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Abstract. Software for accounting and systematization in educational activities developed for the effective work of teachers and students. In Magnitogorsk State Technical University every student who has achievements in educational, research, public, cultural, creative or sports activities has the opportunity to be assigned to an increased state academic scholarship (Order of the Ministry of Education and Science of the Russian Federation of December 27, 2016 No. 1663). For this purpose, on the educational portal of the Magnitogorsk State Technical University a student's portfolio is filled in for each of the activities, which is the link between the student and the teacher. For accounting and systematization of educational activities a web-module was created, integrated into the educational portal. Throughout the course of study, the student has the opportunity to view statistics and achievements in his / her academic activities, add, evaluate, and analyze information for further effective study, obtaining increased scholarships, and successfully defending graduate qualifying work. Reducing the time and labor costs required to collect and systematize the achievements in student learning activities will make the work of teachers more efficient and productive when interacting with students.

Keywords: Data transformation, visualization of information, learning activities, electronic portfolio systems, software.

1   Introduction

In the Russian Federation, students enrolled in educational programs of higher education (bachelor's degree, specialty, master's degree programs), including foreign citizens (full-time students, budget) who have achievements in educational, research, public, cultural, creative or sports activities, provide set of their individual achievements in various fields of activity, i.e. fill out the portfolio.

The development of technology and the growth of the information with which to work, leads to the automation of time-consuming activities. The actual problem is the collection and systematization of documents for subsequent verification, evaluation and analysis of students' achievements for later enrollment in the increased scholarship.

Automating these criteria allows you to simplify this process by reducing time and effort. Students need to monitor the effectiveness of their work throughout the entire period of study. To this end, software has been created for recording and systematizing the achievements, which consists of several modules responsible for different types of activity. So that students and teachers can keep records, analyze, systematize and add information on educational activities, it was decided to create a web module based on the LMS Moodle distance learning system. Educational activities include such categories as: the quality of training in academic disciplines; practice; research work; term papers and projects; candidate exams; absolute and high performance; state final certification; Olympiads and contests; project activities; studying massive open online courses; online exam; mastering foreign languages; mastering additional competencies; internships, academic mobility.

Currently, personality development in the process of education is gaining momentum in our country. The transition to a market economy has set somewhat different priorities in our society. The development of research activities in all spheres of life also affects the need for active, independently-minded specialists, who, along with the ability to adapt to emerging conditions, could change them taking into account the new situation of professional activity, would be able to adequately assess the changes that occurred, have experience in self-fulfilling research competence. This leads to a complication of the mechanisms of education and, accordingly, the activities of people engaged in this field [1,2,3]

The system of electronic portfolio is a program of individual-oriented professional development of a student, which includes the collection, systematization, processing, accumulation and analysis of the results of real changes and individual achievements in the process of studying.

The e-portfolio abroad is not something new and has long been used in the field of education, in the United States such an idea arose in the mid-80s. In the foreign market, in contrast to the Russian, a huge number of ready-made IT-solutions. All of them have different functionalities, and educational institutions can choose the most suitable system from numerous options, so they are more likely to buy such products than to develop their own. Such systems are often closed and you can try them either by using the demo mode or by paying for the product. To use the demo mode, you must directly contact the company. And free solutions have poor functionality, and more are aimed at personal use [4,5,6].

In the Russian Federation, electronic portfolio systems have appeared relatively recently, but are already a requirement of educational programs of higher education of modern FSES (Federal State Educational Standards). Portfolio is filled for such activities as: research, educational, cultural and creative, public and sports. Based on the achievements presented in the portfolio and the absence of academic debts and grades "satisfactorily", an increased state academic scholarship is appointed (Order of the Ministry of Education and Science of the Russian Federation dated December 27, 2016 No. 1663). There are many resources on the Internet that allow you to develop a portfolio of students. The most famous of these resources have one or another functionality of the social network: building relationships with other users of the portfolio system, messaging, rating, etc. This situation is justified by the fact that the portfolio is created to present to other people, to receive their assessment, to recognize the achievements of the author of the portfolio in various situations. This allows you to talk about a different model of developing a portfolio system when such a service is created on the basis of an existing software product[7-10].

Such a model of a social network can be the foundation for creating an educational portal. An educational portal is a website where, first of all, students and teachers are presented, there are flexible possibilities for their interaction and joint educational activities in a virtual online environment. The educational portal of Nosov Magnitogorsk State Technical University has realized most of the functions of the electronic portfolio, it includes the program complex "Improving student scholarships", which was created to facilitate decision making on the appointment of "increased" scholarships [11-12]. The educational portal is based on the LMS Moodle distance learning system. In order to allow students to monitor the effectiveness of their work throughout the entire training period, a web-module was created based on the LMS Moodle distance learning system [13].

2 Purpose and methods of research

2.1 Purpose of the research

Purpose: improving the efficiency of the educational process, reducing the time spent by teachers and students. The subject of the research is the analysis of the effectiveness of the work of students and teachers. The object of the research is the electronic portfolio system and educational portal of the Nosov Magnitogorsk State Technical University.

To achieve this goal solved the following tasks:

1) analysis of the electronic portfolio formation systems;

2) study of the principles of work of LMS Moodle for the development of an electronic portfolio;

3) development of a module for analyzing the performance of students;

4) implementation of the module in the learning process and on the educational portal of the Nosov Magnitogorsk State Technical University

2.2 Methods

When designing a web-module for recording and systematizing the achievements in educational activities, the following requirements were taken into account:

The ability to view statistics on educational activities. Fulfillment of this requirement will allow the student to see his grades in academic disciplines, in term papers, as well as educational achievements, which the user will add manually.

Adding information about the achievement. The achievement is added to the database table, and after the change is displayed on the page. If the user did not fill in all the fields or an error occurred while adding to the table, the system displays a corresponding message on the page.

Changing achievement information. This feature will fix an incorrectly completed achievement. If the user did not fill in all the fields or an error occurred while changing the achievement in the table in the database, the system displays a corresponding message on the page

Removal of information about achievement. If the user has not selected the achievement to be deleted or an error has occurred during the deletion, the system will display a corresponding message on the page.

Loading of information on achievements on the page.

Work with files confirming the reality of achievement. This feature includes loading, storing, modifying and deleting files owned by the user.

The following parts are highlighted in the web module:

1) client part (frontend);

2) server part (backend).

Development of the server part of the web-module. In the server part, many of the built-in functions of the PHP programming languagee used in the development of the web module. Table 1 presents a description of some of them [14].

Table 1. Description of some of the built-in language functions used when writing the program

Function	Description
mysql_gettable	Performs a table query to the database.
mysqli_query	Fulfills database query
echo	Allows you to display lines on the screen
isset	Determines whether a variable is set
json_encode	Returns JSON encoded string (on success) or FALSE if an error occurs.

Since the data-sharing scheme of the Model-View-Controller web application, smarty, a compiling template handler for PHP, was used. The smarty functions used were described in table 2

Table 2. Description of the smarty template handler functions used to write the web-module.

Function	Description

display	Displays a template
assign	Assigns a value to a pattern

For the development of the server side, the language PHP is chosen - a general purpose scripting language that is widely used for developing web applications and is used in the LMS Moodle environment.

The web-server assembly usually includes at least 3 components: HTTP server, site development tool (programming language library, interpreter, etc.) and database management system. For such assemblies, free software is used, so the most common components are: Apache web server, MySQL DBMS, programming languages PHP, Perl.

As a web server, XAMPP version 7.1.11 is used, which contains Apache, MySQL, PHP script interpreter and a large number of additional libraries that allow you to run a full-fledged web server.

XAMPP is one of the popular builds of a ready-made local server. The popularity of the server is due to the quality of the product, a sufficient number of tools, information support [15].

MySQL was chosen as the database management system. MySQL will have good speed, reliability and flexibility. Working with her, as a rule, does not cause great difficulties [16]. MySQL server support is automatically included in the PHP package.

The following technologies were used to implement the server part:

1) PHP is a general purpose scripting language used for developing web applications;

2) MySQL is an open source relational database management system.

3) Smarty is a compiling template handler for PHP, one of the tools for separating application logic and data from representation in the Model-view-controller concept. Smarty is intended to simplify compartmentalization, allowing the front-end of a web page to change separately from its back-end. Ideally, this lowers costs and minimizes the efforts associated with software maintenance [17].

Development of the client part of the web-module.

In the client part, several built-in functions of the JavaScript programming language were used to develop the web module. Table 3 provides a description of the functions used

Table 3. Description of JavaScript functions used in the development of the web-module

Function	Description
alert	Displays a modal message box.
create_error_alert	Error message popup
confirm	Displays a message in a window with two buttons: OK and CANCEL. Returns true / false depending on where the user clicks.

JQuery was used to interact javascript and html. jQuery is a JavaScript library that helps you easily access any DOM element, access and manipulate the attributes and contents of DOM elements. The DOM is a platform and language independent programming

interface that allows programs and scripts to access the contents of HTML, XHTML, and XML documents, as well as change the content, structure, and design of such documents. The library also allows the client and server parts to interact through ajax requests. Some of the jQuery library methods used in the implementation of the web-module presented in Table 4.

Table 4. A description of some jQuery methods used to write a web module

Methods	Description
val	Gets the current attribute value from the first element in the set of matched elements.
wrap	Places selected items inside the specified item.
attr	Gets the attribute value for the first element in the set of matched elements.
find	Searches for items within already selected items.
html	Gets or changes the HTML content of the selected items.
ajax	Performs a request to the server without reloading the page.
load	Allows you to download data from the server and place the returned HTML code inside the necessary elements.

As the development environment was used LMS Moodle, which is focused on the interaction of the teacher and the student. The choice of development environment due to the fact that it is based educational portal of the Nosov Magnitogorsk State Technical University, as well as an open source distance-learning environment.

The following technologies were used to implement the client side:

1) HTML is a markup language for web pages;

2) CSS is a language for describing styles of elements of HTML pages;

3) Bootstrap - a free set of tools for creating websites and web applications, which includes HTML and CSS-page design templates [18].

4) JavaScript - HTML scripting language;

5) AJAX - a set of techniques for building interactive user interfaces of web applications, which consists in the "background" data exchange browser with a web server;

6) jQuery is a JavaScript library to simplify working with HTML elements on the client side [19-20].

3   Results

3.1   The structure of the web-module

The web module implements five modules:

1) module for loading data on the page;

2) module for opening a form for adding or changing information about the achievement;

3) module for adding or changing achievement information;

4) module for deleting information about the achievement;

5) module for working with files confirming the validity of the achievement.

Module for loading data on the page. When the page loads, as well as adding, changing or deleting achievements, an AJAX request to the server occurs, where achievement data is requested from tables in the database. The server returns the generated data that is displayed in a table on the web module page. This module allows you to update information without a full page reload.

The module for opening the form of adding or changing information about the achievement. After clicking the "Add" or "Change" button, a value is transmitted that determines which button was activated. Clicking on the "Add" button will open a form with empty fields. Clicking on the "Change" button will check for the selected achievement. If an achievement has been selected, a form will open and an AJAX request will be sent to the server, where achievement data from the table in the database will be requested. The server returns data that will be displayed in the fields on the open form. In case of success, data from the form and the transferred value are transferred to the module for adding or changing information on the achievement by clicking on a certain button.

Module for adding or changing achievement information. After clicking on the "Save" button on the form, data from fields on the form will be checked for emptiness, if one of the fields has not been filled out on the page, a notification will be displayed and the module will stop working. If successful, an AJAX request will be sent to the server, where, depending on the transferred value, the data will either be added or changed in a table in the database. The server returns a response about the successful addition or change. If the answer is positive, the module loads the data to the page. Otherwise, the page displays an error message.

The module for deleting information about the achievement. After clicking on the "Delete" button, a check will be made on the selected achievements. If an achievement has been selected, the system will ask you to confirm the deletion, otherwise the page will display a notification that you need to select an achievement. When you confirm the deletion, an AJAX request will be sent to the server, where the achievement will be deleted from the table in the database. The server returns an answer about the deletion success. If the answer is positive, the module loads the data to the page. Otherwise, the page displays an error message.

Module work with files confirming the reality of achievement. This feature includes loading, storing, modifying and deleting files owned by the user.
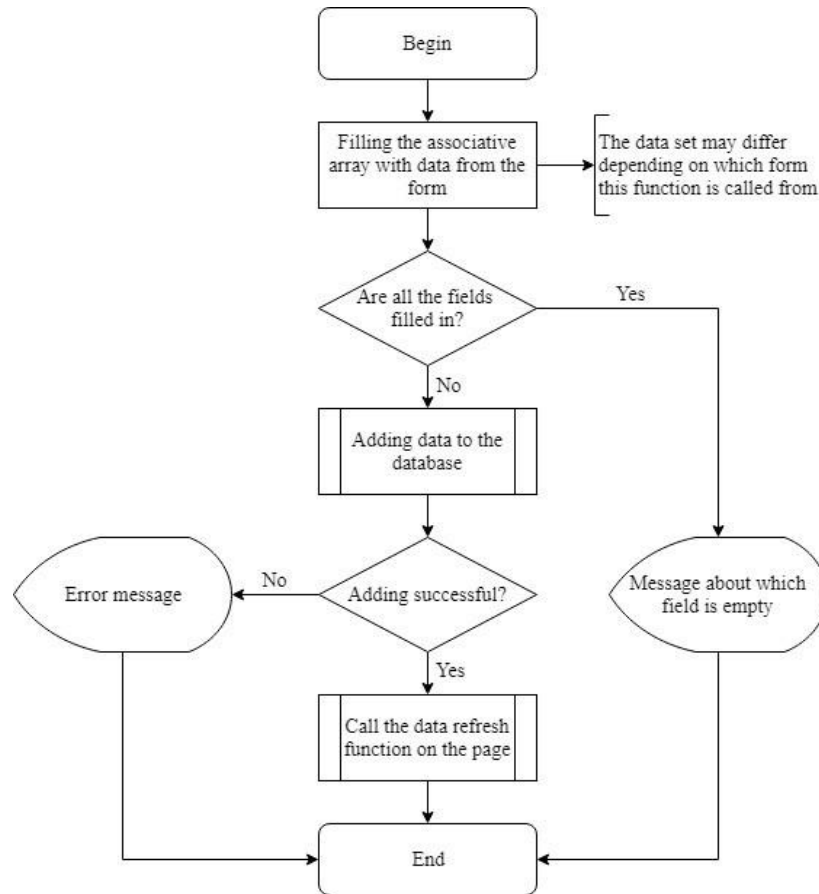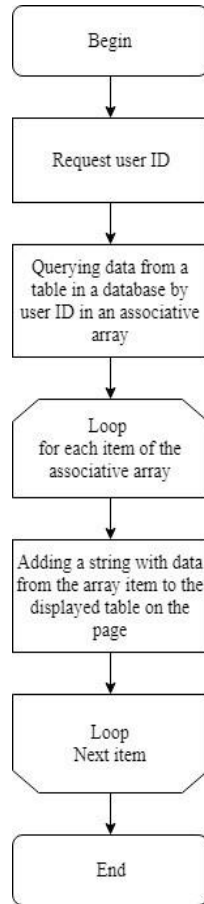
The flowchart of the web module is in Fig. 1.
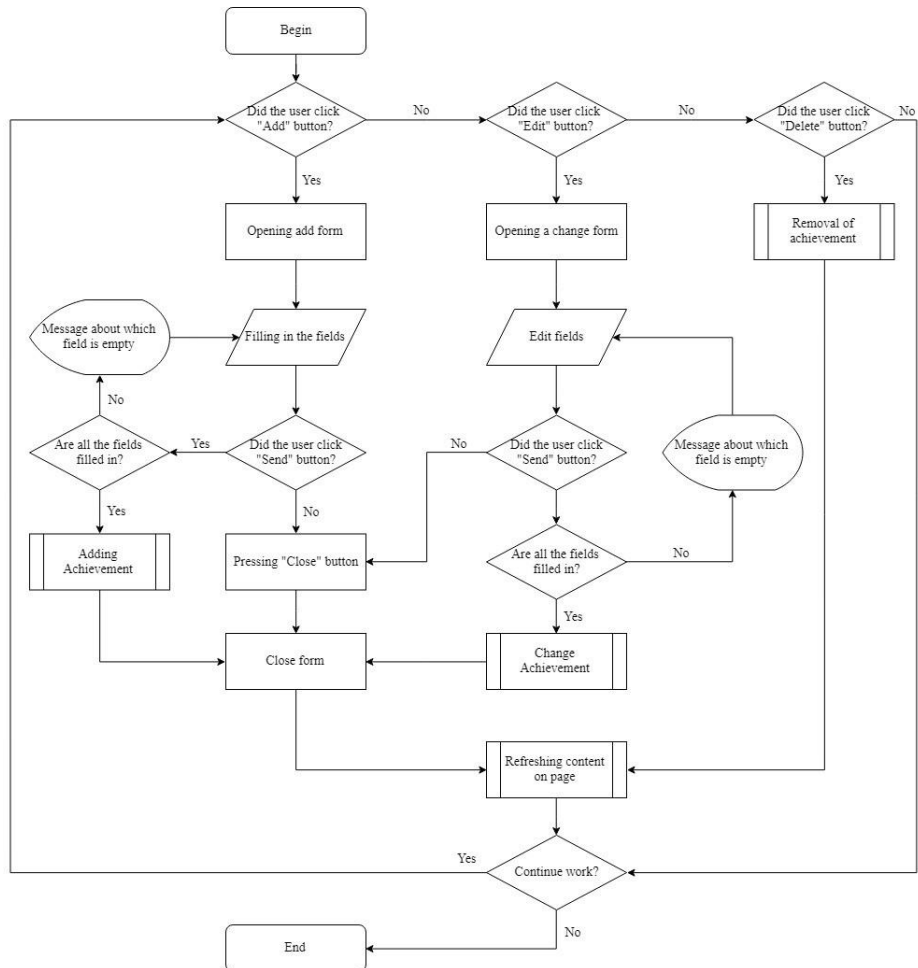
Fig. 1. Flowchart of the web-module

Flowchart of the senddata_click() function for sending a request to add information to a table in the database is shown in Fig. 2.

Fig. 2. Flowchart of the function senddata_click ()

Flowchart of the function of updating the page content on the example of the function intship_init () is presented in Fig.3.

10

Fig. 3. Flowchart of the function intship_init()

The work of the web-module is divided into 5 stages:
1. At this stage, in the index.php file, the user's access rights are checked to view the contents of the web module, and the display function of the portf_input.tpl template is called.
2. The portf_input.tpl template is displayed.
3. After the display, data is loaded into the module from the database, the system waits for further user actions, during which it is possible to add, change or delete information for some tables.
4. At this stage, the forms are displayed, which are caused by clicking on the "Change" or "Add" button, the user fills out the form and presses the "Save" button.
5. After clicking on the "Save" button, the information is updated or added to the database, and the data in the table on the displayed page is updated.
The structure of the web module is presented in Fig. 4.
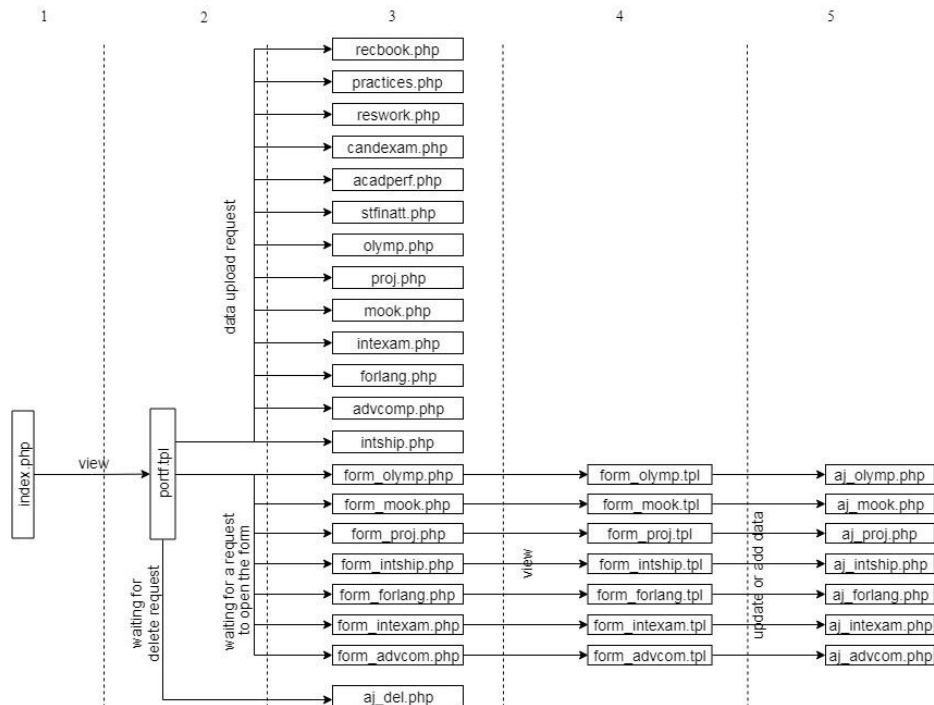
Fig. 4. The structure of the web-module

File index.php is responsible for checking the user's access rights to view the contents of the web module, as well as for displaying the template portf.tpl.

File portf.tpl is main page of the module, which implements the module interface and AJAX request functions.

Files recbook.php, candexam.php, acadperf.php, stfinatt.php, olymp.php, proj.php, mook.php, intexam.php, forlang.php, advcomp.php, intship.php – necessary for uploading data to tables on the main page.

File aj_del is responsible for removing achievements from tables in the database..

Files form_olymp.php, form_mook.php, form_proj.php, form_intship.php, form_forlang.php, form_intexam.php, form_advcom.php are responsible for displaying form templates such as form_olymp.tpl, form_mook.tpl, form_proj.tpl, form_intship.tpl, form_forlang.tpl, form_intexam.tpl, form_advcom.tpl respectively, and also for transferring data from the main page to forms using queries.

Files form_olymp.tpl, form_mook.tpl, form_proj.tpl, form_intship.tpl, form_forlang.tpl, form_intexam.tpl, form_advcom.tpl – form templates that contain the fields required to complete the student's achievements. With the help of requests, the data is transferred to aj_olymp.php, aj_mook.php, aj_proj.php, aj_intship.php, aj_forlang.php, aj_intexam.php, aj_advcom.php files, respectively.

Files aj_olymp.php, aj_mook.php, aj_proj.php, aj_intship.php, aj_forlang.php, aj_intexam.php, aj_advcom.php are responsible for adding or changing achievements in tables in the database.

4   Discussion and conclusions

As a result, a web module was designed to add achievements in training activities and record achievements (analysis, comparison, and systematization), implemented on the basis of the LMS Moodle learning environment. In the program module, two important parts were singled out: the client part and the server part.

When designing the web module, the following requirements were imposed: the ability to view statistics on training activities; adding achievement information; change of information on achievement; deletion of achievement information; uploading information about achievements to the page; work with files confirming the reality of achievement. A scheme of the web module as a whole and its individual functions is described, as well as a flowchart showing the operation of the algorithms.

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