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TABLE OF CONTENTS

School web portal as a means of parent-teacher communication

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***Abstract*— The article presents preliminary results of a project concerned with designing a specific web portal, including its verification in practice. The portal is designed for the purposes of mutual communication between the teacher and the pupil's parent and for the information search. Based on the analysis of user requirements, appropriate portal functionalities have been selected and incorporated. These include, inter alia, simplicity, reliability, quality and speed. A feasibly designed and practically commissioned portal has proved to bring an expected increase in communication efficiency. The paper also outlines possibilities of introducing new features to increase the efficiency of the portal intended for the parent-teacher communication. As the next step in designing the web portal solution, an extension of the system is expected to include new users of the pupil rank.**

I. Introduction

The web portal is a website or a service through which both the parent and the teacher can access a wide range of information resources. The web portal may also be called a gateway that configures the access to information on the Internet. It is communication that plays an important role in such a system. We have assumed that there are numerous communication-supporting systems available in practice. On the other hand, there are also systems that have not settled the issue of an interactive communication, or that have not requested it, yet. The main problem, whose solution we are presenting here, was the communication on the part of the parent and the teacher. The emphasis has been put on the interactive communication. The concept of interactive communication is understood as such communication that offers immediate feedback from the other party. This type of web portals already exists. An example may be the Edupage portal. It enables the communication of its users via e-mail messages. However, we consider this mode only as a non-interactive way of communication. Communication-focused web portals are required to ensure that the communication should be sufficiently secured and that the access mode should be both fast and user-friendly. The key features on which we are going to rely will be mainly the reliability, speed and quality of the web portal. In our solution, we will focus on a more detailed elaboration of the problem of creating a web portal for the parent-teacher communication. The web portal will serve as the basis of that communication. One of the technical tasks aimed at in our solution has also been to verify the possibility of using the API technology. In addition, we have also focused on seeking opportunities of further gradual improvement of the portal.

II. Literature Review

Prior to the commencement of the work on the project itself, concerned with the creation of a specific web portal, we examined a number of procedures, instructions and recommendations.

The instructions and procedures designed to create websites may be found in numerous publications, such as [1,4,7,10,13,19].

According to Al Zabir in [1], the web portal is a website enabling the user to tailor it so as to be also able to place various widgets thereon. The safe environment, search and directory services, community and relations building, these are some of the advantages of the web portal, as highlighted [2]. They argue that even though there is no definite division of the existing portals, there is a small group of portals designed for the commercial environment. This group mainly includes general portals, vertical industrial portals, social portals, personal portals and information portals.

It will be important to get familiar with the differences between the respective portals, to examine their properties, to assess their efficiency, and to choose from their functionalities that may be most suitable for our project.

From a preliminary point of view, Dostál in [4] argues that it is not only about the web presentation, but also about transforming the web into a server and managing that web server. Such a website or web portal may become the basis for distance learning. Keith et al. (1993) published a report on distance learning considering it a tool to improve especially a teacher-pupil interaction. In the context of creating a web portal, before the implementation itself, it is particularly important to analyze the existing portals that are similar to it. According to Chromý in [7] it is necessary to determine a clear goal of the analysis that will consist of the four basic questions (What? For whom? Where? How?). He argues that the question "What?" means what content will be presented, the question "For whom?" indicates the target group of users, the question "Where?" highlights the social structure on the asset side, and the question "How?" hints on the way I am going to impact the target group.

Web portals that are used for communication are now a commonplace in various firms or organizations. For example, Facebook as one of the most famous, is used in domains ranging from communication between friends to such areas as marketing [3]. According to

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Tatnall [19], current web portals represent a considerable range of functions, complexity of structure and a number of services provided. I create such a domain for some purpose and depending on a particular purpose I have an option to choose the type of the web portal. If the web portal meets a particular purpose, it will certainly bring about some benefits.

Townsend et al. in [20] mention some of the benefits that such a portal may bring. These may include, for example, a better access to information, removing barriers for applications, and/or creating order in the data chaos. This approach supports the reuse of information, reduces time and training costs, improves access to information, cultivates better relationships with customers, and has many other benefits.

In addition to the benefits offered by the web portal, it is also advisable to incorporate various technologies. One of them is especially the WEB API [5,10,13,15].

According to Kanjilal in [10], the web is an api-light web architecture that can be used to create web services and use these services with an http protocol. He argues that the web api technology is not complicated and every person should be able to understand its documentation. Similarly, Richardson et al. in [15] argue that the web APIs often have human-readable documentation that explains how to construct URL addresses for all of the different sources. According to Freeman in [5], the web API is one of the basic technologies for creating web applications. Jin et al. in [9] argue that the API interface has resulted from the need to exchange information with data providers who are equipped with tools to solve specific problems, so that people in other companies would not have to spend time solving such problems by themselves.

These resources have inspired us to use the WEB API technologies effectively in creating the web portal that forms the core of our project.

III. METHODOLOGY

This project has been aimed to design a solution for an interactive communication between the teacher and the parent. Making the communication more efficient plays an important role in any web portal. Within the process of creation of the web portal, the designing process has been the most important as it has been composed of the four basic parts: planning, creation of architecture, development and testing. The basic procedure concerning the research procedure is shown in Figure 1.

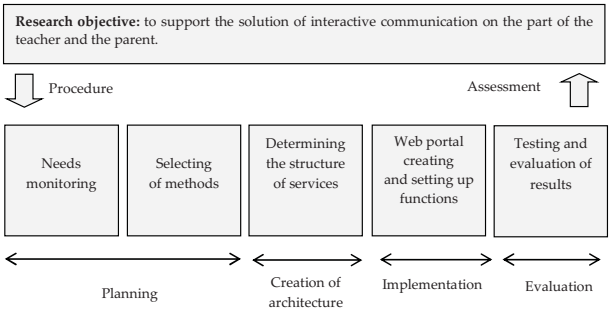

Figure 1 Project procedure. Source: own processing

Within the planning part, we specified the objective, set out individual partial milestones and outlined an approximate structure and layout of components on the web portal.

When creating the architecture and assembling the actual portal itself, our assumption has been to rely on such technologies as Html, CSS, Bootstrap, PHP and WEB APIs. By means of these technologies, we have ensured that the web portal should have an ad-equate design and graphics, response reaction, connection with the database and the possibility of using native web applications to communicate information from one specific source.

Initially, the approach selected in creating the portal has included two main tasks:

1. To create a Landing Site, or, in other words, an introductory site to be visible for each user. The purpose of such a site should be to attract potential users of the web portal.
2. To create a specific application interface to visualize for the user after logging in. This second part of the portal has already been generated based on the parameters of the logged-in user. In this part there will be used an interactive communication.

The resulting solution has been designed so as to make the web portal a common place for multiple users, who will vary based on the role they have in the system.

IV. RESULTS

The main result of the project is the creation of a simple web portal which will serve for the parent-teacher communication and monitoring or controlling the pupil's activity at school. We have divided the web portal into two major parts. The first part is the so-called Landing Site. This part of the portal is visible for every user even without being registered in the system. The web portal is currently available in the Slovak version at www.rukontrola.sk (Figure 1).

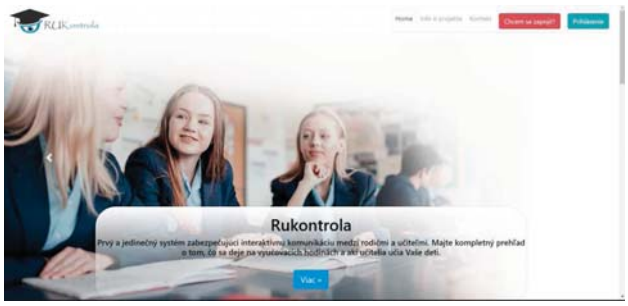

Figure 2 Landing Site of the web portal. Source: own processing

On the Landing Site, the user has the option to view several sub-sites. The first sub-site called "Home" briefly presents the system, the purpose it is designed for, and especially what advantages it offers.

The second sub-site entitled 'Project Information' provides a detailed description of the information concerning the goal of the project. This section describes, in detail, the goal of the project, user groups, and web portal security. On the third sub-site called

"Contact", the user will find all the necessary contact information. In particular, who is the contact person, where s/he is based, how, where and when s/he can be reached. In this project the responsible person is the system administrator at the same time. The fourth sub-site, labelled as "I Wish to Join", serves to register users, especially individual schools, teachers and parents. The fifth sub-site is called "Login" and it serves for the loggingin of the registered user.

If a specific user or school is interested in the project, they can sign up at the fourth sub-site listed above, designated as “I Wish to Join”. This sub-site offers the candidate (parent or teacher) a simple form in which he/she fills in such information as School Name, School Code, School Type, Region and City. After completing the required registration details, the form will be dispatched by the Send button. This information will be delivered to the administrator who will then consider if it is relevant or if the particular school intending to use the portal actually exists.

If the school exists and the information about it is relevant, the system administrator will contact the responsible person who will register with the system. Subsequently, the system administrator will send to the individual candidate, or the contact person for the given school, the login details enabling to log in the system. At the same time, the contact person for the given school becomes a secondary administrator for that particular school.

The secondary administrator (the contact person for the given school) may register other users with the system, especially teachers and parents of pupils of that school. At every school that is registered in the system, there must be at least one responsible contact person – the secondary administrator. The system administrator or secondary administrator at the school will always generate a username and a user password for a specific new user. The Name parameter is fixed and cannot be changed by the user. The second parameter Password can be changed by the user after registration.

The user always enters the system via the fifth sub-site called Login using the Name and Password parameters. After logging in, the user leaves the Landing Site interface designed for all users and enters the system of "Admin Panel" through their specific user profile. In the introduction to the system, the user is offered an opportunity to read a tutorial that will facilitate his/her orientation in the system.

The structure of the web portal consists of three parts. Menu, main window and notification palette. The menu contains the basic navigation components of the portal. The menu contains such items as user profile, main site, users, requests, live stream, chat, user addition and logoff.

In the main window, the user can track various events and functions depending on the item they have selected from the navigation menu. Users may watch news on the main site, search for particular persons in the user section, watch online lessons on the live stream, and chat with various users of the web portal in the chat.

In the notification palette, the user will find a link to the home site as well as a link to the Project Information. In addition, there is also a notification of the arrival of a message and a notification of a change of event on the message board.

Four user groups may be logged in on the web portal. The master administrator, secondary administrator, teacher and parent. The menu is different for each user because each user has different authorizations in the system.

The teacher menu contains such items as user profile, main site, users, list of pupils, live stream, chat, add pupil and logoff. The parent menu contains such items as user profile, main site, users, list of pupils, live stream, chat, and logoff. The master administrator menu contains all of the basic items on offer, such as profile, main site, requests, live stream, chat, add user and logoff. The menu of secondary administrator for a particular school contains such items as user profile, main site, users, requests, live stream, chat, add user and logoff.

The main window displays the contents of the menu items for all four types of the web portal users. Each of these items is bound to the main web portal window especially since the contents of the menu items are displayed right in the main window.

The third part of the portal structure is the notification panel. According to Šerý in [17], the notification is the information displayed for the user at the moment when it is relevant and important for them. It notifies the user of the arrival of the message or the change of the event on the message board in the real time, e.g. when a new event occurs in the profile or when a message from another user has arrived.

The first menu item is a specific user profile. The user profile contains the basic information about a specific user, such as first name, surname, email, and so on.

In addition, the basic display also includes a timeline in which the user is shown various events. The basic events include, in particular, the arrival of a message or the addition of a user. Beside the timeline, the user also has settings available where they can change various parameters of their profile. The basic parameters that can be changed include name, title, and access password. Additionally, the settings sub-site allows to generate an API key (Application Programming Interface) for later use.

Another option, which is located in the menu on the left side and which the user has in the admin role are users. In this section, the user will find every person registered in the system.

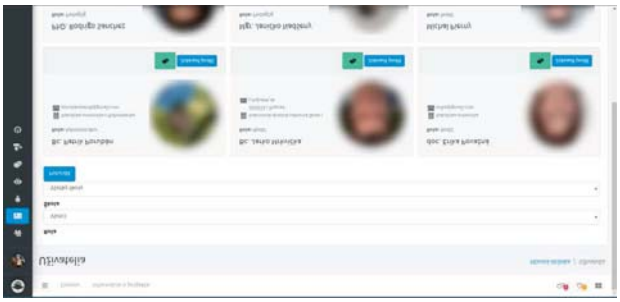

Figure 3 Web Portal Users. Source: own processing

Another option from the left menu of the main administrator are the so called Requests. If a particular school is interested in registering in the communication system and monitoring portal, it should fill in the form located at the Landing Site and all of these data will be received by the administrator in the Requests section.
The innovative portal options offering a very high system interactivity to all types of users, are, in particular, live stream and chat features.
The live stream on the web portal allows parents to watch a live broadcast from the pupil's lesson. The camera only takes up the view of the teacher and the whiteboard. The pupils' faces are not visible. The parent´s own child – the pupil can only be identified by the parent by looking from the back of the class (Figure 4).

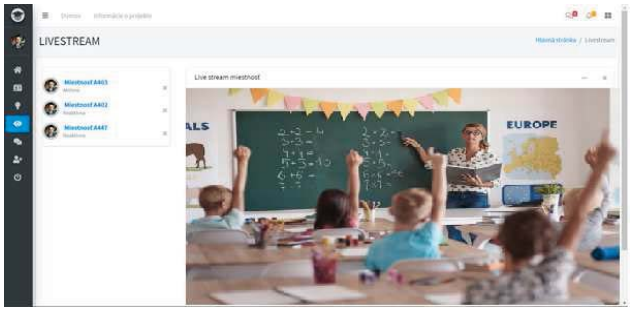

Figure 4 Live stream of the web portal – main window. Source: own processing

The Live Stream section offers two options. One window showing the rooms where the Live Stream is taking place and the other window with a specific Live Stream display.
For specific users (parents and teachers) at a given school, only rooms related to their school appear in the Live Stream section. A parent from another school or a teacher cannot see a Live Stream from the room that is not located in their school. Only the system's master administrator has an exception as their duty is to check the quality of the Live Stream from all schools.
The main Live Stream window is solved by mirroring from various services that support the live stream. The easiest way is to use the Youtube domain and use the link to share the live stream broadcast. The access to other users would only be allowed on the domain of the portal created rather than on the Youtube domain.
The Live Stream is intended primarily for the parents who want to keep track of the way and content of the instruction process taking place at a given school, as well as of their child's activity. This way the parent can perceive the role of the pupil better and can clearly identify also the teacher's instruction style and the content of the curriculum.
The shooting of the Live Stream window is primarily focused on the teacher and the whiteboard. For this reason, prior to using the system, each teacher must undersign the GDPR (The General Data Protection Regulation). By undersigning such a document, the teacher grants consent to their being shot during their lessons.
This option may be used for theoretical subjects but it is especially useful with the practical subjects where the parents can see how experiments are going in chemistry, biology and so on. The concrete Live Stream broadcasts will be archived. If necessary, the teacher can look again at what was broadcast a year ago.
Another major feature of the portal is the possibility of using an interactive communication via Chat. The structure of the Chat is similar to that of the Live Stream. The subsite consists of two windows. The left window where the headers of particular users are located and the right window in which the Chat itself is placed.
In the Chat section, the teacher of one school will see only his own colleagues, plus the master portal administrators. The right-hand window of the portal shows a specific chat with one person. The chat headers show the Title, First Name and Surname of the user, as well as the school where the user operates. On the right there are the basic data, such as the date and time of the received or sent message.
Adding a new user to the system is a privilege of the administrator. The master administrator can add a parent, teacher, or another system administrator. The newly added user will acquire all the privileges that pertain to them.
A concrete class of the school and pupils may be added to the system also by the teachers of that school registered with the portal.
The form for the registration with the portal contains, first and foremost, the feature of selection of the user role. The basic selection options are marked as New User in the parent role, New User in the teacher role, or New User in the secondary administrator role. Only when the role has been selected, other standard information will follow.
The last option from the left menu is to log off the user. The user logs off from the Admin Panel mode and is transferred to the Landing Site's basic environment.

V. DISCUSSION

The project analysed and verified some of the possibilities of creating a web portal for the purposes of communication between the teacher, parent and pupil, and their informing each other. In the second part of the project the concept was built and the specific functional application of the portal was implemented.

The use of the selected methods, procedures, and solutions has proved effective. The results indicate that the teachers and the pupils´ parents have been afforded an effective tool for effective communication and information search.

To this date, the experience gained from the testing and commissioning operation of the portal have proved its functioning, efficiency of its management and its user-friendliness. The condition as has been found herein is a good starting point for making the full use of the portal's capabilities.

Our solution has already been navigated by the analysis of the existing portals and the requirements worded by the parents and teachers. We have managed to address potential users of the portal in 100 schools located in various districts in Slovakia. As a matter of priority, we have been concerned with finding how satisfied they are with the web portal used at their particular school and what their requirements for further improvement are. The second inspiring group of respondents that we have addressed have been advanced computer science students. These students are already teachers who increase their qualifications, but at the same time they are also parents of their children.

The demands of users (respondents) have directed our attention to the three main issues. We have incorporated the above feedback in the project as follows:

1. Archiving information and study materials – we have used the storage technologies through the Youtube website, where particular lessons will be streamed. Via such a privately shared link, the parent and the teacher will always be able to view the lesson repeatedly.
2. Interactive communication - in the portal environment this has been solved by combining the html and css technology. Procházka in [14] supported our solution by claiming that the html technology will suffice for running any browser. With this technology, we have ensured the compatibility with other browsers as well as inclusion of the interactive chat functionality. Even in our solution an online chat means the real-time communication by means of text messaging via the Internet interface, as also defined by Janouch [8].
3. Issues of compatibility with devices - especially with laptop, tablet and smartphone. Our solution is based on the bootstrap technology. This technology is able to recognize a display of the terminal device and based on that it will distribute the individual components of the web portal. We have accepted the recommendation of Spurlock (2013) to use the bootstrap front end framework for building responsive sites. If the Web portal is responsive, it offers the same capabilities and features for all of the devices mentioned above.

We have also addressed the problems related to a mobile app. The web portal operates on a mobile device based on a link to a web site. Within such a link we have ensured the full functionality and responsiveness of the portal. The data and information are consistent across the various devices. The interactivity works the same way at the different devices. In this respect we have also been supported by Štec [18] who claimed that the interactivity is one of the most frequent specialist terms used in the area of "new media", or post-media.

The web portal designed primarily for the parents of pupils brings advantages that are crucial from a point of view of the parent-teacher communication. The emphasis has been placed on improving the teacher-parent interaction. It is for these reasons that we have included, in particular, two interactive components in the web portal. The first is Chat and the second is Live Stream.

In order to advance the functionality of the created portal, as the next step we intend to add the following functions:

1. Expand the portal by the user in the role of pupil.
2. Include additional functions.
3. Connect the portal to some cloud storage facility.

The first option envisaged is to expand the portal by the function of a user in the role of pupil. Thus, in addition to the teachers and parents, it will also be pupils who could access the portal. The pupil would be able to perform simple tasks in the system and have an access to a simple overview of their grades and evaluation.

The second option envisaged is to extend the portal by additional functions, such as schedule, dining room, online payments and the like.

Alternatively, it may also be a facilitation of the connection of the portal to the existing features. The inter-connection could be possible through the WEB API which is included in this web portal. Thanks to the WEB API, as also argued by Pillár (2017), it is enough for the user to have a native application on their mobile or a native site through which they would inter-connect the data transmitted.

The third expanding option is to connect the portal to some cloud storage facility. The cloud-based solution as a combination of component and service is also recommended. This inter-connection would make sense as a part of archiving the live streams that took place on the web portal. Teachers would be able to look back at their lectures and consider how to improve their instruction. The efficiency of the solution will also be increased by adding the pupil-users to the system. Archived lectures would certainly contribute to the increased quality of the learning process on the part of the pupil.

We have also included the function of user assistance in our solution. In case of a problem that the user is unable to handle, the portal administrator can offer an online assistance by means of a stream or another technology. Another option is to provide training to the staff of a particular school concerning the use of the portal functionalities. Obviously, the training may be suitable not only for the teachers but also for the

parents. We therefore intend to offer the opportunity to attend the above training also to the parents.

VI. Conclusions

The presented project has been aimed to design and develop a web portal intended for communication and exchange of information between the pupil's parent and the school or a particular teacher. The presented solution makes use of the capabilities of the current web technologies, especially html, css, web api and php.

The web portal developed offers its users the following functionalities:

- interactive parent-teacher and parent-parent communication,
- ensuring an equal access for terminals - desktop, laptop, tablet and smartphone,
- online monitoring of the instruction process of your own child – pupil,
- as well as other services.

In the future, we expect improving (supplementing) the portal's features with a full-fledged mobile application, extending users by the student role and adding a possibility of inter-connecting it with such existing systems as Edupage or AIS. The intended new improvements could bring more traffic to the web portal due to the accessibility of the portal also to the students. A full-fledged mobile application would allow of using the portal on various devices (Smartphone, tablet, laptop, desktop). In addition, connecting it to another system would upgrade the system functionality.

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