New Trends and Issues Proceedings on Humanities and Social Sciences

Issue 1 (2017) 592-600

ISSN 2421-8030
www.prosoc.eu

Selected paper of 8th World Conference on Educational Sciences (WCES-2016), 4-8, February 2016, University of Alcala, Madrid, Spain

Implementation of e-learning in the educational process of TPU

Vekhter E. V.[a]*, National Research Tomsk Polytechnic University, Tomsk Russia, Lenin avenue, 30, Tomsk, 634050.

Isaeva E. S.[b], National Research Tomsk Polytechnic University, Tomsk Russia, Lenin avenue, 30, Tomsk, 634050.

Safyannikova V. I.[c], National Research Tomsk Polytechnic University, Tomsk Russia, Lenin avenue, 30, Tomsk, 634050.

Skachkova L. A [d], National Research Tomsk Polytechnic University, Tomsk Russia, Lenin avenue, 30, Tomsk, 634050.

Suggested Citation:

Vekhter, E. V., Isaeva, E. S., Safyannikova, V. I. & Skachkova, L. A. (2017). Implementation of e-learning in the educational process of TPU. *New Trends and Issues Proceedings on Humanities and Social Sciences.* [Online]. 01, pp 592-600. Available from: www.prosoc.eu

Selection and peer review under responsibility of Jesus Garcia Laborda, University of Alcala, Spain

Abstract

Throughout this article we have identified the relevance of the application of Smart-technologies in organization of educational process in a technical university. Conditions of using e-learning environment during the organization of individual work of freshmen in subject of "Descriptive Geometry and Engineering Graphics" have been justified and described. Pedagogical aspects of this process also have been described. In the article we've presented an example of development of "Descriptive Geometry and Engineering Graphics" class in TPU MOODLE environment. Furthermore elements and a list of tools of the proposed course have been shown.

Keywords: Smart-technologies,e-learning, individual work of the students, e-course in MOODLE, course's tools.

* ADDRESS FOR CORRESPONDENCE: **Vekhter Evgeniya,** Tomsk Polytechnic University, 30, Lenin Ave., Tomsk, 634050, Russia.

E-mail address: vehter@tpu.ru / Tel: +23 332 53 44

1. Introduction

The sector of education is going through a crisis now, and not only in Russia but all over the world, as it is like a kind of indicator which reflects the general crisis in the political and economic areas. The rapid technological development creates gaps between the existing system of education and the rapidly changing public medium, the visible link between the theory and practice of teaching becomes lost. At the employment of the former students they often have to be retrained, because the educational programs are behind the development of the real market.

There come up serious geographical "discontinuities" when the underdeveloped countries are increasingly lagging behind the developed world as for the quality of the proposed education. Different countries and universities find their own ways and means of solving these problems (Dobozy & Ifenthaler, 2014; Jaggars, 2014; Katsamani, Retalis & Boloudakis, 2012; Zervas, Kalamatianos, Tsourlidaki, Sotiriou & Sampson, 2014).

Over the last decade smart-education has become one of the present-day methods of teaching in many countries. Smart-education is a fundamentally new educational environment; joint efforts of teachers, experts and students to use the world knowledge and the transition from passive to active content (Byers, 2001, Conole & Fill, 2005, Vekhter, Minin, Zakharova, Safyannikov, 2013, Woo, Gosper, McNeill, Preston, Green & Phillips, 2008). At that the smart-learning process is organized to use the innovation and the Internet and allows the acquisition of professional competences based on the system and multi-dimensional vision and study of the subjects considering their multidimensionality and continuous update (Dikke, Tsourlidaki, Zervas, Cao, Faltin, Sotiriou, 2014; Hrastinski & Jaldemark, 2012; Woo, Gosper, McNeill, Preston, Green & Phillips, 2008; Zervas, Kalamatianos, Tsourlidaki, Sotiriou & Sampson, 2014). For the national education system, this is a new and rapidly developing approach. One of the elements of the proposed education is the use of the e-learning environment in the educational process.

The present article looks into organization of independent work of the first-year students of Tomsk Polytechnic University in the medium of e-learning MOODLE while studying the discipline "Descriptive geometry and engineering graphics".

The relevance of this work is determined by the need to organize an effective independent work of the students under current conditions, when the role of a high school teacher is increasingly shifting towards the organization of the conditions for the student's creative activity, development of his ability of independent exploration of the truth and so on. The teacher is a senior methodologist of this tandem, but not the senior information provider, the main role of the teacher is in guiding the student through the infomedia. Today the foremost ability is to be capable of working with information (extract, process, use), while being able to respond quickly and use of the emerging and developing innovations effectively.

The recent redistribution of hours in the disciplines of the curriculum from classroom hours towards independent hours, while setting the ratio of the obligatory and elective courses in favor of the latter, makes the issue of the adequate organization of independent work of the students particularly urgent, especially in terms of the available information and methodological support of the learning process. (Vekhter, Zakharova, Safyannikov, 2011)

Information and methodical support of the discipline "Descriptive Geometry and Engineering Graphics", developed at the TPU Department of engineering graphics and industrial design is aimed to improve the process efficiency of the professional competencies development and includes the following elements: organizational and methodical, information and developing, practice-oriented, project-based, organization of independent work, monitoring and diagnostic (O'Donnell, Lawless, Sharp, Wade, 2015, Vekhter, Zakharova, Minin, 2013).

One of the elements of the information and methodical support of the discipline is organization of independent work of the students, including that using the Smart-technologies and eLearning environment. All materials are freely available for use by students, including those posted in Internet, on the corporate website of the university.

At present time the eLearning environment at TPU is a MOODLE learning management system, where we have developed an e-course on the subject "Descriptive Geometry and Engineering Graphics", which is used for training and organization of independent work of the first-year students of all TPU technical specialties.

Let us go into detail on the description of the elements of the developed course. The eLearning environment enables the creation and storage of electronic materials provided for training and testing, in accordance with the established procedure. It allows for provision of the teaching materials for the students, interaction of teachers and students, the training organization and evaluation, keeping the training logs, monitoring of the student's learning activity, as well as allows for an independent assessment of the students' and teachers' activities within a particular discipline or e-course. The materials may be presented not only in the text format, but also as links, audio and video files.

E-learning is aimed at the joint work of students and teachers. This approach is realized in the course with the following tools: Wiki, glossary, seminar, forum, chat, etc. At the same time, the students can work both independently and in collaboration with the teacher (Conole & Fill, 2005, Ustati, Hassan, 2013, Zervas, Kalamatianos, Tsourlidaki, Sotiriou & Sampson, 2014).

The element "Forum" allows the students and teachers to communicate with each other, ask questions, share files asynchronously. This module is configured subject to the purpose, whether it's news forum with the forced subscription, hidden forum for teachers' communication or usual space for dialogue.

Module "Chat" is there for synchronous communication. This method of communication is based on the principle of social networks, when it is real time communication. Chats are very helpful in the absence of the face-to-face meetings possibility. It can be used to hold consultations which will be scheduled for the certain day and time.

The most convenient format of e-learning course is to breakdown the whole theoretical material into specific topics that will go in the fixed sequence that is the principle we used to structure this course. The principle of the e-learning course development implies gradual addition of the necessary materials using the current elements of the electronic environment (Conole & Fill, 2005, Ustati, Hassan, 2013). Let us consider the primary elements and possibilities used for the development of the present e-course.

The element "Lecture" allowed publishing the educational materials in the flexible format, with the possibility to control the learning process. The lecture like the book is divided into the pages, after its study there becomes possible to control the studied material under the test format (Figure 1). Subject to the correct answers and lecture settings, the student is referred to a particular path of the studied material. Also, according to the settings, the lecture can be estimated and the resulting score is automatically logged.

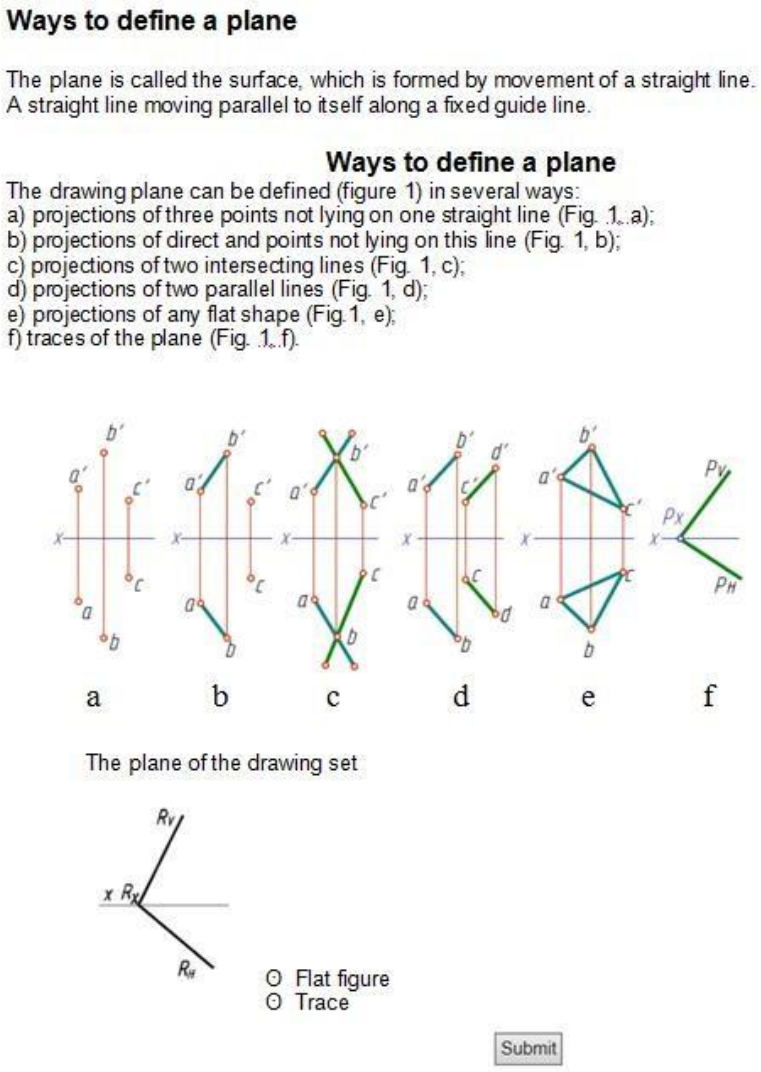

Figure 1. Element "Lecture"

The material is broken down into chapters and posted using the element "Book", including possibility to go quickly through the content (Figure 2). The fragment on the theme "Surface" is presented as an example.

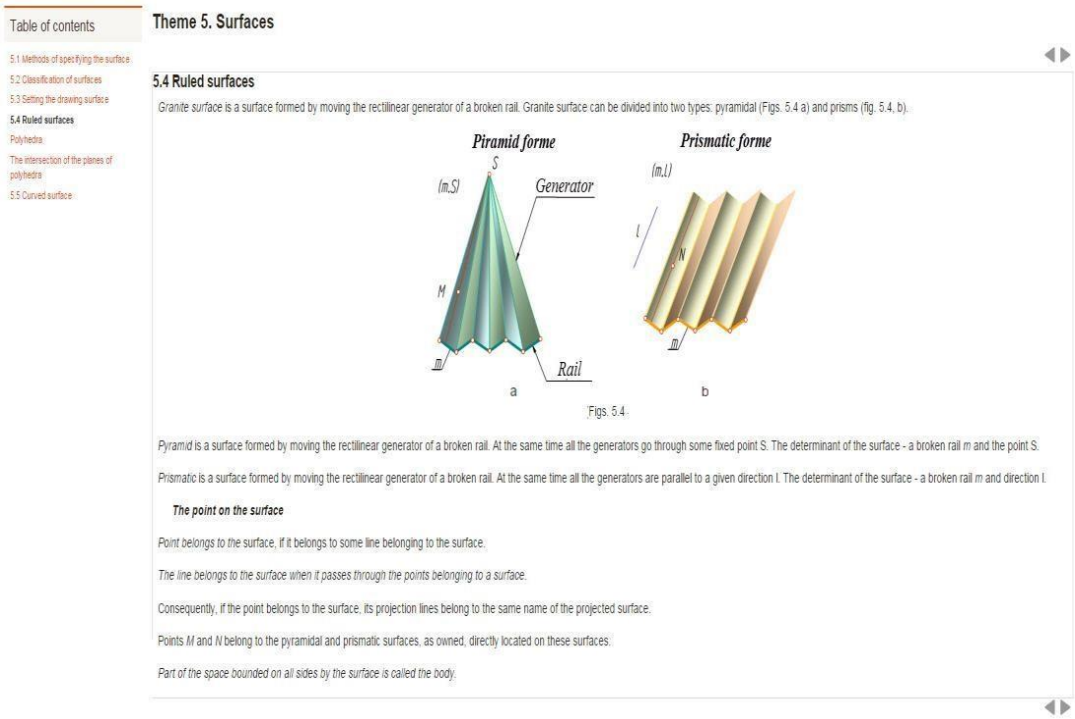

Figure 2. Element "Book"

The variants of individual tasks are added through the element "Assignment". Figure 3 gives an example of an individual task on the theme "Junctions", when the student chooses a task subject to the given theme. Also, this tool allows testing and evaluating the student's work. The work is evaluated in accordance with the rating plan of the discipline learning and evaluation criteria of the work, which is also presented in the element "Assignment". The student's answer can be in any format, such as Microsoft Office documents, images, audio or video, also the answer can be entered on-line with the text editor.

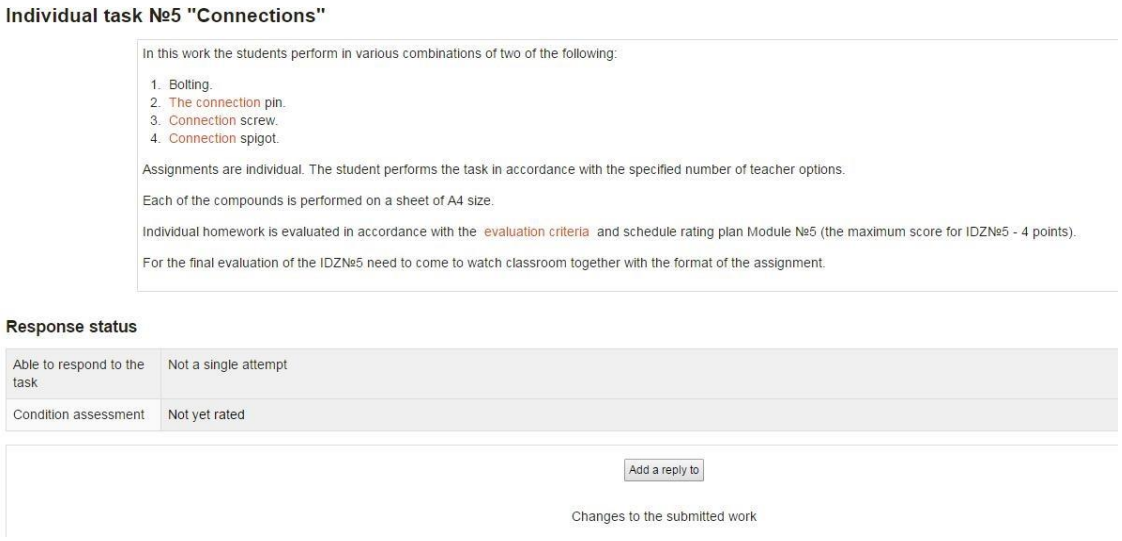

Figure 3. Element "Assignment"

When the work is checked, the teacher writes a review, which can also be a text, picture or audio. Also, the score is given and automatically logged, if it is provided for by the curriculum.

The "Seminar" is also used to evaluate the students' knowledge like the element "Assignment", but the key difference is that this module involves the joint work of the students. Using interactive training methods allows bringing the students to the discussion of the proposed issue and their joint interaction not only with the teacher, but also with each other, allows developing both professional and general cultural competences. All performed works are evaluated not only by the teacher, but also by other participants of the seminar. In fact, the course participants have two types of assessments. The first assessment is directly for the presented work of the student itself, the second assessment is for the assessment of their fellow students, that is, to what extent they adequately evaluated the presented works of the other participants. An example of the element "Seminar" in the form of an interactive task on the theme "Convention and simplification in the assembly drawing" is given in Figure 4.

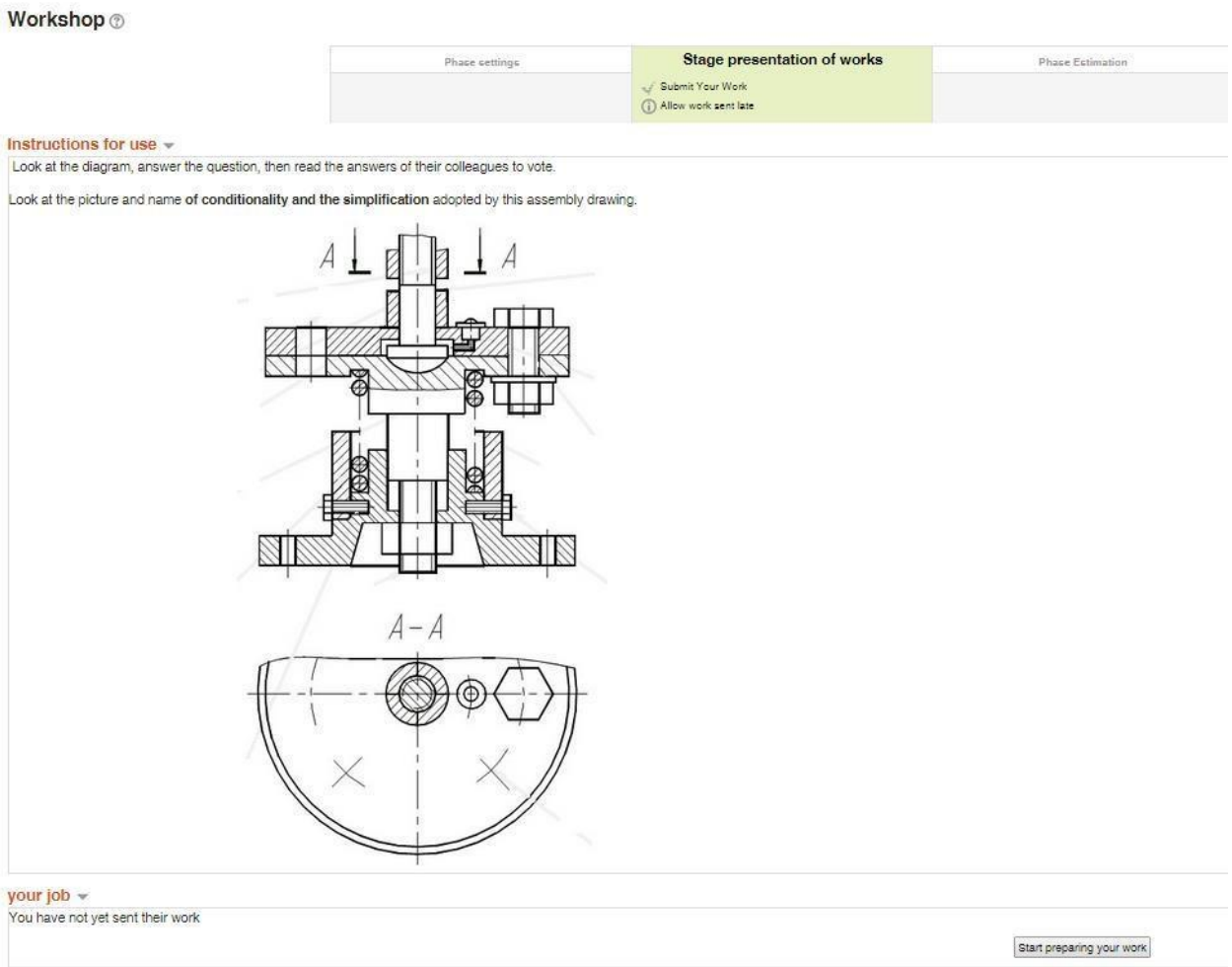

Figure 4. Element "Seminar"

The element "Test" in this course is used to monitor the degree of learning and understanding of the covered material both of a theme and the entire e-course (exam test) (Figure 5). The test contains

several question types such as multiple choice, true/false, choice of missing words, matching question, short answer, essay, etc. There is also a variety of setting options in this module, such as the number of tries, time limit, tips, etc. Availability of various setting options for going through the test allows for consideration of the level of training of the group against goals and the type of the test.

Every answer is evaluated automatically, with the exception of the questions where the student has to write an answer independently, for example an essay. The rating is also logged automatically.

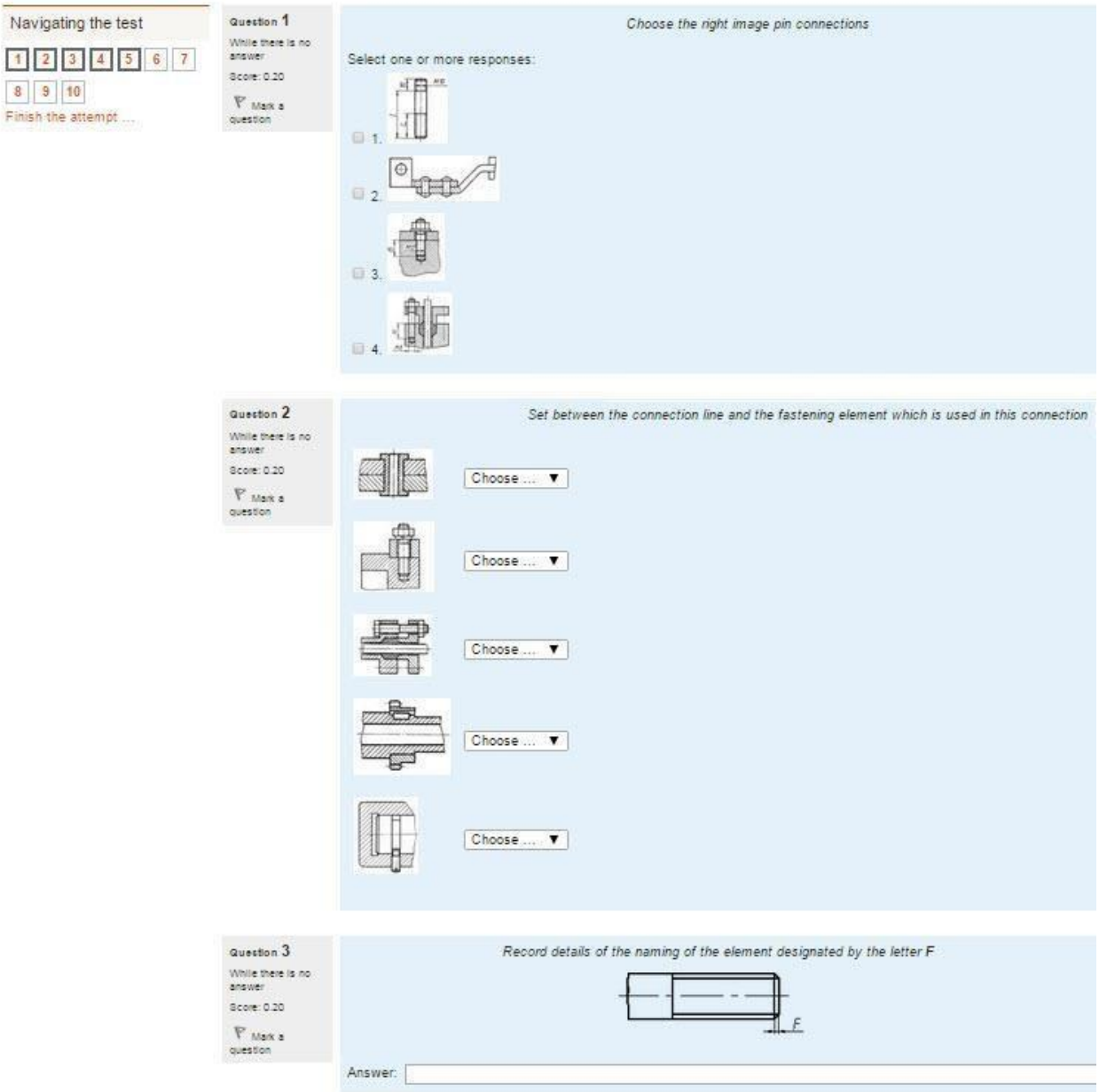

Figure 5. Element "Test"

Also, in addition to the primary elements, the electronic environment contains auxiliary elements that allow posting the additional resources of the course, such as "Hyperlink", "Catalog", "File", etc.

2.Conclusion

The e-course on the subject “Descriptive Geometry and Engineering Graphics” which we designed and described has been actively used in the TPU educational process since the start of the school year that already allows making certain conclusions. One of the major advantages of using Smart-technologies in education is “seamlessness”, that is, the used hardware independence, the data continuity and mobile access thereto. This allows for the students to organize their own learning schedule, when and where it's convenient for them. Also among advantages of using e-learning courses can be considered: focus shift from the length of study to its effectiveness, availability of the regularly updated educational content of the e-learning course with free access for the students, feedback between teachers and students, sharing knowledge between teachers and students, an electronic portfolio with the results of the work.

Using e-learning course allows for consideration of the students’ level of training and development, the number of the students in a group, the degree of self-support in the material learning. It is especially important to take this fact into account in the organization of educational process at the first year, which is the most critical period, during which the students go through the complex and diverse processes of adaptation to the conditions of education and university life that eventually brings many students to rejection of the proposed training environment (12).

Thus, by means of using e-learning the teachers will be able to effectively level off and improve the competencies of the students in a group in a short period of time. The major problems that may arise in the implementation of Smart-technologies are unavailable hardware and poor intelligent competence of the teachers. The unique capacity of Smart-technologies proves that their introduction into the educational process, as e-learning, is promising and can be widely used in educational domain.

References

Byers, C. (2001). Interactive assessment: An approach to enhance teaching and learning. *Journal of Interactive Learning Research*, *12*(4), 359.

Dikke, D., Tsourlidaki, E., Zervas, P., Cao, Y., Faltin, N., Sotiriou, S., & Sampson, D. G. (2014, July). GoLabz: Towards a federation of online labs for inquiry-based science education at school. In *6th International Conference on Education and New Learning Technologies (EDULEARN 2014)*.

Dobozy, E., & Ifenthaler, D. (2014). Initial teacher education by open and distance modes: A snapshot of e-competency experiences in Australia. *eLearning Papers: Digital Literacies & eCompetencies*, *38*(May), 57-67.

Conole, G., & Fill, K. (2005). A learning design toolkit to create pedagogically effective learning activities. Journal of Interactive Media in Education, Special Issue Portable Learning, 8, 1–16.

Hrastinski, S., & Jaldemark, J. (2012). How and why do students of higher education participate in online seminars? Education and Information Technologies, 17(3), 253–271.

Jaggars, S. S. (2014). Choosing between online and face-to-face courses: Community college student voices. American Journal of Distance Education, 28(1), 27–38.

Vekhter E. V., Minin M. G., Zakharova A. A., Safyannikov I. A. (2013) Organization of Bachelor of engineering and technology training for the design and engineering activity // Higher education in Russia. - 2013 - №5. - p. 106-113.

Ustati, R., Hassan, S. (2013) Distance learning students' need: Evaluating interactions from Moore's theory of transactional distance // Turkish Online Journal of Distance Education. – Vol. 14, №2. – P. 292-304.

Katsamani, M., Retalis, S., Boloudakis, M. (2012) Designing a Moodle course with the CADMOS learning design tool // Educational Media International. – Vol. 49, № 4. – P. 317-331.

O'Donnell, E., Lawless, S., Sharp, M., Wade, V.P. A review of personalised e-learning: Towards supporting learner diversity // International Journal of Distance Education Technologies. – 2015. – Vol. 13, № 1. - P. 22-47.

Vekhter E. V., Zakharova A. A., Minin M. G. Information and methodological support of Bachelor of engineering and technology training for the design activity // Level specialists' training: public and international standards of engineering education [electronic resource]: collection of works of the Scientific Conference, March 26-30, 2013, Tomsk / Tomsk. Polytechnic University (TPU); Editors under A. I. Chuchalin [et al]. - Tomsk: Publishing house TPU, 2013. - p. 165-166.

Vekhter E. V., Safyannikov I. A. The model of engineering and design competences development in conditions of multilevel system of technical education // Modern problems of science and education. - 2012. - № 1; URL: www.science-education.ru/101-5371 (accessed date: 07.04.2015).

Vekhter E. V., Zakharova A. A., Safyannikov I. A. Model of project and design competences development in conditions of multilevel system of technical education // Third International Symposium on Project Approaches in Engineering Education (PAEE'2011): Aligning ngineering Education with Engineering Challenges, Portugal, Lisbon, 1-2 October, 2011. – 181-187.

Woo, K., Gosper, M., McNeill, M., Preston, G., Green, D., & Phillips, R. (2008). Web-based lecture technologies: Blurring the boundaries between face-to-face and distance learning. Research in Learning Technology, 16(2), 81–93.

Zervas, P., Kalamatianos, A., Tsourlidaki, E., Sotiriou, S., & Sampson, D. G. (2014). A methodology for organizing virtual and remote laboratories. In *Digital systems for open access to formal and informal learning* (pp. 235-255). Springer International Publishing.