Hands-on Science

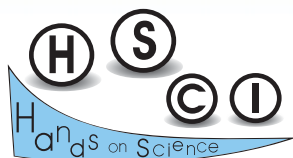## Innovative Education in Science and Technology

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The Hand-on Science Network

Hands-on Science
Innovative Education in Science and Technology

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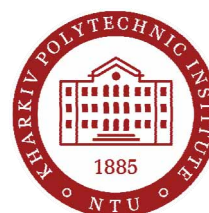Manuel Filipe Pereira da Cunha Martins Costa, University of Minho, Portugal

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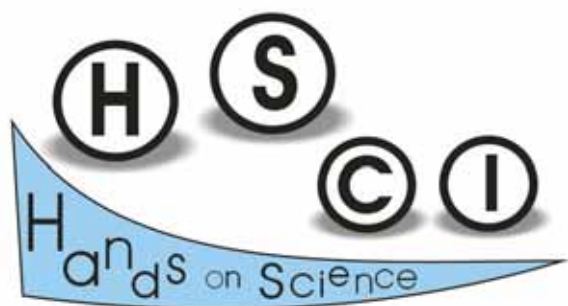

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FOREWORD

CONTENTS

The Experience of Using the Moodle LMS Scheduler Plugin to Control the Appointment Management

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Abstract. The use of open-source software applications has become an important tool to support modern approaches in medical education. The experience gained during the implementation of the Moodle, an open-source Learning Management System, at Horbachevsky State Medical University in Ternopil (TSMU) is presented regarding some aspects of a teaching process in medical education. A Moodle-based system enabling students' self-appointment to complete missed classes is proposed. This system is implemented through integrating the Scheduler plugin. The experience of developing, using and supporting this system at the TSMU is described. Also an example of how the version control system was applied to manage the processes of open-source software adaptation and support is shown.

Keywords. Distance Education System, Learning Management System, LMS Moodle, Medical Education, Open-Source Software, Scheduler Plugin, Software Development, Version Control System.

1. Introduction

There is a great importance of application of information technology in the healthcare system and medical education now. The field of medical education should provide training for specialists who can effectively use the capabilities of modern medical information systems. To achieve this goal, modern learning tools and technologies must be used in higher medical education. [1]. Conceptual approaches to introduce modern information technologies in medical education have included application of Learning Management information Systems (LMS) which also often provide services of distance education too - as well as learning material management systems (LMMS or LCMS - learning content management systems).

2. The use of LMS Moodle in the educational process at Ternopil State Medical University

The leading position among free and open source LMS/LMMS/LCMS software for years has been taken by open source LMS Moodle (https://moodle.org/). TSMU has been using this LMS in the educational process since 2006. At the beginning, LMS Moodle was used only to implement test assessment of students' self-training results before classes in the teaching process at TSMU. It was a small part of integrating the credit-module system into the academic process at TSMU.

The methods and approaches of the LMS Moodle application within the TSMU academic process has improved significantly until today [2-4]. Educational capabilities of the LMS Moodle-based system at TSMU were significantly extended during recent years to meet specific needs of the academic process in medical education. It was achieved by introducing a few additional Moodle's third-party modules (plugins). Some of them may include a source code customization feature [5-6].

An online repository of versions of LMS Moodle programming code has been created by Andrii Semenets to support and track the changes in custom codes. It is published as the branch (fork) of the main LMS Moodle's project on the GitHub server [7]. The repository is updated on a regular basis using the version control system (VCS) git, in according to LMS Moodle stable releases has been published.

Continuously increasing level of automation of the educational process sets new requirements to LMS/LMMS/LCMS software. In particular, in 2013 it has become necessary to implement a system enabling students' self-appointment to complete missed classes according to the class schedule at the TDMU.

The aim of paper is to present author's experience regarding the implementation of the

system for students' self-appointment to complete missed classes using LMS Moodle capabilities and further support of this system as well.

3. Advantages of implementing the system for students' self-appointment to complete missed classes

At the beginning of developing the system authors decided to implement it as a component of LMS Moodle which was already exist in TSMU by the time. Such decision has been made to ensure the maximum level of integration (both users' data and system features) and unification of programming approaches as well. The basis of the system is the module activity Scheduler [8] which allows to implement the scheduling feature to make appointments and determine meeting time. The specified "activity" module allows teachers to create and edit schedules of appointment time for individual meetings with students, as well as to keep attendance and score records. Simultaneously, students are given the opportunity to register for a particular hour of a visit and review their grades.

Numerous changes were introduced into initial programming code of the module in order to meet the requirements of higher medical education process and take into consideration some specific features of the TSMU academic process as well. Among them are:

1. Teachers were given the opportunity to create a list of multiple dates when missed classes may be re-scheduled by selecting those dates interactively using the Calendar tool.
2. Ability to create several schedules within different courses for the same teacher, with timeslots being overlapped.
3. Automatic limitation of the total number of students when they try to make appointments with the same teacher within overlapping timeslots.
4. The custom configuration setting option which allows a teacher to ask a student why he/she wants to make an appointment.
5. The TSMU-specific optimum configuration pre-sets.
6. Minor user interface upgrades and some bug fixes of the code.

7. Localization for Ukrainian and Russian languages.

The Scheduler plugin programming code for the version adopted at the TSMU has been developed by Andrii Semenets and published as the branch (fork) of the plugin major developer repository [9] on the GitHub server.

Figure 1. A dialog to create a list of dates for instant scheduling of numerous appointment timeslots

Some new features of the customized LMS Moodle module are presented below with more details. A dialog to create a list of dates for simultaneous scheduling of multiple appointment timeslots on available dates is shown in Figure 1. It is based on the YUI Calendar control, which allows users to select (mark) as many dates as needed. A set of timeslots (hours for completing missed classes) will be created within a given time range for all selected dates. Most of the configuration parameters have already been assigned default values which are recommended to be used at the TSMU.

The process of choosing timeslots (to make an appointment to complete missed class) by student is shown in Figure 2. A list of available timeslots is displayed along with the names of

corresponding teachers, a number of students who have already got appointments and a modal window to enter reasons to complete a missed class within a timeslot being currently selected.

Figure 2. The process of students' self-appointing to complete a missed class

The view of the teacher's panel in the modified self-appointment module is shown in Figure 3. It contains a list of all timeslots with names of students, who have already chosen certain timeslots for an appointment with a teacher. The following controls are available for a teacher to manage students' appointments:

1. A complete list of timeslots available for choosing by students with names of those students, who already have chosen a particular timeslot.
2. Checkmarks, which indicate that a particular student attended the appointment made.
3. Surnames of students who already have chosen particular timeslots as well as names of teachers who repeatedly conducted missed class.
4. Action buttons: the main (a gear icon) - to access a dialog to configure each timeslot and the "quick link" - to delete a timeslot or switch it between "individual" and "group" appointment modes – postponed by a number of still allowed choices (in the red square) in case of the "group" appointment mode (default at TSMU).
5. Student's grades (if the assessment mode is enabled for this Moodle "activity").
6. Action buttons to delete a current timeslot or cancel all choices made for it.

Many improvements and changes were made by authors in the module code during 2014-2018:

1. To provide the compatibility with new releases of LMS Moodle.

2. To integrate changes that were made by the major developer of this module - Dr. PhD Henning Bostelmann [10].

Over updating and refactoring of the module programming code the following main changes were made:

1. A JavaScript-library of the Calendar interactive tool was replaced. The programming code of booking event handler was adjusted according to LMS Moodle guidelines for developers (Figure 1).
2. A part of the custom code which provided the feature to force students to enter messages explaining the reasons why an appointment is made was removed - because the idea of this feature was adopted by the major developer and implemented within the core plugin code.

The latest version of the modified self-appointment Scheduler plugin with all code upgrades is available at a special branch of the Github repository mentioned above [11].

Figure 3. The user interface of the teacher control panel in the Scheduler modified module

4. Conclusions

The wide-scale application of free- and open-source software is essential to modern trends in developing an adequate learning environment at institutions of higher medical education.

The author's experience of implementing the open-source Learning Management System Moodle focused on some specific aspects of medical education at Horbachevsky State Medical University in Ternopil is reported. A Moodle-based system for student's self-appointment to complete missed classes was

developed. This system was implementing through introducing the Scheduler plugin was. The experience gained in the course of the development, use and support of this system at the TSMU is described. Additionally, an example of how the version control system can be applied to the processes of open-source software adaptation and support is given.

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