Rationale for choosing the model and tool for developing an e-learning course

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Abstract. – The emergence and discussion of the reasonable choice of methodological bases for the creation and subsequent application of electronic training courses within the framework of a separate study is not accidental. Analysis of the theory and practice of the use of information technologies in education showed that, along with the discussion of informatization of education, including adult education (andrology), the use of computer-based training programs to improve the quality of teaching in various disciplines, studies of pedagogical capabilities of electronic training courses, principles of development and technology for creating electronic educational materials remain insufficiently studied. Properly grounded methodological and technological components of the process of creating such resources will ensure high quality of the final product, as well as reduction of time and financial costs. The article presents a generalized description of the basic models and methodologies for the development of electronic educational materials, namely: ADDIE (Analysis, Design, Development, Implementation, Evaluation); SAM (Successive Approximation Model); SMART (Specific, Measurable, Attainable, Relevant, Time-bound); ALD (Agile Learning Design). The authors pay special attention to the ALD (Agile Learning Design) model, describing its basic principles. The structural analysis of ALD with the help of the IDEF0 functional model allowed showing the logical interconnection of all the stages of creating an e-learning course, to demonstrate its iterative nature. The study also addresses the issue of the reasonable choice of tools for developing e-learning courses. The choice was made on the basis of T. Saati’s method of analyzing hierarchies. The selected alternatives were Adobe Captivate, Articulate Storyline and iSpringSuite as software solutions used for the professional development of e-learning materials. The choice was made on the basis of such criteria as maintenance, implementation, functionality, price, experience of usage. As a result of the testing with the MPRIORITY decision-making system, the Articulate Storyline software platform was selected as the tool for the implementation of the subsequent e-learning course project. This software product has significant functionality if compared to the other alternatives: low cost and availability of development. Further work on the creation of an e-course is sure to be carried out with its use.
1. Introduction

Nowadays the fact that information technologies are becoming an integral part at all levels of education is indisputable. An increasing interest in this area is the study of the application of modern technologies, in particular, e-learning courses (ESC) to improve efficiency and optimize learning.

In the world and national theory and practice of education, considerable experience in the organization and implementation of training has been accumulated. Based on the use of computer-based training programs, this experience confirms the relevance of this topic. The problems of informatization of the educational process have been discussed in the works by Robert [7], Tuzhikova E.S. [8], Gorozhanov A.I. [3]. The problems of development and application of computer-based training programs in order to improve the quality of teaching in various subjects were tackled upon in the research by Asanova S.A. [1], Badrutdinov M.N. [2] etc. The didactic and pedagogical possibilities of using computer-based learning systems are reflected in the papers by Makukha L.V. [4], Yagafarova G.A. et al. [9].

The analysis of scientific papers allows concluding that in modern educational practice due attention is paid to the use of information technologies, electronic courses in particular, whereas the principles of development and technology for creating electronic teaching materials have been developed to a lesser extent. In this context, the problem of competent ESC development organization is particularly relevant, which will ensure high quality of the final product, as well as time and financial costs reduction.

2. Materials and Methods

The main approaches to the development of software, including ESC, are the system and object-oriented approaches. The object-oriented design is based on the idea that a software system should be designed as a set of interacting objects, where each object belongs to a certain class, and the classes form a hierarchy. The system approach, in its turn, considers an object as a system consisting of a set of interrelated elements that form a certain integrity and possess systemic properties.

In the modern practice of creating e-learning materials, the systematic approach to making ESC has been proposed. This approach allows not focusing a manual on a specific group of users, but enabling even an unprepared user to use it without any difficulty.

Hence, when developing an e-course, it is desirable to follow the principles of the system approach. At the same time, we propose to apply the methodology of developing an e-course in accordance with the principles of the following groups of scientific methods: knowledge management (KM) and information-communication methods.

KM methods are based on various organizational approaches to the educational environment formation, and students’ motivation for achieving better results. Information and communication methods and approaches are based on the methods and principles of designing information and communication systems, including systems analysis and metadata structure development [6].

In the field of e-learning, several models and methodologies for developing educational materials are considered. The main ones include the following:

- ADDIE (Analysis, Design, Development, Implementation, Evaluation);
- SAM (Successive Approximation Model);
- SMART (Specific, Measurable, Attainable, Relevant, Time-bound);
- ALD (Agile Learning Design).

Let us consider these models in more detail. The most popular of these is the ADDIE model, which is explained by its simplicity, flexibility and versatility. This model involves five stages: analysis, design, development, implementation and evaluation. Note that the main disadvantage of ADDIE is considered to be the linear process of creating training, which has a negative effect on the cost and duration of course development within this methodology. The aforementioned deficiency has given impetus to the development of more modern and circumspect “Agile” models of training construction.

The Successive Approximation Model (SAM) assumes not a systematic linear development of the project, but a combination of performing small in content, constantly repeating development cycles. Each cycle gradually expedites the implementation of the common task as a result of increasing
concentration of efforts as the cycles pass. This allows creating even very large-scale projects in "small steps", developing each component as quickly and simply as possible, gradually building up elements of the mutual binding in the process.

The SMART project management system is based on well-defined and measurable goals. The goal must necessarily be specific, measurable, attainable, meaningful and have a deadline. The speed and efficiency of the task fulfilment depends on its correct formulation, and it does not matter in what way the result will be achieved. The preliminary analysis and planning of paths are crucial in using this model, therefore this concept is applicable to pedagogical design as a whole.

ALD is a model aimed at accelerating advanced training due to a sharp increase in concentration on specific tasks. For this model, the key factors are speed, flexibility and cooperation of development. ALD is increasingly used in the creation of distance learning and retraining systems, where material intensive transfer and the use of the learner’s active interest are necessary [10].

The main principles of the Agile Learning Design model are:

- interactive material presentation with constant numerous consideration of the key points for consolidation;
- use of templates and other standard tools to quickly and efficiently complete the task;
- active use of student’s interest and its stimulation;
- priority of presentation of key items over minor ones;
- active involvement of experts in concrete fields of knowledge;
- creation of interactive databases with the appropriate reference material on the topic itself and on allied branches of knowledge;
- concentration on the material and the learning process, not on planning;
- systematic assessment of the learning process and the needs of the student at each stage.

3. Results and Discussion

Thus, ALD is a development of the ADDIE model, the stages of which are outlined in Figure 1 with the help of IDEF0 notation. It should be noted that the model under consideration is based on an iterative development i.e. the project is divided into functional elements (modules), which are subsequently to be merged. The functional elements are developed sequentially and, whenever it is possible, simultaneously, which reduces time costs, besides, solutions of one element can be reused in the development of other segments [13].

The selected model should be implemented with the aid of a specific toolkit. Among the software tools (ST) used to create e-learning courses, let us choose the most popular ones and, using the decision taking system (DTS) “MPRIORITY”, determine which ST will meet the specified criteria to a greater extent.

Let us consider the following software: Adobe Captivate, Articulate Storyline and iSpringSuite. Adobe Captivate is an e-learning program that can be used to record video lessons, create a program simulation, training presentations, and various tests in the .swf format.

The Articulate Storyline software is often used in the professional development of electronic teaching materials. The advantage of the system is the ability to work with variables in which one can save the data entered by students, and then use them elsewhere. For example, one can save a student’s name and then address them by name.

iSpringSuite is not a standalone software product, but a plug-in (addition) to Microsoft Office MS PowerPoint, it is very easy to use and has sufficient functionality [10].

Let us remark here that the “MPRIORITY” DTS is based on the hierarchy analysis method (HAM). This method provides an opportunity to structure the problem in the form of a hierarchy, to compare and quantify alternative solutions. In addition, the HAM method reveals inaccuracies and contradictions in the judgments of the decision maker [5].
As part of choosing a platform for developing an e-course for training enterprise employees on first aid, the following comparison criteria were worked out:

1. Maintenance (availability of support service, the quality of its work and its availability, whether updates are released and whether they are free);
2. Implementation (ease of installation, whether it requires additional adjustment after installation, the availability of implementation methodology);
3. Functionality (list of opportunities that the platform provides to the developer: import from other programs, interactivity adjustment, a variety of practical tasks, etc.)
4. Price (the cost of the package should be as low as possible);
5. Experience of use (whether the program was used by the employees of the company earlier, what feedback they left).

In the course of the analysis it was revealed that of the listed criteria the most significant is “functionality”, its weight being equal to 0.4747.

Software pair-wise comparison according to the criteria revealed that Articulate Storyline has a significant advantage in terms of this criterion, its weight being 0.5396.

The developers of the company have a successful experience in Articulate Storyline usage, consequently, this platform has the greatest weight according to the corresponding criterion, which is equal to 0.683.

Thus, having filled in all the matrices and performed the necessary calculations, we obtained the results of the alternatives evaluation. Software pair-wise comparison according to the criteria revealed that Articulate Storyline (0.5062) has a significant advantage. Thus, on the basis of the aggregate results of the abovementioned stages of platforms for creating electronic courses comparison, it can be affirmed that in our case it would be advisable to use the Articulate Storyline software platform.
4. Conclusion
It is obvious that the use of electronic courses is a promising direction in the organization of educational activities of any kind, though today the problem of improving the quality of ESC by improving the process of their development is coming to the fore. In order to ensure high efficiency of the process of creating e-learning materials, the following condition should be fulfilled: the development should be carried out in accordance with the principles of the system approach according to the chosen methodology, for example, Agile Learning Design, which should be implemented through a particular software tool (Articulate Storyline).

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