

# Methodology Of Creation Of Software Products For The Organization Of Independent Work On The Basis Of Distance Education Technologies

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**Abstract:** *The article presents a model of software development for the organization of distance learning in higher education, the adoption of independent work, processing, reproductive and productive communication, observation and comparison, the formation of online communication*

**Keywords:** distance learning, information technology, Asset Sharable Content Object (SCO), internet services, ADL (Advanced Distributed Learning).

## Introduction

In the 21st century, a new era of development in human civilization has begun - the era of the information society. It is characterized by the rapid development of information and telecommunications, the rapid spread of information technologies, the globalization of society development processes, the international communication environment, the formation of education, communication and production, and the development of the infosphere. The organizational and technological basis of the information society is the global information network - the Internet.

The organization of the educational process in distance education can be carried out on the basis of the following stages:

- Determination of course objectives. It is determined which knowledge (subjects, science, etc.) should be given and who should be taught.
- Selection of teaching methods. During the educational process, it is necessary to carry out a diagnosis of the level of knowledge and skills, as well as to determine the sources and methods of verification.
- Development of methodological requirements for educational material. It is necessary to determine the methods and volumes of imparting new knowledge.
- Development of lesson schedule. It is necessary to divide the entire course into several modules, to determine what knowledge the student should have after the completion of each module.
- Organization of educational process monitoring.
- Planning inspection processes,
- Planning students' independent work,
- Preliminary evaluation of the results of the educational process;
- Results detection and analysis software.

Organization of distance education directly requires different categories of staff, professors and software team [1].

The implementation of distance education in any higher educational institution is a complex process and mainly requires the following:

1. Spiritual and spiritual preparation of professors and teachers for the application of new technologies;
2. Teaching and training of professor-teachers in computer literacy, Internet, new information technologies (MS Word, PP, Excel, IE);
3. Development, introduction and implementation of the internal legal-normative and regulatory base of the higher educational institution;
4. Solving issues of purchase or creation of distance education system, electronic courses.

Distance education in higher educational institutions, including TATU Karshi branch, cannot be organized immediately without any preliminary preparation. For this reason, in the organization of distance education based on Internet technology, any higher educational institution should set the following specific tasks, different from the MT system used in developed countries, on the basis of the practical experiences gained in applying the elements of distance education to the educational process:

1. To increase the real contact time between the student and the teacher.
2. Creating an educational environment in which students interact.
3. In distance education, it is necessary to correctly solve spiritual-educational, moral-educational issues, that is, not to allow education to be disconnected from education.

Distance education organized in a higher education institution has its own purpose and task, and it should be aimed primarily at the population who do not have the opportunity to receive full-time education in computer literacy, Internet and information technologies [2].

Таълим жараёнида талаба ва ўқитувчи ўртасида ўзаро боғланиш вақти reduced to a minimum. The "Virtual University" form of day-time education, which will be established, allows to use many processes in the educational process with the help of new technological platforms. The student is effectively connected with the teacher on a daily basis, and it is ensured that the teacher works with the student at a higher level of individuality than in the classroom of the full-time education[4].

Due to the fact that the classical lecture form of teaching in the recommended distance education system is less effective, traditional lecture classes are not used, they are replaced by electronic text learning materials. Communication with the teacher is provided through e-learning classes and conferences (chats). In this case, the teacher organizes the student's study by giving him guidance and advice on the subject. Monitoring of educational results is carried out on the basis of a large amount of test materials, that is, the student can check his knowledge by switching to the "tutor" mode [5].

SCORM (Sharable Content Object Reference Model) is recommended as the recommended standard and software for distance learning in higher education institutions.

SCORM is a set of specifications and standards developed for the distance education system, which includes requirements for the organization of distance education and its educational materials. SCORM enables components to work together and multiple times. In it, learning materials are organized in the form of small blocks. Therefore, it allows the application of the distance education system regardless of who, when and where, with what means it was created. SCORM is based on the XML standard [3].

The ADL (Advanced Distributed Learning) initiative group started work on the creation of SCORM in 1999. The 3rd version of "CMI001 — Guidelines for Interoperability" created by the AICC in September 1999 was taken as the basis for its creation. This includes the Computer Managed Instruction (CMI) and the Assignable Unit (AU) used in it. AU and CMI interact by reading/writing network files (CMI001 v1.0, created in 1993), or using the RTTR protocol (CMI001 v2.0, created in 1998) or Javascript API (v3.0, 1999). CMI001 text files in CSV format are used to write e-course elements. Part 2 of the specification (AICC and CMI001) (transmitted data model and interaction description via Javascript) is included in the SCORM RTE (Run-Time Environment) developed by the ADL group. In 2004, the 1st edition of SCORM 1.3 was developed. Version 3 in 2006 and SCORM 2004 4th Edition in March 2009. Content Aggregation Model (CAM). This component of the standard covers the content of study blocks and the structure of the study material package. The package will consist of a course, exercise, test, model, etc. The package includes an XML file (manifest), which describes the structure of the package and files that make up the educational unit.

The package manifest includes:

- meta (a component of educational materials);
- organization of educational material (development of how to place components);
- resources (file names, package contents);
- sub-Manifest (if it has a very large and complex structure, it is used to avoid filling a single file with a large volume).

There are 2 types of educational materials included in the package:

1. Asset
2. Sharable Content Object (SCO).

Asset does not interact with the learning management system server (LMS server). It can be an html page, a simple picture, a sound file, a flash object.

SCO- this element communicates directly with the learning management system and provides information about the progress and result of the study, receives or transmits additional information.

When transferring packages across a network (for example, for uploading to a learning management system), SCORM CAM places the package contents into a zip archive. Run-Time Environment (RTE). This part of the standard describes the communication between the SCO and the Learning Management System (LMS) through a software interface application. The SCORM RTE requirement ensures that SCO and LMS are compatible with each other. In this case, any distance education system that complies with the SCORM standard must be in communication with the SCO. The LMS provides the resources required by the user, starts the SCO, processes the data about the student's activity, transfers the required data to the SCO object, and ensures the storage of the obtained data. SCO's operating system: (html page asks the learning management system for the student's name) [3].

One of the main components of distance education is the database of educational modules. Since the effectiveness of distance education is determined by how well the student can learn the learning material independently, there is a strict requirement for learning modules. Therefore, it is necessary to pay special attention to the methodology of creating educational modules. Also, the main contribution to the costs of distance education is spent on the development and creation of educational modules. But these costs are one-time. It is also necessary to spend additional funds on increasing the number of educational modules during the educational process and improving them based on the analysis of the progress of the educational process [8].

Currently, the following modules are used in the distance education system:

- in the paper version of educational materials;
- on video and audio cassettes;

□ using computer disks.

It is advisable to use all options and types of modules in the effective organization of a modular training course. At this time, the student has the opportunity to choose the module that is easier for him to master.

The effectiveness of organizing students' independent work through distance education technologies depends on the possibilities of quick communication between the student and the teacher and the form of communication. It is worth noting that in the teaching system without the participation of any teacher, there will be no opportunity to solve questions that arise during independent study of educational courses without contacting the teacher. For this reason, the distance education center needs to pay special attention to the organization of the student-teacher connection system. Currently, distance education involves the use of all the following types of communication: mail, telephone, computer networks, telecommunication lines, real communication between the student and the teacher [7].

A student's tuition costs will certainly depend on how he/she communicates with the teacher. In order for the distance education center (educational institution) to be competitive, it is necessary to reduce the costs of quick communication between the student and the teacher.

To achieve this, the following is recommended:

- creating methodologically correct educational modules;
- educational module or teaching methodology to clearly identify the field of knowledge on the knowledge mastered by the student and ensure that the teacher gives competent advice in a very short time;
- make a video or real connection with the student and the teacher only when the student and the teacher have a complete and clear understanding of the issues being discussed;
- It is economically acceptable to organize a real meeting between a student and a teacher in a group of students, because the financial costs are divided equally between students.

The use of Internet tools and Web applications in the organization of independent work of students through distance education technologies provides an opportunity for the participants of the educational process to enter the system in an automated mode. Using the web application allows users to authenticate their access to learning resources, and to record all communications and interactions and learning outcomes. This ensures the automation of internal electronic document circulation and control of the educational process in the educational process [6].

When introducing the organization of students' independent work through distance education technologies, the following two factors must be taken into account:

1. The form of implementation of the organization of independent work of students through distance education technologies;
2. Meeting the standard requirements for the results of the educational process of higher educational institutions of the Republic of Uzbekistan.

Also, achieving an interface that allows teachers and academic support staff to have a clear and easy access to the system, centralized access to information about students and compact planning of activities for groups throughout the period of distance learning will help to achieve high efficiency.

**Summary:** The methodology for creating software products for organizing independent work based on problem-based educational technologies involves several key steps:

1. Needs Assessment: Identify the educational objectives and the specific needs of the target audience.
2. Research: Investigate problem-based educational methodologies and technologies to understand best practices and existing solutions.
3. Design: Develop a conceptual framework for the software product, outlining its features, user interface, and functionality to support problem-based learning.
4. Development: Build the software product according to the design specifications, using appropriate programming languages and development tools.
5. Testing: Conduct thorough testing to ensure the software functions as intended, addressing any bugs or usability issues.
6. Implementation: Introduce the software product into the educational environment, providing training and support for users.
7. Evaluation: Assess the effectiveness of the software product in facilitating independent work and problem-based learning, gathering feedback from users and stakeholders.
8. Iteration: Use the evaluation results to make improvements to the software product, iterating on the design and development as needed to better meet the educational objectives and user needs.
9. Maintenance: Continuously maintain and update the software product to ensure its relevance and usability over time.

By following these steps, developers can create effective software products that support problem-based educational methodologies and empower learners to engage in independent work.

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