THE LMS PLATFORM AS THE TOOL OF CHECKINGPROGRESS IN THE LEARNING ENGINEERING GRAPHICS

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Abstract. The Platform for Distant Learning has been used in Geometry and Engineering Graphics Centre for didactic aims since 2007. The paper presents examples of using the Moodle Platform in checking the learning progress. The practical realization of tests with two types of questions: "match the answer" and "multiple choice" has been shown. The presented tests cover the basics of technical drawing. The method of creating the tests and their application in didactics process has been presented in the paper.

Keywords: E-learning, LMS platform, checking of learning progress

1 Why e-learning?

In many publications the issue of decreasing number of teaching hours of subjects connected with engineering graphics at the technical courses of studies and problems resulting from that fact are discussed. The changes introduced to the syllabus of the classes and elaboration of new forms and methods of classes seem to be the answer to that problem. The main trend of aiding the teaching process is creation and presentation of didactic materials with the aid of computer and multimedia. Lectures are enriched with presentations prepared in MS Power Point and various visualizations, and the ways of solving construction tasks can be presented on WWW pages in a form of flash animations [1]. Geometry textbooks are published in electronic form, on CDs or internet services. All these didactic materials in electronic form can form perfect base for elaboration of e-learning courses aiding traditional form of teaching.

Distant learning platforms are used in majority of universities in Poland and worldwide [4,6,7]. E-learning has become common in the recent years mainly due to greater availability of Internet and greater capacity, which form the basic requirement for using educational contents. Currently in Poland according to the regulation of the Minister of Science and Higher Education here is no possibility of realizing studies in distant mode [5]. This decree determines the number of hours of classes which can be carried in a e-learning form as well as conditions which must be met by a university in order to make it possible. The form of conducting classes as suggested by the Ministry of Science and Higher Education is called blended learning, in which big part of lectures can be realized in a distant form.

Blended learning is the method, which facilitates learning through effective combination of various forms of transfer, models of teaching and styles of learning. Many authors claim that it is the most effective form of learning as it combines the best forms of traditional teaching with wide possibilities of distant learning. Therefore, majority of universities develop platforms of distant learning which enable aiding traditional teaching process and overcoming geographical and time barriers in contacts between a teacher and a student.

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2 Checking the learning progress

Since 2007 classes carried by the academic teachers of the Geometry and Engineering Graphics Centre have been aided by the Platform for Distant Learning, based on the Moodle system. The LMS platform forms a supplement to classes, which are still realized in traditional way in full time [2,3]. The teachers put presentations from lectures and the contents of designing classes there. The platform is also for communication between teachers and students. Currently, works are being carried to broaden functionality of the courses with the control for progress check. The format of the progress check must be adapted to the kind of course as well as the method of teaching. In majority of subjects quizzes and tests can be used as a form of progress check, and that refers to engineering geometry too. The tests realized at the distant learning platform can have the following applications:

- as a preliminary test before the course,
- as self study for students,
- as a form of progress check carried by a teacher.

Tests and quizzes in Moodle platform are formed from questions which should be pre-prepared and placed in questions bank, divided acc. to suitable categories. In each kind of questions feedback information can be placed for the answerer. This information may contain confirmation of correct answer (e.g. very well) or contrary, it can point out wrong answers. A chapter of a book or topic of a lecture which should be revised can be inserted. Feedback information for the answers is of particular importance when a test or quiz is for self study of the already covered material. For the students of the Silesian University of Technology a series of test questions on the fundamentals of technical drawing has been elaborated. They cover the issues of six projections, axonometry, dimensioning and sections. Two types of questions have been used i.e. match the answer and multiple choice with only one correct answer. What is more, in feedback information a graphic file with e.g. correct answer can be included. Both types of questions, apart from the content, include a drawing presented below the task contents. The drawings have been preliminarily prepared with Corel Draw program and then a proper size and resolution have been determined with Corel Photo-Paint. The drawings have been recorded in GIF format which can be directly presented by Moodle in an internet browser. They are placed in catalogues of test course. When creating a question an access path to the file is given (Fig.1). Graphic file in GIF format is shown in a browser window and thus its size (resolution) must include two criteria i.e. the drawing must be readable and fit the screen together with the content of a question. The answers must be visible too.

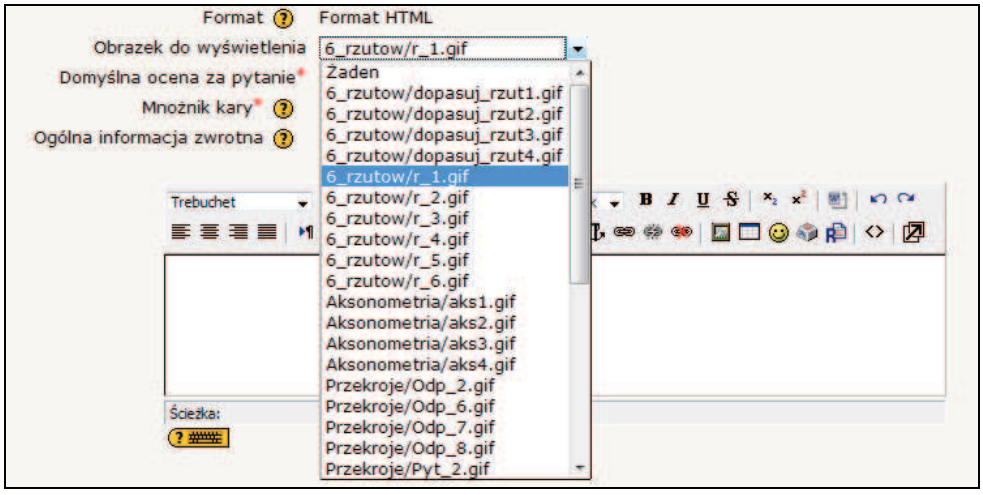

Figure 1: Attaching graphic file to a question

2.1 Questions concerning orthogonal projection and axonometry

Figure 4 presents an example of a question on orthogonal projection. A drawing attached to the question presents a model of a solid in axonometry, whereas numbered fields symbolized places where solid projections should be placed with six ready projections. The task is to match a view number given in a set of six orthogonal projections to a suitable solution A, B, C… . Having chosen a proper combination of questions and answers a student submits the answers. With matching questions the system does not show which answers were wrong, a student gets the feedback: the answer partly true and on the basis of subtracted points he/she can figure out the number of mistakes.

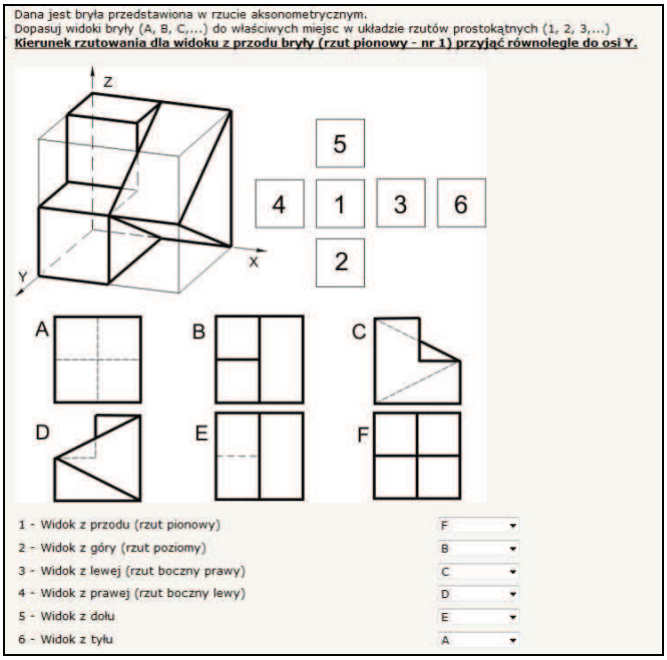

Figure 2: Example of match the answer questions

The next figure shows example of multiple choice questions, where a student has two projections of a solid and a model. The task relies on pointing a missing projection from the list. It is much easier task from the previous one due to the fact that only one projection is missing and the remaining two are already given.

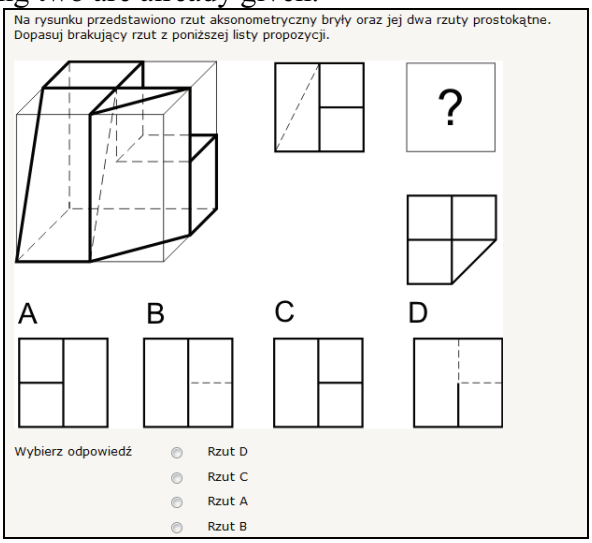

Figure 3: Multiple choice question on orthogonal projection

Figure 4 presents an example of a multiple choice question where three projections of a solid are given. A student must point which solid has these projections and there are three choices A,B and C.

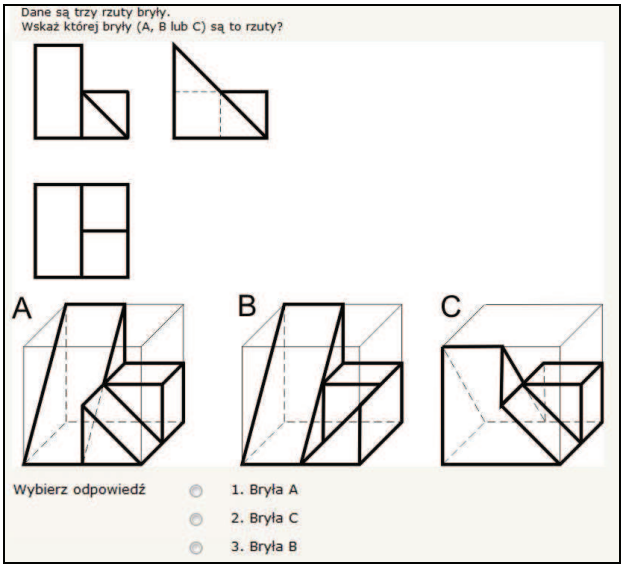

Figure 4: Question concerning orthogonal projection and axonometry

2.2 Cross sections

Figure 5 presents an example of a question of multiple choice type, used in the range of cross sections. The task of a student is to point out correct cross sections from the list below. In the case of that question, there is a possibility of attaching feedback information of a graphic file as well. In this way when a wrong answer is given it is possible to show correct answer in a graphic form (Fig.6). Giving correct answer can be used when the test serves as not only the check of progress but also self study.

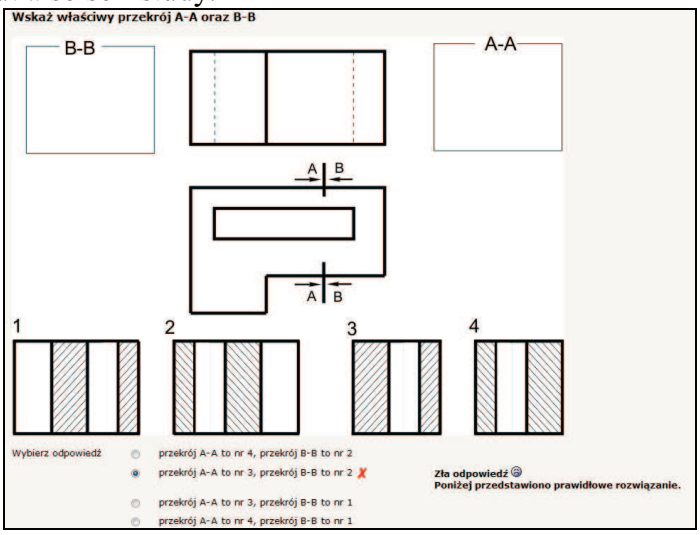

Figure 5: Question on cross sections

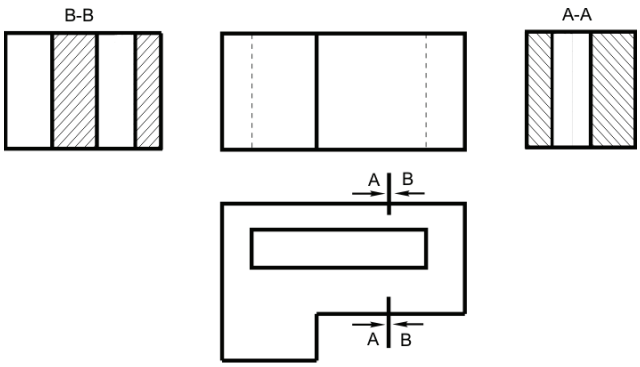

Figure 6: An example of feedback information including a drawing with correct solution

2.3 Dimensioning

In case of topics concerning dimensioning both types of questions have been used. Question of multiple choice type have been used in the test where the task for students is to point to correctly dimensioned model (Fig.7).

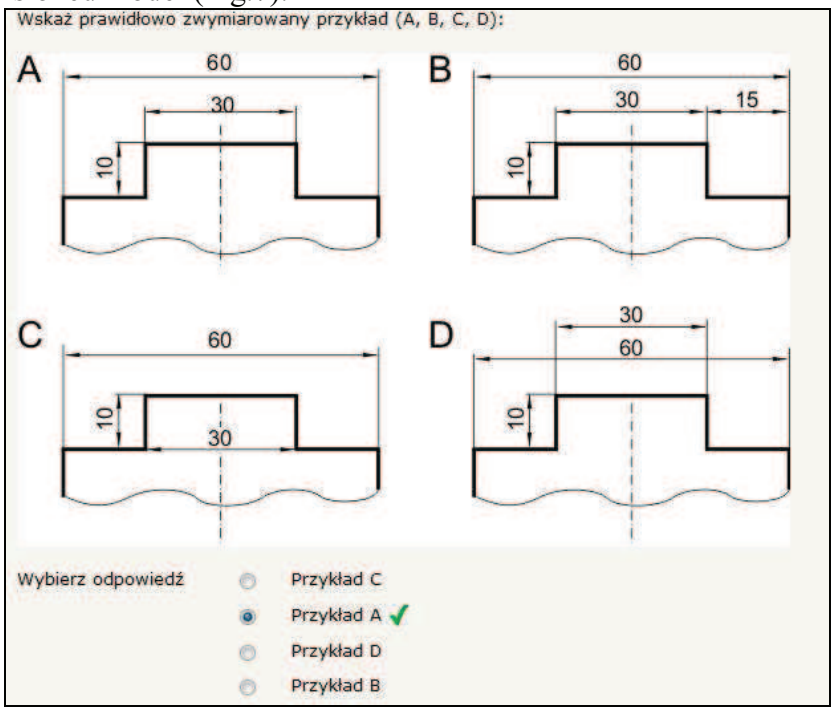

Figure 7: Question on dimensioning of 2D figures

More extended version of a test has been elaborated, where match the answer types have been used. The task is to point out the kind of mistakes for four models presented in pictures. It seems that this type of tests is especially beneficial for revising knowledge since the ability to recognize the mistakes in the drawings requires the knowledge of the rules of dimensioning (Fig.8).

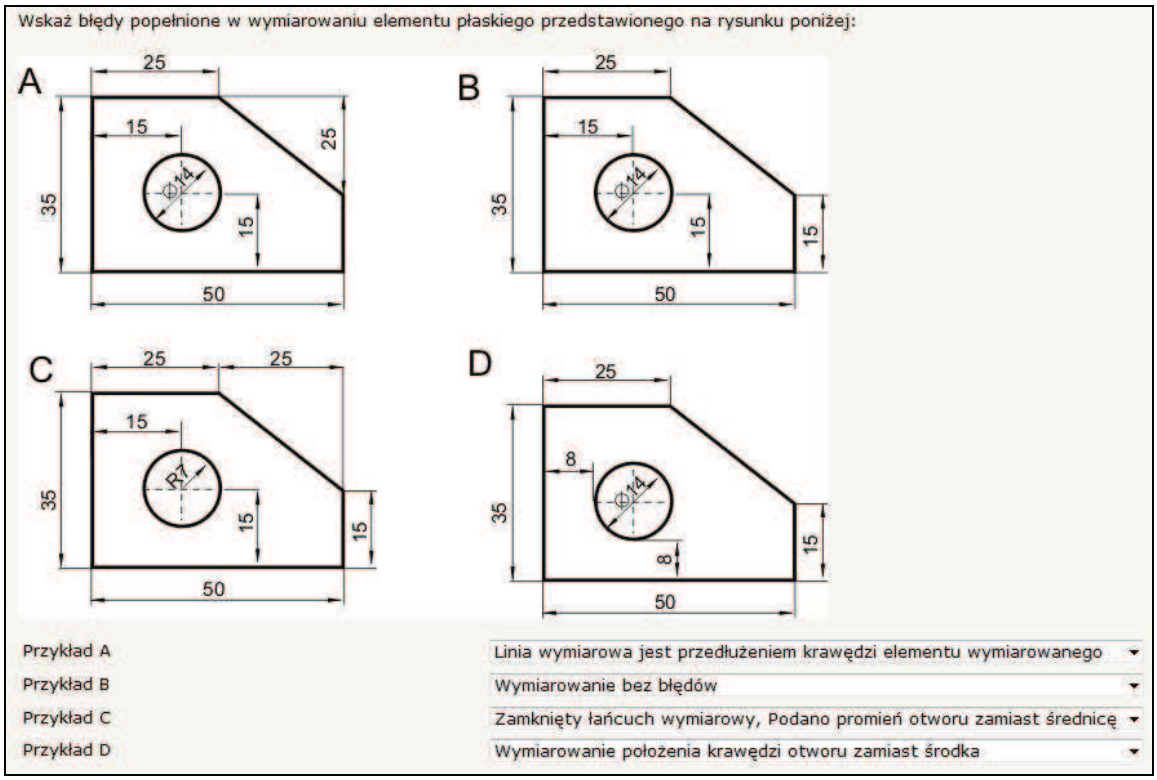

Figure 8: The task in which a student determines mistakes in particular examples of dimensioning

3 Conclusions

Based on three-year experience of using the platform the following advantages and disadvantages of introducing the elements of distant teaching to traditional classes of engineering graphics have been observed:

Advantages of using the platform from the students' point of view:

- Constant access to materials and information on the subject, regardless of time or place
- Possibility of consulting tasks without leaving your home
- The lack of necessity of storing materials in paper form as all the materials are in one place
- The access to earlier topics of project. Doing homework relies on solving tasks chosen by a teacher
- Possibility to self study by means of tests and quizzes placed on the platform by a teacher .

Advantages of using the platform from the point of view of a teacher:

- Extending educational offer with new, more attractive forms of teaching
- Simplified repeatability of the content of classes, materials once prepared can be used many times
- Easier contact with students – easiness of transferring materials for classes and information on classes organization
- Automatic assessment of tests, without teacher's involvement
- Saving paper and ink in printers

The basic drawback of preparing materials for classes in distant mode is great time load which has to be carried while creating them. In particular it refers to materials for self study i.e. tests and quizzes. However, the possibility of reusing the materials definitely makes up for the time spent.

Conclusions concerning the operation and usage of geometry tests will be formed after the first semester of their use on the platform, nevertheless the experience of the authors in using this form of progress check allows forming the statement that it is the correct direction in didactic offer within the platform for distant teaching.

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[5] *Rozporządzenie* Ministra Nauki i Szkolnictwa Wyższego z dnia 25.09.2007 *roku w sprawie warunków, jakie muszą być spełnione, aby zajęcia dydaktyczne na studiach mogły być prowadzone z wykorzystaniem metod i technik kształcenia na odległość*.

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PLATFORMA LMS JAKO NARZĘDZIE DO SPRAWDZANIA POSTĘPÓW W NAUCZANIU GRAFIKI INŻYNIERSKIEJ

W ośrodku Geometrii i Grafiki Inżynierskiej Politechniki Śląskiej od roku 2007 stosowana jest w celach dydaktycznych Platforma Zdalnej Edukacji. W artykule przedstawiono przykłady zastosowania platformy MOODLE w kontroli postępów w nauce. Przedstawiono praktyczną realizację testów z pytaniami typu „dopasuj odpowiedź" oraz „wielokrotny wybór", opracowanych z zakresu podstaw rysunku technicznego. Omówiono metodykę tworzenia testów oraz ich zastosowanie w procesie dydaktycznym.