

Software Application for Managing Multidisciplinary and Interdisciplinary Projects as a Part of Educational Process

Zoran Lovrekovic¹, Tomislav Lovrekovic²,

¹ Higher Technical School of Professional Education Novi Sad, Serbia

² Daily Newspaper "Press", Editorial Board, Novi Sad, Serbia

Abstract – To be able to apply all four types of knowledge conversion (socialization, internalization, externalization and combination) during formal education, for the purpose of developing appropriate attitudes, knowledge, skills, intuition, and creativity, it is necessary to have the work of students on real projects. Real projects, however, are never limited by boundaries of a single case. They often cover body of knowledge in various subjects, from different years of study, and even study programs. The real work is also very team, where each team member perform tasks in their domain of expertise. This implies that the project must participate with students of different subjects, majors, years of study and even different schools. To facilitate the coordination of such projects, special software was developed –as Web applications. Application itself provides a classic project management, and collaboration and cooperation of a number of teachers and students that can be spatially distant, as well as basic educational components-monitoring student achievement, their evaluation and self-evaluation, assistance in teamwork, and learning through trial and error method, analysis of the literature, brain-storming and team participation. In this paper, the possibilities of application are presented, a description of its use is given, and the importance and usefulness of the usage of such applications is discussed.

Keywords – Managing educational projects, web application, knowledge management, teamwork.

1. INTRODUCTION

Modern system of study involves learning through work on real projects. By using the concept of Nonaka and Takeuchi on the spiral of creation of new knowledge through socialization, internalization, externalization and combination, it becomes obvious that without the participation in real projects there is no creation of new usable knowledge, and no corresponding development of attitudes, skills and abilities, as well as the development of creativity and intuitiveness are now imperatively required of

university graduates, professionals. The problem is that real projects are never bordered by with just one school subject, but almost always cover the necessary knowledge, skills and attitudes in the area of a number of subjects, from different schools and different years of study [1]. This would mean giving up the self-sufficiency in the case of professors, and turning to real teamwork and a number of professors and students on a particular project. Included would be professors and students from different subjects, years of study and study program, according to the requirements of the project. Each professor would be within its subject a carrier of sub-projects, and students to work in teams, and each of them received the grade in their field work on the project, that is the subject of which was co-opted to the project. To facilitate the management of these, complex real projects that consist of multiple sub-projects, a software application was developed.

2. DATABASE FOR APPLICATION

For the purpose of application relational diagram was developed, as is shown at the Figure 1. As we could see application database consist of 9 tables: Major (Smer), Consist (Sadrzi) with fields idmajor (Sifra smer) and idsubject (Sifra predmeta), then Subject (Predmet), Professor, Project (Projekat), Subproject (Podprojekat), CheckPoints (Kon_tacke), Student_on_Project (Studenti na projektu), and Students (Student). SK on the picture means External Key (Spoljni Kljuc).

Table student with data and name, number Index, which is also the primary key in this table and unique for each student. Table student merge with the table department by inserting in the table student the primary key table department (department code) because it is one to many connection, because student can be registered only in one department and in one department there may be more students enrolled.

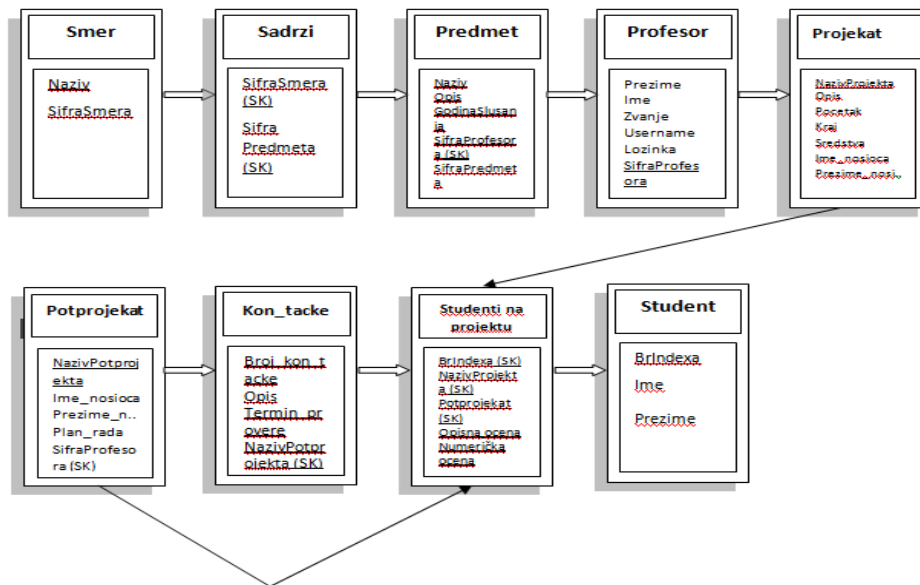


Figure 1. Relational diagram

Table student has its department name and code. Our database has seven different departments. Every department has certain courses which are intended to be attended in the course of that department. Courses can be repeated in several departments, so this connection more to more is connected to the table which will with its outer keys define that the tables that are connected over primary key table department (department code) and primary key table course (course code). Table course with data course name, description (short description which means that the student who attends that course is capable of performing and that the student in that course must know), year of attendance, and its primary key which is course code [2]. Table professor with information regarding the name, last name of professor, title, username and password that is unique to each teacher and that teachers use to access and be able to log in and work on projects. Course code as the primary key table. Table projects with the project name as the data which is in this table the primary key because the projects can not assign identical names, a description of the project (brief description of what this project means that it is and knows), the date of commencement and completion of the project which is envisaged, the means needed for implementation, and the name and surname of the holder and this is one of the professors. In table students on the project table, there is the index number of students, the project name and the name of the action in which Student work, and then their numerical and descriptive ratings that were given to subprojects. In the table sub-project, there are the sub-project name field, name holder, a work plan and code of professor because this table that was associated with a table of teachers to be able to make requests to list of professor who hold these sub-projects. Table kon_tacke, we have fields for the

number of control points, description, date and name checks for which the action is related to the control point. These points are required for teachers to define when to check the activities on their subprojects. Subjects were divided by year of listening and directions, but can be repeated in multiple directions. So, it was allowed to choose the department and years of listening and the database and items that are intended for listening will be selected.

3. PROFILE OF USERS WHO WOULD USE THIS APPLICATION

User profile of this application is divided into two groups, namely:

- Professors, who are ultimately the bearers of projects
- Students, who represent the group of users that access is just as a participants of the project.

According to the division to these categories, the user has access to certain parts of the application:

- Teachers can perform listing of projects and determine their parameters. Then, enter data on personnel working on the project and primary information about their connection with the project.
- Students can view the projects on which they work and thus have access to their progress in the work and research.

4. TECHNOLOGY AND APPLICATION ARCHITECTURE

For making the application, for the most part php is used, which provides the functionality of this application. In many lines of php, it has many functions that allow the operation of this application. On each page a session is started:

```
<?php
session_start();
if (!(($_SESSION['user'] ||
($_SESSION['user']=="gost"))) { header("Location:
index.php"); } ?>
```

Here we check whether someone is logged in order to prevent the user directly typing the address file can access the page without login, or, if registered as a guest, you cannot login to access a site intended for teachers.

```
if(isset($_POST['student'])){
    $_SESSION['user']="gost";
    header("Location:
studenti/PregledProjekata.php"); }
```

This code is checking whether someone is registered as a guest, and then it is automatically sent to a page intended for guests (students). On the page of projects entry, we have a number of text inputs for which it is checked if all fields are filled, and then if so, the data is forwarded to the base, and if not, the user will remain with empty fields until they are full, and when pressed the button again, then it will only be able to write data into the database[3]. If on a page there were more buttons, each variable that we would need for later use or on another button, we keep in the session, e.g..

```
$stud=$_POST['broj_stud'];
$stud = (int)$stud;
$_SESSION['stud']=$stud;
```

On the page subject of the review, projects and subprojects, we used select boxes and radio buttons, which are selected using the data, and on the basis of selected the table provides information requested by the user, and they are printed from the database. At each picking, the selected data are stored, so users do not need to chooses all the same for every subject or project. Example code for the select box:

```
<?php $con=mysql_connect("localhost","root","");
if (!$con){ die ("Ne mogu da se konektujem na
server"); }
$db=mysql_select_db("projectoid",$con);
$query="SELECT smer.Naziv FROM smer";
```

```
$sql=mysql_query($query,$con);
?>
<select name="stud_prog" size="1">
    <option value="">...</option>
    <?php while ($red=mysql_fetch_array($sql)){
?>
    <option value="<?php echo $red['Naziv']; ?>"
    <?php if(isset($_POST['stud_prog']) &&
$_POST['stud_prog'] == $red['Naziv'])
        echo ' selected="selected"';?>>
    <?php echo $red['Naziv']; ?> </option>
    <?php }?>
</select>
```

Example of radio button:

```
<label> <?php
$post = "";
if (isset($_POST['godina']) && 'prva' ==
$_POST['godina']) {
$post = ' checked="checked"';
} ?>
<input type="radio" name="godina" value="prva"
<?php echo $post;?>>
    1 godina studiranja
</label> <br>
<label>
<?php $post2 = "";
if (isset($_POST['godina']) && 'druga' ==
$_POST['godina']) {
$post2 = ' checked="checked"'; }
?>
<input type="radio" name="godina" value="druga"
<?php echo $post2;?>>
    2 godina studiranja
</label> <br>
<label> <?php $post3 = "";
if (isset($_POST['godina']) && 'treca' ==
$_POST['godina']) {
$post3 = ' checked="checked"'; }
?>
<input type="radio" name="godina" value="treca"
<?php echo $post3;?>>
    3 godina studiranja
</label>
```

Example of prints to the table:

```
<?php
if(isset($_POST['prikazi'])){
    $pred=$_POST['predmet'];
    $con=mysql_connect("localhost","root","");
```

```

if (!$con) { die ("Ne mogu da se konektujem
na server"); }
$db=mysql_select_db("projectoid",$con);
$query="SELECT
predmet.Naziv,predmet.Opis,profesor.Ime,prof
esor.Prezime FROM smer INNER JOIN sadrzi
ON (smer.SifraSmera = sadrzi.SifraSmera)
INNER JOIN predmet ON
(sadrzi.SifraPredmeta=predmet.SifraPredmeta)
INNER JOIN profesor ON
(predmet.SifraProfesora=profesor.SifraProfeso
ra)
WHERE predmet.Naziv='$pred' GROUP BY
predmet.Naziv";
$sql=mysql_query($query,$con);
while ($red=mysql_fetch_array($sql)){
echo "<table border='1' width='65%'
align='center'>";
echo "<tr>"; echo "<td
width='30%'>".$red['Naziv']."</td>";
echo "<td
width='30%'>".$red['Opis']."</td>";
echo "<td width='30%'>".$red['Ime']."
".$red['Prezime']." </td>";
}
mysql_close($con); }
?>

```

There is also a page for uploading data. Here registered users are allowed to hang the required documents after or during the project, other users can read detailed information about the project, and after it is done, they can read about how he went, and who did what. Code looks like this:

```

<?php

if(isset($_POST['submit'])){
if (($_FILES["file"]["size"] < 2000000)) {
if ($_FILES["file"]["error"] > 0) {
echo "Greska: " . $_FILES["file"]["error"] . "<br />";
}
else {
echo "Upload-ovano: " . $_FILES["file"]["name"] .
"<br />";
echo "Tip: " . $_FILES["file"]["type"] . "<br />";
echo "Velicina: " . ($_FILES["file"]["size"] / 1024) .
" Kb<br />";
echo "Privremeni fajl: " .
$_FILES["file"]["tmp_name"].
"<br />";
if (file_exists("upload/" . $_FILES["file"]["name"])) {
echo $_FILES["file"]["name"] .
" already exists. "; }
else {

```

```

move_uploaded_file($_FILES["file"]["tmp_name"],
"upload/" . $_FILES["file"]["name"]); echo "Smesteno
u: " . "upload/" . $_FILES["file"]["name"];
} }
}
else {echo "Invalid file"; }
}?>

```

Limitation during uploading is of file size in the form, which must not exceed 2 Mb, which is enough for the documents. If necessary, for some users, this number can be increased. In case of uploading a file which already exists on the server, the upload will not be executed, because of security measures to prevent a user from intentional or accidental copying an existing document. The file names must be called only by the name of the project, the connection to the database, and prints in the table for viewing projects. When Professor uploads file on the screen, he can see the name of the file that is uploaded, type, size, temporary name, and where the file is located. Finally, teachers are able to enter course grades, when the sub-projects and projects are completed, so that students could see have what they did, because with a numerical score, there is also a descriptive rating which will explained why and for what reason the student received the grade he received. The code is organized as follows:

```

<?php

if(isset($_POST['studenti'])){
$projekat=$_SESSION['proj'];
$pot_proj=$_POST['potprojekti'];
$_SESSION['pot_proj']=$pot_proj;
$con=mysql_connect("localhost","root","");
if (!$con) { die ("Ne mogu da se konektujem
na server");
}
$db=mysql_select_db("projectoid",$con);
$query="SELECT
student.Ime,student.Prezime,student.BrIndexa,
studenti_na_projektu.NazivProjekta,studenti_na_proje
ktu.Potprojekat,studenti_na_projektu.Opisna_ocena,st
udenti_na_projektu.Numericka_ocena FROM student
INNER JOIN studenti_na_projektu ON
(student.BrIndexa=studenti_na_projektu.BrIndexa)
WHERE
studenti_na_projektu.NazivProjekta='$projekat' AND
studenti_na_projektu.Potprojekat= '$pot_proj'";
$sql=mysql_query($query,$con);
while ($red=mysql_fetch_array($sql)){
$_SESSION['brind']=$red['BrIndexa'];
echo "<table border='1' width='95%'
align='center'>";
echo "<tr>";
echo "<td width='10%'>".$red['Ime']."</td>";

```

```

echo "<td
width='10%'>".$red['Prezime']."</td>";
echo "<td
width='10%'>".$red['BrIndexa']."</td>";
echo "<td width='20%' align='left'><textarea
rows='3' cols='20'
name='opis_ocena'></textarea></td>";
echo "<td width='20%' align='left'><input
type='text' name='num_ocena' size='10'
maxlength='2'></td>";
echo "</tr>"; }mysql_close($con);
}
if(isset($_POST['unos'])){
$projekat=$_SESSION['proj'];
$pot_proj=$_SESSION['pot_proj'];
$brind=$_SESSION['brind'];
$opis=$_POST['opis_ocena'];
$num=$_POST['num_ocena'];
if((!$opis) || (!$num)){ echo "Niste uneli sve
potrebne podatke."; }
else {
$query2="UPDATE studenti_na_projektu SET
Opisna_ocena='$opis',Numericka_ocena='$nu
m' WHERE BrIndexa='$brind' AND
Potprojekat='$pot_proj' AND
NazivProjekta='$projekat'";
mysql_query($query2);
header("Location: uspesno3.php");
}
}
?>

```

Professor selects first project to which its sub-project is related, and then, based on that, he can fill in the appropriate grade for the listed students. So, due to security measures, teachers are prevented from enrolling, by any chance, for projects where ratings are not carriers, therefore, each user can only enroll grades to students with their projects, which is quite logical, because it is always better to prevent than cure.

5. APPLICATION USAGE

While loading the very application, the user can use a login form, which depending on your user profile meets and starts an application in a particular environment. As the home page there appears page for data entry on the projects (Figure 2):

Figure 2. Application Login Form

On this page, the user is able to manipulate information on the project in one form and another form of subprojects. For the project, he can enter the project name, name of teacher who he is implementing the project and anticipated start and completion of the project, specified funds set aside for the project, and describe it in brief or more extensive thesis. By pressing the button *Make project*, all unite information from the forms are forwarded to the base project and there placed in the table for him. In the second form the user is able to manipulate information for sub-projects, such as: project name for which he is attached, the name of the action, name of the developer, the number of students who work on the project and their data, the number of control points and work plan [4]. By pressing the buttons in the form, the data is sent directly to the base, the table-related sub-projects. When choosing a site for review of cases (Figure 3), the user has the ability to inspect the base and, through a selection of certain items from it, pull out a list of students who study a particular year and the program, listen to some subjects, in order to have access to the preferences of students whom he wants to employ on a desired project.



Figure 3. Review of Cases

On the very page, the user selects from the drop-down menu program of study, year of study, and by the choice narrows down the list and, in the end, he may be obtain a review of students categorized according to the desired criteria. Then, on the next page, the user has the ability to examine all desired projects that were entered into the database, and also the students that are responsible for them. (Figure 4).



Figure 4. Projects

In selecting projects from the database, the user can get full access to them and to examine students and personnel responsible for the desired project. It is necessary to choose from drop-down list the desired project from the database and table data will be listed on it. The list in the second row, may request a view of students who are responsible for working on selected projects. As on the previous page, the user on the next page on the same principle as on the previous page has a choice of sub-projects and an overview of students who are in charge of work. (Figure 5) :

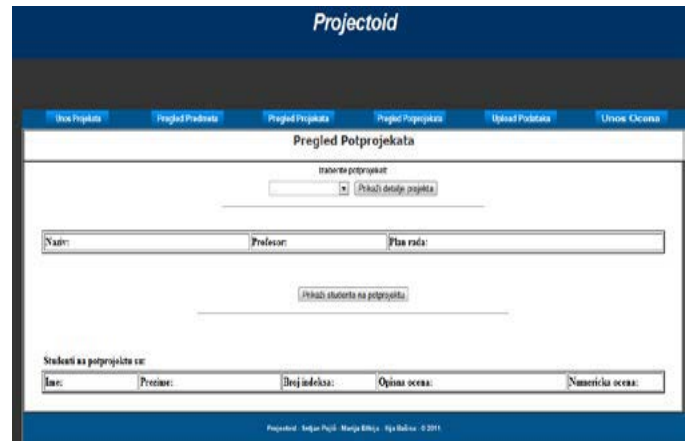


Figure 5. Subprojects

Optional sub-projects from the database, the user can get full access to them and examine students and personnel responsible for desired subproject. It is necessary that the drop-down list select the desired sub-project from the database and table data will be listed on it. The list in the second row, may request a display of students in charge of the work on the selected subproject. On the next page, data upload up to 2MB is provided, which is very tolerant and satisfactory for text documents (Figure 6) and if necessary, this limit may change.

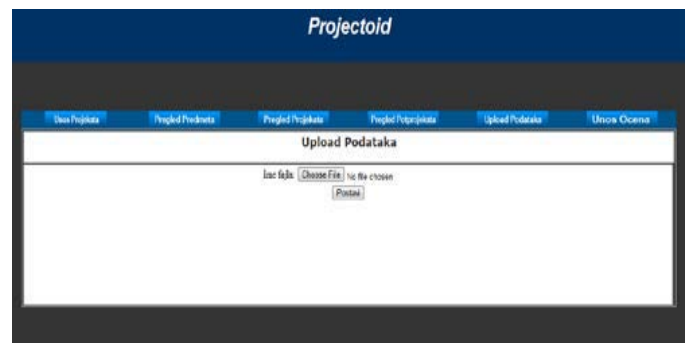


Figure 6. Data Upload

Upload form is very simple to use and consists of a button to select the desired file to upload, and buttons for forwarding to the server. The name of the file which is uploaded must be identical to the name of the project, to be able to connect to the database, and later to review the documentation related to a specific project [5]. On the last page of the application, the user can enter numeric or descriptive marks to students for a specific project, for which students are categorized (Figure 7) :

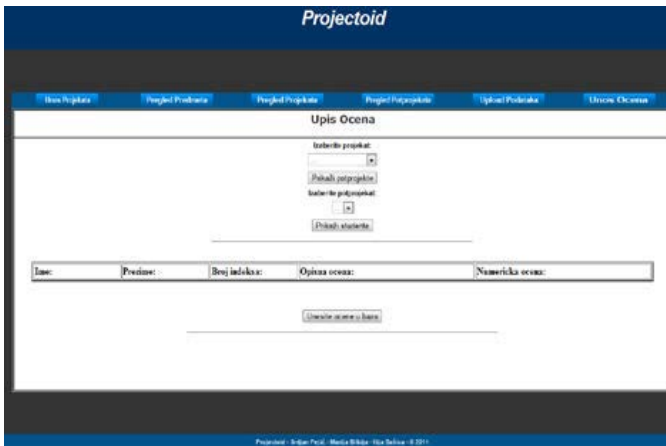


Figure 7. Numeric or Descriptive Marks

After choosing the desired project from the drop-down list, the user has access to students and their numbers in the table on the project, and if desired, and by matching search criteria, he can enter grades for students, descriptive and numeric types, and by pressing the button below the table, information about evaluation are stored in the database.

6. CONCLUSION

During the very login option, applications seamlessly classify user profiles and for each one organizes an interface intended to work in the application. Selection menu is fully functional and provides the user with a clear and quick selection of desired parts of the application and quick interaction between the sites, which is satisfactory and better than the main menu or in the form of drop-down list. Data entry in all forms is functional and accurate. Connection between the base and the script is flawless, as every route and flow of data from the base to the application has been repeatedly tested. Data is protected with profiled user choice and advantage of this is safety that is at a high level. Working with the application choice for consumers is made easier because of the additional explanations of each field and buttons that provides safe operation to the user with no errors and each step can be restored to its previous state, so data corruption is thus avoided. Print lists and tables are legible and organized to provide a clear view of desired data. During the development of the application, all members of the creation team have improved their knowledge of HTML, PHP, CSS, SQL area. By using JavaScript to the PHP code to an application might look more dynamic, because it allows the creation and completion of certain text inputs, select boxes, etc. without clicking a button. Projectoid is designed and implemented for the purpose, it serves perfectly and its use is very comfortable and easy to master. It is functional in every aspect that makes and provides comfort when working with it. Technology used in making the application provides maximum compatibility and

flawless operation. The main application code has been carefully designed and built so as not to burden the system when running certain functions and operations.

Modern system of study involves learning through work on real projects. By using the concept of Nonaka and Takeuchi about the spiral of creation of new knowledge through socialization, internalization, externalization and combination, it becomes obvious that without the participation of unreal world projects there is no creation of new usable knowledge, and no corresponding development of attitudes, skills and abilities, as well as the development of creativity and intuitiveness of are now imperatively required of university graduates, professionals. The problem is that real projects are never blundered, with just one school subject, but almost always cover the necessary knowledge, skills and attitudes in the area of a number of subjects, from different schools and different years of study. This means giving up self-sufficiency to case of professor, and turning to real teamwork and a number of professor and students to a particular project. Included are professors and students from different subjects, years of study and study program, according to the requirements of the project. Each teacher within their subject is sub-carrier, and students work in teams, each of which receives evaluation from their domain of work on the project or the subject from which to project is co-opted. Without applications like Projectoid, you cannot manage these, complex real-world projects that consist of multiple sub-projects, and thus no proper education in the era of knowledge.

REFERENCES:

- [1]. Nonaka, I., Takeuchi, H., "The Knowledge-Creating Company", Oxford University Press, New York, 1995.
- [2]. Lovreković, Z., "What is the purpose of the Knowledge Management?", Proceedings, 2. Scientific Conference "On the Road to the Knowledge Age", Valdanos, Montenegro, 2004.
- [3]. Gerber, M., "The E-Myth Revisited, Why Most Small Business Don't Work and What to Do About It, Hrper Harper Business, NY, 2001.
- [4]. O'Toole, J., "How Business Schools Lost Their Way", Harvard Business Review, May 2005.
- [5]. Lovreković, Z., "Internet programming", NGO "Knowledge Management Initiatives", Kač, Serbia, 2009.

Corresponding author: Zoran Lovreković
Institution: Higher Technical School of Professional Education, Novi Sad, Serbia
E-mail: lovrekovic@vtsns.edu.rs