

One Approach of e-learning Platform Customization for Primary Education

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Abstract— There are many different types of platforms for e learning. A lot of them can be adapted to the teacher's needs in a relatively small scale and in pre-defined templates. Very often, these changes are related to contents change but not to the display mode or organization of content and can't offer complete customization. In the daily work in primary school, with pupils at the subject of geography, we concluded we need to realize special dedicated software that will be used in teaching geography. In this subject exists a lot of specific skills, tools and knowledge, which are generally not supported in classic e-learning platform (work with maps, coordinates, longitude, latitude, relief, etc.). This paper presents one approach of realized e-learning platform used for learning and testing pupils in geography. Proposed solution is realized based on PHP and MySQL according to MVC architecture, in the form of the dynamic and interactive web application. The proposed contain completely customized admin panel for content managing, separate pages with specific learning materials in geography, appropriate tests for every lesson, help and recommendations for pupils. Special focus is addressed to realization of interaction between user and graphic maps.

Index Terms— Geography, e-Learning, on-line testing, web application.

I. INTRODUCTION

Modern technology, in addition to the primary goal of quantitatively and qualitatively provide better performance, have the characteristic that they are easily accessible and graphically very attractive. These benefits can thus be used for a variety of student service and implementation in education, based on different learning strategies [1].

Development of the Internet and exponentially rapid growth of production and sales of personal computers has led to the fact that today a large number of families have a computer and Internet access. In this way, there was a strong possibility of placing and availability of various kinds of information in e learning [2]. This is particularly pronounced among the younger generation who are starting from primary education were in contact with. Also, a lot of them had classes in computer science during the primary education. The lack of fear of technology and the popularity of information and communication technologies has led to the fact that today all of its services (even if not commercial) are on the Internet. Special benefit brings new widespread media approach such

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as: mobile phones, tablets, laptops etc. Actuality of these devices and their availability has opened a new way to communicate, offering faster transmission and multimedia information applied in distance education [3].

In addition to the commercial services that are available today on the Internet, just as much content and information can be found in all other domains. Especially important role has the sites that offer various kinds of educational data and documents. Electronic education has given distance education and thus the availability of information does not depend on geographic distance or time. In this way were created a new era of education that is necessary to make a quality development strategy [1].

Bearing in mind all the advantages offered by the Internet, as well as a worldwide network, appears a large number of software solutions and tools to easily create and manage content. The purpose of these tools is to enable setting up of information aimed at specific target groups, such as students whose learning geography [4]. Unfortunately, these tools usually only create static web pages with the possibility of deployment images, animation and video or they are desktop application. In this way, the interaction with the user is often absent, meaning that the automatic creation of tasks and responsibilities which the user needs to carry out in a given period.

The qualitative change may be implemented by using programming and script languages that establish dynamic and interactive communication throw web sites[5]. In this way, the user is given the opportunity to actively participate in learning and that the process is especially interesting.

In this paper we present an example of a dynamic web site that was specifically created for learning and testing of elementary school students. Bearing in mind the problems with which the authors encountered in practice, in the course on geography, this paper will show practical solutions [6] for fifth-grade students who study this subject [7].

Namely, within the course there are many lessons that often represent problem in mastering knowledge, especially in situations when used for their explanation of terms that are yet to be studied in the later years of schooling. The concept of latitude and longitude without knowing the ideas of coordinate system, or the notion of distance and scale without knowing the proportions etc. can be very complex and abstract. Guided by these ideas and concrete problems in teaching, there is an idea to be implemented applications that disciples was easily accessible, interesting and above all educational. In this paper we present the realized solution with all its details and will make a comparative analysis of this approach with conventional work.

The paper is organized in five chapters. After an introduction, the second chapter offers the technical

characteristics and conditions for the use of the proposed software solution. The third chapter is briefly explained the problems of individual teaching units that have found a place and its solution in this paper. The detailed description of the application with pictures of individual stages or the lesson is given in the fourth chapter. At the end of the paper are given further guidance for the development.

II. STRUCTURE OF APPLICATION

The proposed solution is implemented as a web application server. Creating a dynamic web site that should meet the following functionality:

1. Authorization and authentication
2. View of the limited information not authorized users
3. Entry forms all questions, answers and the accompanying texts for each lesson
4. Testing of candidates
5. Analysis and automatic creation of reports on the results to the specific students in all lessons
6. Analysis and automatic creation of reports on the results achieved by all students that one/all lessons
7. Adaptability to all types of browsers, bearing in mind that interactivity in individual lessons obtained by positioning and clicking the mouse.

The proposed solution is achieved by using the programming language PHP [5]. All source code is written in a modular way and can easily be expanded and modified. As the database server is used MySQL for free licenses and extremely good compatibility with the PHP language [5]. All parties were organized by using CSS and HTML. For user testing we used Java Script. The dynamics and interactivity in a number of lessons was carried out using jQuery and for the needs of server processing the individual steps is used AJAX.

In the application there are two basic parts:

- a. Area for authorized and
- b. By unauthorized users.

Authorized users are divided into two roles:

- a. Students and
- b. Teachers.

Access to lessons, animations, and tests can be carried out only authorized students. Each student may terminate started testing, and continue it later with all the information about previously testing and points stored in the database. Special attention was paid to the possible misuse in attempts to possible bad results will not be recorded: break the connection, outages browser before check-out students, parallel to the opening more access to and the like.

Authorised teachers can access a part in which are created lessons. Lessons include the ability to add text and images, animation and video clips. In addition to lessons, teachers can create tests and assign them questions. Questions can be implemented in any of the standard form (only one is true, more accurate, complement text, etc.). For specialized issues (definition of longitude and latitude, the determination of the city with the given coordinates, define the distance of the cities shown on the map, etc.) that use preloaded maps and divisions, teachers can define all the parameters necessary

for these purposes, then program them automatically adjusts the data format and automatically creates questions.

Testing is realized in a way that points are awarded to each question with the possibility of defining negative points. The tests are divided into sections, and each section is displayed n of m questions from the database which are associated with that continent. In this way, if the student re-doing the test in the same area, can get a completely different questions. Teachers can access the analysis of all previously performed tests, and make comparative analyzes. These analyzes can be done on the issue, a pupil or group of pupils and the whole test.

Unauthorized users have access to all the lessons from the textbook, brief description states that followed their flags, all maps that will be used in the application and instructions for the purposes of the test.

The application has no restrictions in terms of operating system types or versions of browsers and Internet connections. Previous testing has been done and with the Internet and Intranet computer network and showed equally high-quality performance in terms of speed of response and processing time by the server.

III. PROBLEMS IN THE TEACHING OF GEOGRAPHY

Matter subject geography for pupils of fifth grade are very different from the matter of the case in the higher grades. Given that students have the basic concepts of physical geography and concepts that require specific knowledge in math, fifth-grade materials can represent a serious problem some students [6]. For this reason, there are a large number of materials that teachers provide additional guidance in the process of transferring knowledge [7].

Further difficulties arise in teaching by modeling the Earth abstraction with lines defining the latitude and longitude coordinates. For these reasons, it is necessary to devote more time to specific examples from these areas, because the regular classes does not have enough time [7]. For this reason, considerable research is aimed at finding the best solutions in the teaching of geography [8], [9]. By creating an application that provides learners with the opportunity to further educate themselves and practice on practical tasks in the visual environment, this problem can be solved [10]. The effects are far greater if, in this type of learning involved and multimedia presentations in e learning methodology [11].

Bearing in mind all the possibilities that are in this electronic mode offered as well as the general role of the Internet in education, as future learning way [12], this learning approach can give good results and achieve the proper effect of active learning and realty environment[13].

Bearing in mind all the problems in teaching but also electronic education, in this paper is implemented application that should enable easier and better performance of students in the learning process of geography. For the purposes of this study were selected four areas to be covered because they are located as well as the most difficult to overcome by the students:

1. Determination of longitude and latitude given city
2. Determining the position of the city based on the given longitude and latitude

3. Determination of the distance between the two cities on the basis of the scale
4. Finding the given country on the world map.

Each of these parts is a whole graphic and multimedia treated, similar as in [14]. If the student gets the wrong answer brief help with tips that fit the theoretical matter are given. In this way, the student is stimulated to second attempt to be based on an additional and complementary knowledge. Student does not exceed the following question until currently question not completed with the full understanding of the matter.

IV. RESULTS

Home page of application provides basic information about the service and how to use the application. It consists of: a navigation menu, the form for logging and form to search for unfamiliar terms, Fig. 1.



Fig. 1. Home page of application.

Search is available to all parties, except in the area with the tests. Clicking on the Search key performs the searching of lessons and states in the database. If the term is found as a result of time will provide links with the names of the lessons that contain the search term, Fig. 2.



Fig. 2. Search terms in lessons.

The site contains lessons with teaching unit that follow the school textbook "Geography for the 5th grade of primary school" [14]. Selecting the lessons from the drop-down list, you will be shown the contents of the lesson.



Fig. 3. Teaching units from textbooks.

Page with maps showing the map of the continent with marked states and capitals based on the selected continent, Fig. 4.



Fig. 4. Display maps with numerous details.

Page with the tests is available only to authorized users. Questions are grouped into five areas. The first part of the test is a text questions about the basic concepts of geography. These questions were offered two answers. In the case of giving the correct answer, you get the two points and moves to the next question, because otherwise the student is given an opportunity to read further clarification and try again, Fig. 5.



Fig. 5. The first part of the test - questions with a choice of one of the two.

The second part of the test is to find a certain state. In the central part of the application is given a map that the user needs to click on a particular country in order to respond correctly to the question, in Fig. 6.



Fig. 6. The second part of the test - Selection of the given state.

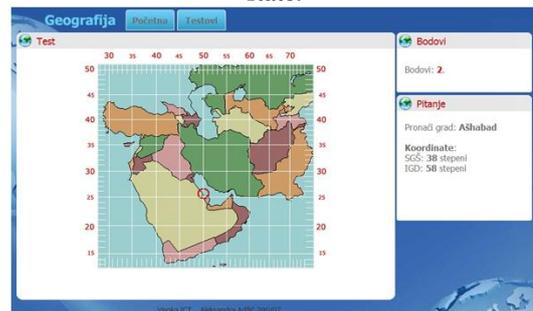


Fig. 7. The third part of the test - Search for a location based on longitude and latitude.

The third part of the text is to find a city whose coordinates are given. In the central part of the application's data map, where users should click on the place the given coordinates to respond correctly to the question, Fig. 7.

The fourth part of the test relates to coordinate input for a given city. Specific city is marked on the map, and is expected to input the longitude and latitude, Fig. 8.

The fifth part of the test relating to the scale. For given two cities need to enter their distance in kilometers, in relation to a given map scale, Fig. 9.

The test is completed when a user replies to all the questions. On the right is shown the number of points won in relation to the maximum number of points. In the central part of the link that leads to the statistics and the button to start the test. Clicking on the link, AJAX print issues that users solved in the test, as well as the answers he entered by the student, with the number of attempts to obtain the correct answer, Fig. 10.



Fig. 8. The fourth part of the test - Entering a latitude and longitude for a given city.

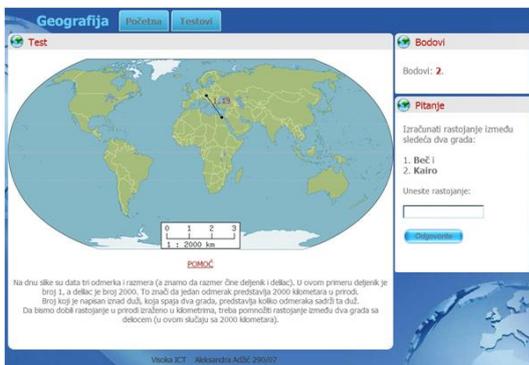


Fig. 9. The fifth part of the test - Calculation of distances on a map.

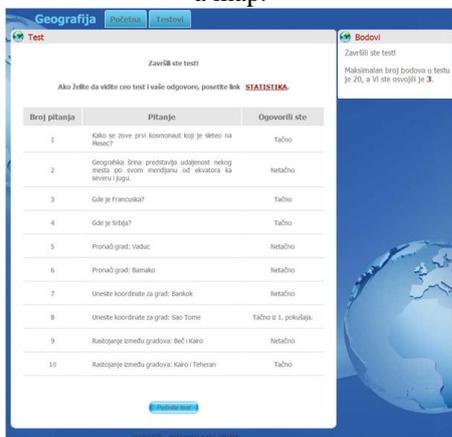


Fig. 10. End of test.

Clicking on the link Statistics, the authorized user is shown a list of dates when he tackled the tests and how many points he won. Each date is a link that leads to a page with detailed description of the selected test, Fig. 11.



Fig. 11. Statistics - display a list of tests progress.

When a user on a page with statistics clicks on dates, he will be forwarded to a page where can see which issues he had in the test and how he have answered them, Fig. 12.



Fig. 12. Statistics - Display solution test.

A special role in the application have teachers who are assigned to the administrator role. Assuming that teachers do not need to have programming knowledge, all functionality and data entry into an application is made graphically. In this way, the administrator's part is a much more complex and extensive and occupies a special place in this application.



Fig. 13. Entry teaching unit.

Depending on which part of the application needs to be changed or added content, the administrator selects the drop-down list after which are displayed links that lead to pages for entry and display specific content. Areas relating to basic geographic concepts, information on countries, cities,

and the data in the test, as well as maps that are used in the application.

By choosing a field related to the basic concepts of geography are printed links leading to pages for entry and display of questions in the test, lessons and files. Entering a new teaching unit is realized through a web form, shown Fig. 13.

The web page for the defining allow user forms for input questions for the first part of the test. Selecting a unit which belongs to a question, the administrator enters the necessary information for database, Fig. 14.

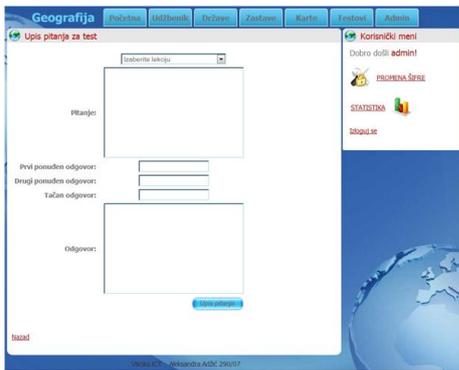


Fig. 14. Insert question.

The web page for the enrollment pictures, videos or animations assigned to the teaching unit is provided through a special form, Fig. 15.



Fig. 15. Enrollment of additional files associated lessons.

Web page for registration of coordinates state allows the administrator to enter the coordinates of the countries in the database. In the central part of the page is a map. Alternating clicks on the appropriate places on the map are taken coordinates state. JavaScript infection were done that every click on the map records the X and Y coordinates in the corresponding text field, Fig. 16.

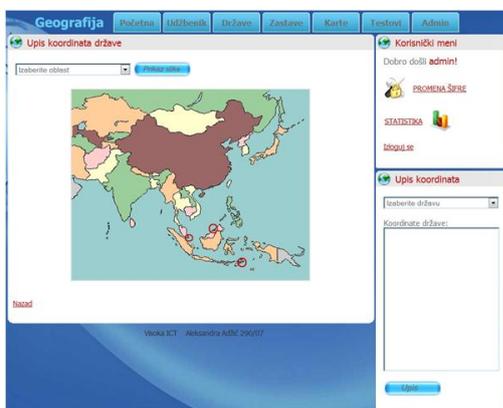


Fig. 16. Insert coordinates of countries on map.

The coordinates are then entered into the database by clicking on the button *Registration*.

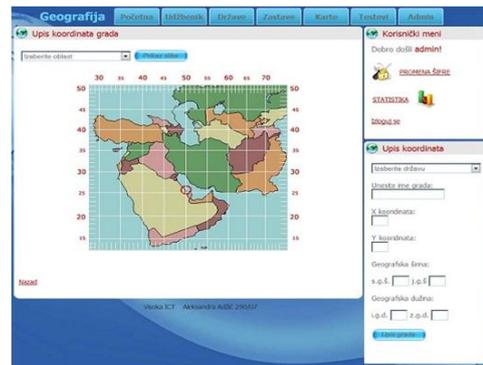


Fig. 17. Entering the coordinates of the city.

The web page for the entry of the coordinates of the city allows you to specify the city entered coordinates. In order to reflect the coordinates of a city on the map, JavaScript infection is done to click on the center position (set latitude and longitude) automatically complete fields for X and Y coordinates.



Fig. 18. Defining the number of questions in the test.

In the application a specifically support is designed that defines a number of questions of the test, the number of groups of questions, the scores for each question and number of questions for each area, Fig. 18.

All data entered by authorized teachers can be modified or deleted at any time, for which there is no special graphics support. In this way, the role of system administrator separated only for the initial installation of the system, and all the rest is allocated to teachers as initiators user of the system.

All these implementation are realized based on cooperative learning in geography teaching [15], in order to archive satisfactions for teachers and students at the same time.

V. CONCLUSION

This paper presents a Web-oriented solution for the needs of on-line learning and testing. The proposed solution specialized for the needs of teaching geography in elementary school, in the fifth grade students. The main motive in the course of this work is to help students overcome individual lessons in an interactive and engaging way. Further work will focus on the implementation and correct in relation to the results to be analyzed during operation.

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