Example branch table page where the student can divide next content

of learners. From the lists of questions, the Moodle system randomly select group of the questions to input on the question page. If the amount of questions are huge, it will possible that the same question are not select many times by the system. The parameters according to the question page are possible to choose on “End of cluster” page.

## 4. Conclusion

Using online courses in academic education can be a very attractive way of learning for students. Not only can e-learning enhance traditional education but can also be used as an individual course covering a particular subject. In that respect, The Moodle Lesson Activity is truly amazing as it allows the creation of engaging, interactive packages presented in an attractive form. It helps to make students more active and involved in the learning process, not only at the university but also in the home. The Moodle learning platform allows the use of non-standard educational procedures while embedding external media into Moodle makes it even more attractive. There is the option to add more dynamic content to lessons such as graphs, videos, animation, sound, or even have online tutorial sessions. Additionally, having the opportunity to not only present teaching content to students but also to test students' progress allows both parties to evaluate the time necessary to achieve learning goals. Due to the use of Moodle, students' grades improved and they found the Moodle learning experience to be very positive.

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