INSTRUCTIONAL DESIGN OF E-LEARNING ENVIRONMENT: STRUCTURE AND MODEL OF KNOWLEDGE

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Abstract

The article deals with the issues related to the implementation of instructional design of e-learning environment in higher education institutions. It presents the primary purpose, stages of implementation, and results of instructional design. The author considers the process of teaching students in conditions of e-learning environment of the university as an object of instructional design. She describes the layered structure of presenting the model of knowledge in e-learning environment based on ontological modelling principles.

Keywords: instructional design, e-learning environment, model of knowledge, e-learning, higher education institutions.

1. INTRODUCTION

The definition of instructional design is based on a systematic approach to the planning and development of efficient teaching materials that improve the quality of the learning process.

In the design of traditional learning, the subject of project detail is a fragment of the content of this learning and its activity and procedural support, and in the case of personality-oriented education, the design element is an event in the life of the individual which provides comprehensive life experience (Serikov, 1998). Subjective approach in the design is also supported by V.V. Gura, who underlines that the efficiency of learning is directly related to the quality of its design; that instructional design is not a mechanical and impersonal process, it should be focused on the student, but not the teacher (Gura, 2007).

Scientific, psychological and pedagogical literature presents instructional design as a complex and multifaceted educational phenomenon. Some authors consider only as a regulatory aspect of the educational process within the instructional design, others mention only the design component of teaching activities, and still others describe the instructional design as a preliminary development of the main details of future activities.

The main idea of the instructional design is building, development and practical accomplishment of the results (in specific teaching systems). For this reason, the instructional design is characterized by the process and activity approach, determined by a precise definition of the design object, logic of the organization and dynamics, sequence of stages and phases, starting from the definition of the idea to the evaluation and analysis of the results.

From the point of view of the project management theory, we can distinguish the following main stages: project initiation → goal setting → choice of conditions and means → planning → project implementation →
control → analysis and correction → project completion.

In addition to the above, the result of the instructional design is an educational project, which represents an innovative model of the teaching system (concepts, models, technologies, etc.) oriented on a large-scale application.

2. INSTRUCTIONAL DESIGN OF E-LEARNING ENVIRONMENT

One of the results of the instructional design is a teaching system. E-learning environment of a higher education institution can be represented in the form of a new-level teaching system (A.A. Andreev, L.I. Anikushina, I.B. Gosudarev, V.P. Dronov, S.A. Nazarov, E.N. Ostroumova, etc.). In the system under consideration, the relations between a teacher and a student are fundamental, and the presence of feedback is a system-forming factor.

Instructional design of e-learning environment of the higher education institution is a necessity based on the integrated provision of the educational process (including both psychological and pedagogical support as well as software and technical provision, learning and teaching materials as well as information and communication support) and improvement of the content of education on the basis of a unified information methodology; a necessity aimed at ensuring quality education, unity of knowledge, activities and development of students.

When designing the learning process in the conditions of e-learning environment, it is necessary not only to select the technologies, methods and means of training that provide work with a specific fragment of the educational content, but to create a single didactic complex, thereby providing one of the most important characteristics of the e-learning environment which is integrity.

In other words, the task of the instructional design of e-learning within the framework of the e-learning environment is transformed; it consists in creating a range of projected trajectories of education in a personality-oriented e-learning environment, with the possibility to control the quality of acquired knowledge (Gura, 2007), in developing a new approach to the design of the e-learning environment in the form of a structural element of e-learning space within the design activities for the construction of the information society (Vostrikova, 2006).

2.1. Ontological Construction of Models of Knowledge

The methodological content of the instructional design of the adaptive e-learning environment of a university is focused on the development of the model of student's personality development within the higher educational institution, which allows him/her to easily adapt and become independent in the modern information society and future professional life (Toktarova, 2018).

In our case, the object of instructional design is the process of teaching students in the conditions of e-learning environment of a university. Based on the essence and logic of the design technology, let us consider the ontological structure of the model of knowledge in accordance with the cluster of competences.

The ontology in electronic systems is understood as the formalization of a certain area of knowledge with the help of a conceptual scheme that includes data structures, relevant classes of objects, as well as the rules of their interaction.

At the same time, the model of knowledge is some formalism designed to display structured data (regularities, principles, laws, etc.) of the subject area. Knowledge bases are used to store knowledge.

Despite the advantages of descriptive models (visibility, absence of special requirements for the structure and completeness of the described subject area), formal models of subject areas in the form of ontological models are more efficient in practical terms.

Ontological models are the base of information systems built upon ontologies (Ontology-Driven Information Systems, ODIS); they allow to solve the following groups of tasks:

- Formation of a single dictionary of terms from a subject area;
- Creation of a hierarchy of concepts (taxonomy) describing the subject area;
- Optimization of search and navigation in electronic resources;
- Provision of integration of heterogeneous databases and data warehouses, information systems on the basis of general principles and standards (Guryan, 2012).
2.2. Representation of a Model of Knowledge in E-learning Environment

In accordance with the semantic and taxonomic features of ontological modelling, let us present the structure of the model of knowledge in e-learning environment.

The initial step is to determine the list of competences that need to be formed by students when studying a certain subject / module. The list of the identified competencies is the base for the construction of a cluster of competences formed by students in the process of studying this discipline / module. For example, the system of mathematical training of students at the higher education institution includes a set of subjects in mathematics (or related to it), course and/or diploma design, different types of practices.

The next step is to formalize the knowledge of the subject area of each subject: name of the subject; term; number of academic hours; goals and objectives; other subjects, which are the basis for this subject; formed competences according to the educational standard; sub-competences, etc. Let us break the teaching material into sections / topics / training elements. Each training element is put in accordance with the sub-competence it forms.

The third step of the implementation is to design and develop each training element in different variations, taking into account personal style features, individual qualities and abilities of students. For example, to take into account the type of presentation of teaching materials (text description, graphic representation, video, audio), the level of complexity of teaching materials (elementary, intermediate, advanced), the amount of teaching materials (short / detailed presentation), the strategy of presentation of teaching materials (consistent representation of small fragments, full provision of the training element), teaching techniques (providing guidelines and instructions, creating case study tasks, building a training plan, organization of communication with experts, etc.), the forms of educational activities (theoretical training, laboratory and practical works, preparation for the test, exam, comprehensive study of the course), the pace of learning (accelerated, normal, slow), etc. (Toktarova, 2015). This process is time-consuming, but will subsequently improve the efficiency and quality of training in the conditions of e-learning environment.

The final step is the presentation of a set of training elements in the form of individual routes / trajectories of mathematical training of students based on their personal qualities, abilities and preferences.

The level structure of the model of knowledge in e-learning environment is presented in Figure 1.

![Diagram of the level structure of the model of knowledge in e-learning environment](image-url)

Fig.1. The level structure of the model of knowledge in e-learning environment.

The proposed model of knowledge representation in the adaptive system of mathematical training of students in the conditions of e-learning environment of the higher education institution allows to describe the academic subjects for the educational standards of different majors / professions, to prepare the structure of databases and knowledge bases for individual learning paths, and to build a graphical display of the adaptive learning process.
4. CONCLUSION

Thus, instructional design is a purposeful systematic approach to the construction of the educational process in the electronic environment; it involves the transfer of teaching technologies to a certain educational content of the subject.

The level structure of the model of knowledge in the e-learning environment allowed to structure the subjects in accordance with the educational standards of different majors / professions, to break them into training elements taking into account the style, individual qualities and abilities of students, to prepare the structure of the database and knowledge base for the formation of individual learning trajectories.

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REFERENCE LIST


