Automated System for Development of Doctoral Documentation

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Abstract

The article presents a web application through which doctoral study documentation can be prepared and developed. The main functions and characteristics of the various user roles involved in the development of the documentation are presented. An example of an adaptation related to the learning process is described. Several screenshots of the application are presented. Future plans for the development of the application are shared.

Keywords: education documents; web-based application; educational application; doctoral documentation

1   Introduction

The creation of documentation in electronic form is a trend that has long proven to be successful and applicable. The use of this type of resources at any time and place is a convenience that more and more institutions are focusing on, using good practice for their accessibility. A time when digitalization is everyday, requires the use of modern information and communication technologies to provide electronic services accessible to every user.

The use of web-based applications provides users with fast, useful and up-to-date information that they can receive in real time. It provides an opportunity for joint activities and teamwork from any point [2]. Modern technologies allow the created applications to be adaptable to any digital devices having access to the Internet.

This article proposes an author's application, which aims to support and automate the preparation and creation of doctoral study documentation. Automated and unified to process entered information and to eliminate the possibility of human error.
The approbation of the considered application is to be presented to the academic staff of FMI, at Konstantin Preslavsky University of Shumen and to be realized experimentally.

2   Main features of the application

The application is an author's realization for the creation of doctoral study documentation providing the educational process of doctoral students enrolled in FMI, and in the future, it is planned to integrate it with other major structural units at Konstantin Preslavsky University of Shumen. The choice to create such an application stems from the need for a tool to help both the doctoral students themselves and their supervisors and department heads.

The educational documentation, by its nature, contains a general and individual plan, in which various educational, scientific and creative activities are planned, for which the respective number of credits is awarded [9].

All these requirements the Head of the Department, plans and structures according to the approved rules of the university. The structure and content of the documentation will help the heads of doctoral students at the respective department to plan the activities related to the training of doctoral students faster and easier.

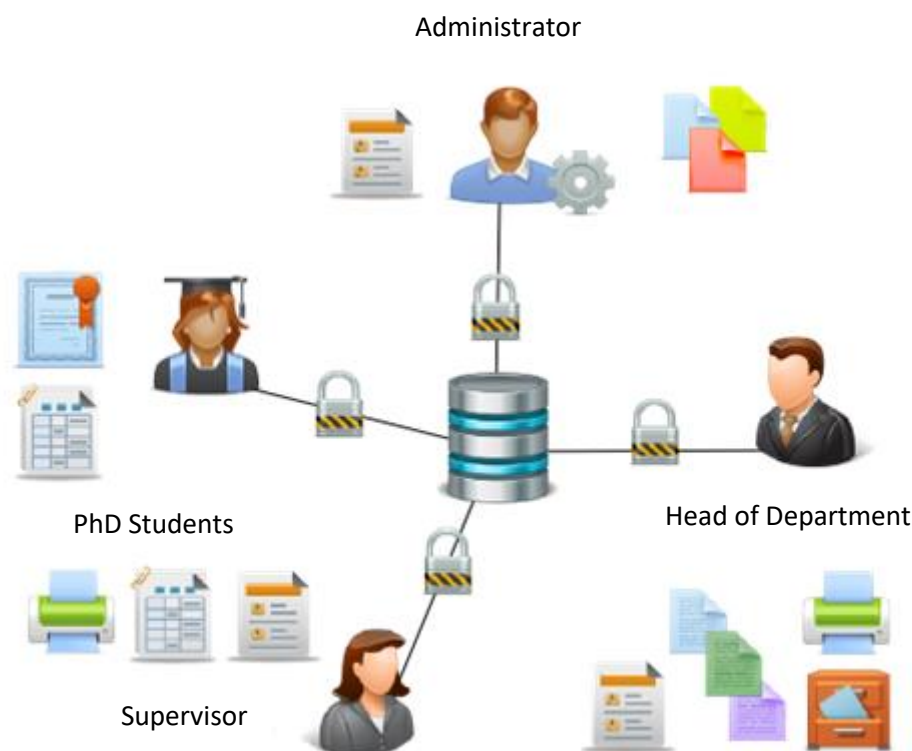The main roles of the application are presented in Fig. 1, as in general they are:

Fig. 1 Visual model of user roles

• **Administrator:** registers and defines the role of each user in the application and prepares the hierarchical relationship between the areas, fields and doctoral programs in education;

• **Head of Department:** prepares and implements the doctoral study documentation. Introduces doctoral students and associates them with the relevant supervisor;

• **Supervisor:** introduces the main activities related to the individual doctoral plan, interim and annual reports, as well as the doctoral student's participation in various projects. It determines the disciplines that the doctoral student must study;

• **PhD student:** introduces the activities related to research / artistic activity, as well as monitors the implementation of his / her individual plan.

The technical implementation of the application is in line with the latest standards for building web applications. The latest versions of HTML, CSS, PHP, MySQL are used, and Ajax technology is used for dynamic processes. Various popular methods of data protection related to their security on the Internet have been applied [1]. The application is quickly and easily managed by the latest web browsers for both desktop operating systems and mobile devices [6, 7, 8].

Adaptation of the application to the learning process of Faculty Mathematics and Informatics

The application is distinguished by its universality in the development of doctoral documentation. Such applications make a major contribution to the development of online resources accessible to a wide range of users [4,5]. We will now look at some of the main functions set out in it to see its capabilities in developing doctoral documentation.

Each general curriculum created by the Head of Department consists of three main sections: "Educational activity", "Research / artistic activity" and "Teaching-methodical and teaching activity". The structure of the section "Educational activity" includes compulsory, elective and optional disciplines, which carry the appropriate number of credits. If there are more disciplines planned for the respective type of disciplines, then a value "from the application list" is determined. The Supervisor chooses at a later stage any discipline in the individual plan.

A user form is displayed on the screen, through which the new activities and sections are added to the curriculum. Each activity that is planned must bring credits to the doctoral student, so that at the end of his / her studies, he / she has collected the necessary credits for deduction. Fig. 2 show the structure of a specific curriculum.

Fig. 2 Generating a general curriculum

If a change in the structural elements of the plan is required in the process of work, then by "Delete" each element can be removed and a new one can be planned in its place. Thus, it is not necessary to delete an already entered curriculum fields that can be used.

In order to add or edit the information on the elective, optional, compulsory disciplines and the doctoral minimum, the user must select the menu "Disciplines" and proceed to the appropriate action. Each discipline has different fields related to the number of hours and credits. The number of credits is formed automatically, and for every 30 hours 1 credit is provided (Fig.3).

Fig. 3 Adding a new course

In the **Supervisor** profile, the user can see each individual plan of the PhD students associated with it. Each curriculum is accompanied by the "Report" tool, which determines the desired interval for generating a report on the implementation of the planned activities. The view of the report visualizes each performed activity to the respective section and the number of accumulated and remaining credits. The generated report can be downloaded in text format for MS Word.

Fig. 1 Preview and download a generated report

Another important part of the training phase of doctoral students is their participation in projects. In the section "Participation in projects" (Fig. 5) the head of the doctoral student enters all participations in projects of the doctoral student during his training. The projects that may include doctoral students are domestic, national or international for the respective calendar year. At a later stage in the development of the application, a reference could be made to the number of doctoral students participating in projects and the creation of reports

Fig. 2 Participation in the project

or reports related to accreditation activities.

Each registered doctoral student can visualize his / her individual plan according to which he / she is studying and prepare his / her reports. In his / her profile, the doctoral student could change his / her personal data, as well as introduce activities related to his / her

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scientific and artistic activity. In the menu "Individual curriculum" the doctoral student can review his individual plan and monitor its implementation. In case of inaccuracies or missed activities, the doctoral student may promptly notify his / her supervisor.

In the activity related to the scientific or artistic activity, for the doctoral students it is envisaged that each of them introduces his / her respective activities. In electronic form it is necessary to enter the main things related to this activity, as there is a place for authors and a list of scientific bases, in case the activity is published. Throughout the training period, doctoral students can introduce various activities or update them without any restrictions.

Conclusion

In the proposed software implementation of an automated system for developing doctoral documentation with a web-based interface, it can support the administration and the process of training doctoral students. The application can contribute to the purposes of accreditations, audits or the preparation of other documentation. All faculty members involved as supervisors or department heads can create the necessary curricula regardless of where they are located and what digital device they work with. The developed application can support the preparation and unification of the training documentation and improve the time for its implementation.

Future Work

The presented web application can be developed with the following functionalities:
- Sending messages between different user roles;
- Filtering the results;
- Creating a support system;
- Integration in other structural units of Konstantin Preslavsky University of Shumen.

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