Computer Systems That Assists the Interactive Lectures

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Abstract — The paper presents the computer system that facilitates the contact with the pupil in the classroom at school, activates the work of the pupil in the classroom and gives a more thorough check of the progress of each pupil. The assumptions, functional and non-functional requirements for the system are presented, as well as the implementation details and the discussion of the possibility of system deployment in school.

Keywords: Computer system to conduct lessons, automatic checking of knowledge, activation of the student's learning.

I. Introduction

Multimedia learning tools such as projectors and interactive whiteboards for some time appeared in the schools. Interactive whiteboards allow you to touch the displayed images and to check a pupil's skills in a more pleasant way through play. Projectors are present in the classrooms allowing the teachers to avoid rewriting the same information on the board many times. Changing world, however, leads to the fact that such tools are not enough. Teaching is no longer only taking of notes of the information provided by the teacher.

An innovative solution is the use, for educational purposes, the mobile devices such as a tablet or smartphone, which cease to be luxury goods, and increasingly present in our homes. Currently used tools can be complemented with proposed solution in order to stimulate the students' work in the classroom.

There are both free and proprietary applications available on the market for the preparation and conduction of tests for checking the knowledge in any field. An example is the eTest [1], which is a program for carrying out such tests. This program allows you to shorten the time that should be devoted to the preparation and conduction of the standardized tests, and these tests can consist of any number of questions. The application allows you to share and use tests developed by other teachers. It is possible also to check the answers to the mistakenly answered questions.

There is also e-Tablica module for the e-Dziennik application [2] that allows digital recording and sharing of the lessons from the interactive whiteboard screens. This module stores all entered content and makes it available to the chosen pupils. With this solution, all pupils have the same notes, even if they were not present in the classroom, and pupils do not need to rewrite the contents from the interactive whiteboard, but can reflect on the discussed issue. This module is a web service and for the proper functioning requires Internet access. It also requires to purchase a license.

Application stores for the mobile devices have many applications on offer that can be used to better organize the time by student homework tracking, to-do lists creation and lecture timetable elaboration. There are also applications for solving tests that allow mind training. Usually the set of available questions is limited to those prepared by its creator. An example is the Testy Edukacyjne - TEEDU [3] which includes the educational games, learning mode, test mode, stored results and game statistics. Unfortunately, the application is available to a small amount of subjects and the results are stored locally on the device.

Actually it is noted the lack of the complete solutions that would adequately organize the work in the classroom and after. The available applications for the mobile devices are built mainly with the aim of individual learning, and not for the use in the classroom.
where their main objective is to organize and coordinate the activities of a larger group of participants. They apply more locally so that are not capable of verification by third parties. Systems with more functionality in the context of teaching are proprietary. Usually they allow to save notes from lessons in digital form. The most useful tools for conducting interactive lessons are expensive, so access to them is limited only to the high budget schools that leads to the digital backwardness of the poorer schools. The available systems are characterized by a lack of integration of different modules that does not lead to the deployment cost reduction.

The paper presents a system that allows not only to share teaching materials and checking knowledge using mobile devices but also allows for the conducting classes interactively, for the automatic verification of the pupil's degree of mastery and for the automatic statistics collection on each pupil. The system contributes primarily to activation of the students in the classroom and at the same time to test the knowledge of all pupils at the same time, which is unlikely under normal conditions.

The system is developed using public free tools and technologies, and is inexpensive to implement and maintain. For the proper functioning of the system it is sufficient to possess the desktop computer with LAN access, an inexpensive Wi-Fi router and the mobile devices such as smartphones and tablets running Android operating system. The solution aims to facilitate contact with the student in the classroom and give the opportunity for more accurately checking of the each pupil progress.

Using the system pupils will be able to browse the teaching materials provided by the teacher directly from the mobile application and to solve the exams in the form of e-learning. The system also gives the opportunity to answer questions asked by the teacher during the lesson and the teacher will have the opportunity to review the progress of the pupils during the lesson and after its completion.

II. DESCRIPTION OF THE SYSTEM

The system is created in the client-server architecture using MVC design pattern and consists of three modules: the server module, the module running on the desktop computer, and the module running on any operating system installed on it and the module running on the mobile devices such as smarthone or a tablet with Android system installed on it (Android system version 3.0 Jelly Bean or later). The server module and the module running on the desktop computer are connected using any LAN technology. The modules running on the mobile devices are connected to the rest of the system using Wi-Fi.

Server module is implemented in PHP 5.4.7 [4] using NetBeans 7.2 IDE [5] and CodeIgniter framework [6]. The Apache HTTP Server 2.4.3 [7] is used as well as MySQL database version 5.5.27 [8]. Using the data stored in the database a server module prepares the teaching materials of each lesson, generates questions for the particular lesson and prepares the whole exams. It also allows to automatically check the pupils answers during the lessons, to evaluate the examinations answers and to produce the statistics for individual students.

A module running on the desktop computer is implemented as the web application using PHP. To run this module a web browser is needed. The module can run in the administrator mode, the teacher and the student mode. In the administrator mode, the module allows to manage user accounts. The teacher mode allows to create new courses taught in school, to add lessons to the particular course, to add teaching materials and questions for each lesson, to set the password to the particular lesson and to create tests and examinations for each course. The student mode allows to view the teaching materials for the individual lessons, answering questions during a lesson, solving the tests and examinations and view the statistics for the selected pupil. The server module and the desktop computer module can run on the same computer.

The mobile module is created using Eclipse Juno 4.2 IDE [9] and Android Development Toolkit [10]. It works only in the student mode.

III. CONCLUSIONS

System testing results showed that the process of verification of the pupil's degree of mastery has accelerated and the teacher can follow on a regular basis who is better and who is worse in coping with the assimilation of lesson material. The process of solving exams in electronic form allows to address them in a convenient way using smartphone or tablet screen.

Operation of the system reveals a high deployment potential of the software and the modular design allows for easy software development and modification. The system can greatly facilitate the checking of the knowledge of all pupils that are present in the classroom.

A survey conducted among the teachers that tested the software showed a high usability of the system and that the system contributed to the significant improvement in the activation of pupils during the lessons.