Preparation and holding of business games implementation of e-learning students of the construction areas

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Abstract. The students of the specialty "Energoeffektivnosti and ecology sustainability of buildings" shall in addition to the standards ESKD and SPDS to study the environmental safety standards products, ISO 14000, along with the use of electronic templates to be able to independently carry out the design documents of related industries, including engineering drawings. To increase interest in the topic "Engineering drawings", motivation to acquire knowledge necessary to use adaptive instructional techniques.

Studying of graphic disciplines increases the level of development of cognitive functions for forming the engineering intuition and design skills of students. Execution of works on the module "Engineering graphics" contributes to the development of spatial thinking, develops the knowledge and skills necessary for performing and reading of technical drawings, improvement of quality of mastering of theoretical material.

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Reducing classroom workload for the course of graphic disciplines in the universities in accordance with the new curriculum while maintaining a slight training in secondary schools determines the necessity of searching for interactive forms and methods of teaching with the aim of ensuring the effectiveness of the learning material in the learning process.

Such methods should include simulation methods of active learning. The creation of a special methodological techniques and situational tasks, business games, study the final section of the course engineering drawing – helps to consolidate the practical skills of drafting and cursory reading of drawings, acquisition of professional knowledge and to develop General abilities and professional competencies.

The analysis of modern technologies of teaching students has shown that to improve the quality of educational process it is necessary to introduce not only new forms of learning-oriented computer technology, but also new forms of knowledge control. Due to the high saturation of the disciplines of graphic tasks require a significant amount of time on the answers and the test questions.

For graphic disciplines, the transfer of the finished job, its evaluation by the teacher, error correction and new control and analysis of peer work is a long process, complicated by the incompatibility of graphics programs. The proposed method allows to prepare students to learn advanced (special) e-learning courses in the Moodle system, the development of which are actively employed teachers of the Irkutsk national research technical University.

In the process of solving situational problems, students should use acquired knowledge to independently work with educational literature, design and normative documentation, to demonstrate engineering thinking. In the course of the work the simulation of production situations, acquiring skills of teamwork and creativity, independent decision-making, takes into account the speed of decision-making, self-discipline and qualitative assessment of fellow students.

In the Irkutsk national research technical University at the Department of descriptive geometry and technical drawing worked out methods and organization of business games, which are a kind of simulation teaching methods [1]. During the lectures, practical and laboratory work are used the following interactive teaching methods - solution of problem tasks, self-monitoring.

Simulation training methods must meet a number of requirements, General and supplementary. Common requirements include: the forced
activation of thinking of students; a long time involving trainees in the learning process; independent decision making; continuous interaction between students and teachers through forward and backward linkages; a high level of motivation and emotion.

In the future when creating e-learning courses in the Moodle system, such as practical and laboratory works, tests, etc. teachers based on the skills students acquired during the studies of graphic subjects, namely, the ability to use drawings, pictograms, diagrams.

Additional requirements include a simulation of professional activity, interaction between trainees, the availability and allocation of roles.

The Department tested a number of game situational problems for fun games that can be divided into the tasks of the first, second and third levels [2].

In jobs first level is the task of dimensioning on drawings of parts.

Level include the design sketches of parts, as with nature, and a verbal description of their shape and size; execution of working drawings of parts.

The job of the third level include the drafting and reading blueprints, namely, in performing the calculations, drawings split connections; in the preparation and execution of Assembly drawings based on sketches or working drawings.

Business games are held on the last and final stage of the course engineering drawing and reinforce practical skills of making and reading of drawings, acquisition of professional knowledge. At the same time it is a quality check completed the program.

Further organizational and methodological principles of the game has been added to and improved to reflect the changes in both external and internal factors.

One of the external factors, we note an insufficient school training in mechanical drawing and geometry, the lack of semantic memory, the ability of logical sequence in reasoning and actions, lack of employment skills, training (mental) activities.

Another external factor is the shift in emphasis in training in accordance with FOS for the independent study students of entire sections of courses graphics disciplines.

Note that the first factor has the most negative impact on the second and makes it sometimes quite impossible.

Gained experience in business games subject assigned to the above factors, developed by the Department of situational tasks were reorganized into one. When taken into account that all the design office one of the most important types of engineering work, along with the design is compliance
with norms and Standards, i.e. checking of drawings and other design documents for compliance with their standards.

It is modeled on a game basis, first to those studying graphic disciplines that enables students to gradually restore memory school knowledge or the gaps in them and to prepare for the business game to the themes of the course in the final stages of training.

Restructured case problem got the name «compliance assessment». Training games has the following objectives:

1) to acquaint students with objectives, content and methodology of compliance assessment of the design documentation, to cultivate the initial skills in its implementation;
2) to raise the level of graphic training of students;
3) to develop attention;
4) to intensify the independent work of students on engineering-graphic disciplines;
5) to educate the students independence and responsibility for the results of their work;
6) to educate the participants a sense of community and mutual support;
7) to save the time spent on identifying and eliminating simple mistakes when drawing.

Task control defines the GOST 2.111-2013 «compliance assessment»:

1) monitoring compliance with standards and requirements stipulated in the standards at all levels;
2) monitoring of compliance with the design documents standards ESKD;
3) maximum possible use of the developed products previously designed, produced, standardized products and generic design solutions;
4) possible limited range of standardized products, their component parts and materials.

These tasks should be addressed in the educational game «compliance assessment», given a program and study section of the course technical drawing. The main is the second task.

So in the process of conducting a business game you can select a few problematic situations c content of State standards. Each of these problem situations, assign an appropriate symbol, for example:

- determination of the necessary number of images;
- incisions, cross-sections;
- the choice of the main;
- drawing layout;
- the calculation of the elements of the fasteners;
- the image and the designation of threads;
- roughness;
S (Sketch) - general rules of implementation of thumbnails; AD - assembly drawing;
leftrightarrow - the number of dimensions and their application;
DD (Rule making) - general rules of registration of drawings;
WD - general rules for execution of working drawings;
SP - implementation specifications to the General Assembly drawing;
- axonometric view details.

The teacher prepares in advance sheet examination in two copies in the sample, which in the future will be indicated the names of participants in the game and put scores for solution of each problem situation. In addition to these teachers, students can highlight other problematic situations denote them by the symbol and putting the transcript in the note. Provides graphs for a penalty and additional points. Scores are recorded in the examination sheet after completion of the work and its analysis, as well as in protection time. Every business game has its own system of assessments, penalties and additional points, which necessarily must be brought to the attention of the participants of the game.

General rules of business games the following.

1) Rationing stages of the business game. In table 1 the norms of the time spent on the individual steps of the business game, may vary depending on the specific conditions (activity, organization of students, their level of training, skills to use literature, etc.).

| № p/p | The name of the stage | The time norm, min. |
|-------|-----------------------|---------------------|
| 1     | Entering the game:    |                     |
| 2     | The allocation of basic problem situations: |                     |
| 3     | The decision of the task in the sequence listed problem situations |                     |

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4 Analysis, vzaimopomosch made options 20
5 The comparison analysis of options c optimal, protection, summarizing 14

**Total:** 90

2) Organization and work of the engineering departments. The teacher, after selecting a particular business game, in the previous lesson, tells the students the topic and brief contents of the work. It is necessary to warn students of the theoretical questions of what the guests are repeat, what materials, tools, educational and reference literature required for the successful implementation of this task. But the teacher must be himself ready to ensure that all students are required to work.

Depending on the complexity of business games, defined by the level and the amount of the contained situational problems, and also option, the study group divided into 2 or more of the design Department (K. O.) led c leading designer. The teachers of practical classes in the group are heads of departments. Departments can be divided into teams of two to four students, employees, designers. It is necessary to tell students that two K. O. provides the competitive nature that both K. O. will perform the same task and in the end will have to choose the best. In this regard, you can offer the students to organize their own K. O. to select a lead designer, to prepare lists of employees of the Department. This will enable students to create K. O. according to psychological compatibility, independently and critically evaluate own abilities and knowledge of each other, take into account the possibility of the contribution of each future employee of K. O. in the General case, contributes to the development of autonomy in decisionmaking, sense of community, responsibility, etc.

Teacher – head of Department – produces technical specification for the work of lead designer, which distributes individual tasks to teams or between employees of the Department. The duties of the lead designer is responsible for providing assistance to Department personnel, maintaining discipline, mediation between head of Department (teacher) and designers (students) on matters of an organizational nature. All technical issues related to the execution of the work, the leading designer is obliged to decide on their own. In addition, a leading designer may anticipate and to fulfill your individual task.

3) Analysis of the solutions and protection of completed jobs. The adopted credit system and final evaluation. As you complete individual tasks leading designer collects them, checks brings (neatly in red) required patches and fills sheet of the examination. In completing the worksheet examination and correction of errors can take part all the members of K. O. Signed a
leading designer sheet is transferred to the head of Department. If two or more teams in the division are filled in the examination sheets for each team. In this case, the best work together with the annexed sheet of examination and also submitted to the Department head. Head of the Department offers the best options of jobs that are compared to the same tasks performed by the participants of the game.

By results of discussion the head of Department fills the second copy sheet of the examination. The results of the calculation of points determine the winners in problematic situations and between departments. Each problem is worth 10 points. For every error in the given problem situation is removed 0.5 points. Errors are corrected in red or another color. Leading designer, having considered the total number of points for each problem, fixes them in the appropriate column of the sheet examination. If this problematic situation when compared to the optimal error is not detected, then the number of points inserted is a leading designer, add incentive points to the highest possible value. If additional errors are identified, then the amount of points deducted one point for each mistake (in this case, there can be a negative amount of points that will point out the insufficient preparation of students to the current occupation). The largest algebraic sum of points will decide the winner. The final rating of «excellent» is placed for 9, 10 points received for each problem situation; «good» if at least one problem situation received 8 points and "satisfactory" if at least one problem situation evaluated in 5 points. This technique is widely used in the scoring system to assess knowledge and based on the independent work of students with the teacher.

After studying the module "Engineering graphics" students can easily Orient themselves in the module "Building drawing" when drawing concrete products, metal constructions and architectural drawings.

To increase the interest and motivation to the subject, to learn to assess their own preparedness, conduct self-monitoring and compliance assessment – the main objectives of the introduction of business games in problem situations for studying of graphic disciplines. The learning outcomes of the discipline "Engineering graphics" should include the preparedness of students to study e-courses on special subjects, the formation of such General professional competences like the capacity for independent learning new methods of research, ability to collect, information analysis, selection of optimal solutions and draw up surveys and reports.

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