

The E-Student Profile – Status, Challenges and Perspectives

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Abstract – This paper presents a prototype of an electronic system for the needs of students. The objective is to develop and promote a prototype electronic student profile. The methodology for designing the proposed prototype includes a review and comparative analysis of existing electronic student profiles in universities from Europe, America and Asia, based on the usability and other leading features similar to the functionality of the proposed system. Advantages of university platforms regarding functionality, user interface, usability, speed of access are described. Some of the analysed systems have weaknesses and associated problems that have been avoided in the developed electronic system. A survey was also conducted among students who actively use electronic profiles for training and administrative services, and the results were integrated to add useful features to the developed system. The paper presents the main characteristics of the proposed prototype, such as speed and ease of use, and an intuitive design with easy access to the required resources. The prototype could be implemented for the needs of academic users in any educational institution.

Keywords – E-student, e-teacher, e-profile, learning resources, educational management systems.

1. Introduction

Nowadays, information technology covers almost every sphere of people's lives.

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Consumers born in the 21st century have grown up surrounded by modern technological devices and the Internet. Every day they receive a diverse and large volume of information.

Thus, they have developed, from an early age, specific skills to perceive and structure it faster and more efficiently than the 20th-century consumers. With each new generation, rapid changes are required in the way information is delivered in different areas of contemporary life. Especially with the mass consumption of computing and mobile devices in the last fifteen years, people using them in their daily lives for work, travel, medical treatment, entertainment, and education.

Education today is closely linked to information and communication technologies. The application of a variety of tools and software applications to support methodological approaches makes it possible to achieve better results. The incorporation of digital technologies has inevitably contributed to the rapid development of educational institutions, covering primary and secondary schools as well as universities, colleges, and research departments. Linking innovative technologies to educational resources has been perceived as a positive challenge in recent years, in particular in e-learning [1].

Progressively, e-learning is replacing the face-to-face and televised courses used in the past. This process is evolving at a rapid pace as e-learning leads to a better learner experience. Any educational institution can develop e-learning software to attract more learners and contribute to the effectiveness of their learning. The traditional way of education is not always applicable or suitable for everyone; using online learning software in such a case would help with access to virtual learning opportunities around the world [2].

E-learning is being applied in educational and scientific institutions, providing the opportunity to digitize educational resources and scientific literature. Nowadays, e-learning is beginning to be used and is preferred in companies. It is applied to increase the qualifications of employees, as well as to improve their professional knowledge and skills. Professional education in enterprises involves also various forms of e-learning or distance learning, based on the idea of a practice-oriented concept [3].

Learning is an ongoing process that people need to achieve a variety of objectives in their lives. It should not be limited only to academics [4].

It is true that administrative offices in higher education institutions are primarily concerned with students' employability skills and are always willing to assist them in achieving their career goals [5].

E-learning can definitely be a complementary form of education. Many enthusiasts can gain relevant qualifications and acquire new skills by studying online [6].

The more knowledge and skills employees have, the more they can be useful to their company. E-learning is a cost-effective way to drive change among employees and support their personal and professional growth. This way, employees can keep up with the demands of their jobs with relative ease [4].

Systems developed and designed for users to facilitate the learning process are used to provide and manage e-learning information and resources. Software applications of this kind help not only to organize the learning process and its accompanying activities in an educational institution, but also to develop them towards better quality learning with remote access.

Nowadays, numerous platforms and electronic systems serve the convenience of learners in various courses and in a variety of scientific fields. Their rapid adoption as the only way to deliver information, especially during the COVID-19 pandemic, has served as the basis for their continued use in the future. The extraordinary shutdown of a large number of educational institutions on a global scale has led to a change in the traditional way of conducting the learning process, which has been replaced by learning through electronic systems, the use of information and communication technologies, and the Internet. Using different platforms, learners were able to access learning content that was not only possible through a computer system but also from a smartphone [7].

This has led to widespread adoption of mobile learning as a new modern method [8]. Its main goal is to provide an opportunity for "greater accessibility and availability of educational resources, anytime and from anywhere" by learners, trainers and administration [9].

It also proves to be an alternative way for most educational institutions, as well as an opportunity to deliver learning in a non-presence but real environment – through conference calls, presentations, video lessons, text files, etc. [7].

It is important to mention here that in the online environment, learners perform activities that could not happen face-to-face.

They usually reflect, think, read and write under the guidance of tutors in in-person forms of learning. In online learning, learners choose what information to access, in what order, and for how long [10]. When searching for the required information, it is an important factor to find it with a certain/minimal number of mouse 'clicks', i.e. quickly and easily.

This paper presents a prototype of a learning management system, in particular a student profile. The system could serve as a starting point for the future development of an application that meets the specific needs of an institution or the students being trained. The main objective is to enhance the learning process of learners through online resources according to the respective curriculum. The key functionalities are related to publishing, online resources, checking, and assessing the student's current knowledge, grading final projects, tutor-student connection, filtering calendar with current services and events.

For a clearer presentation of the process of building the developed prototype of the E-student profile and its possibilities, a scientific approach has been applied, and the article is organized in the following structure. In the second section, the main criteria to be met by an education management system are analyzed. Section 3 reviews some of the popular e-learning systems used in the academic and research communities. In the following Section 4, existing systems in educational institutions in three European countries and the USA are presented and compared. Discussions and interviews are conducted with students studying at the respective universities. Section 5 describes the developed Learning Management System designed for an academic environment. Basic elements and some of the program code are shown. Information from a survey of system users is also summarized. Conclusions are drawn in Section 6.

2. Review of Educational Management Systems (analysis, usability and drawbacks)

Modern users have increasing requirements and preferences when working with electronic systems and web applications in terms of access, design, functionality, and speed. To be used by a large number of users, a system must meet their expectations, interests and mood, especially when it is designed for learners.

It is essential for a system to be competitive compared to similar systems and to establish itself among users over a long period of time. Detailed research is needed to build a quality system aimed at a specific target group of users.

This is an important step related to the process of planning, building, upgrading the design and functionality of the application. Otherwise, there is a danger that it will not match the user needs.

Student profiles are designed to facilitate the learning process and its accompanying services in higher education institutions, colleges and schools worldwide. Learning institutions are specialized institutions and sources of information designed to provide students with basic skills for their future professional and scientific development. A learning management system including student profiles provides a good opportunity for the development of e-learning. As a complement to traditional learning, any implemented system would enable educational institutions to provide increasingly accessible and quality education.

In recent years, there has been a significant rise in the adoption of such systems among users. This is a prerequisite for more and more people to be able to access educational resources using different devices such as computers, tablets, or mobile phones. The main purpose of such systems is related to the accessibility of learning materials and electronic resources in different formats, publishing of voluminous files, use of multimedia resources, camera and sound, working with teams or virtual rooms in real time, chat-forums, video recordings of seminars, lecture courses, etc.

The availability of web-based online learning and access through student profiles allows university learners to engage in a variety of learning activities that meet their needs arising from the requirements of their respective courses or from their personal learning interest [11]. As a result, learning systems and remote access services are helping both students and faculty.

The use of digital tools allows for the enrichment and effective transformation of existing didactic technologies. The learning process can become more interesting, flexible, dynamic, and independent of social and other factors with the use of these new learning tools [12].

The adoption of e-learning is being investigated primarily on behavioral intention, ease of use, usefulness, and attitude. Existing theoretical models in that field incorporate the most favorable external factors, such as anxiety, enjoyment, social influence, facilitating conditions, and self-efficacy [13].

Possible problems that could arise in their use are related to the user interface, devices used, accessibility and functionality. Another important characteristic is the speed of access to the resources searched, the criteria for which have been reduced from 7 seconds in the recent past [14], to 2-3 seconds today, and with a minimum number of clicks, according to the basic rules of the Search Engine Optimization (SEO) [15].

Practice shows that users do not read the information on web pages and electronic systems in detail, but scan it, visually and photographically. They do not search for the optimal solution to access the given resources, but select the initial elements they think will be worthwhile. Users do not try to understand how a service works. Rather, they would try it out – based either on previous experience or on whether or not it will work for them [14].

It is of particular importance that the application is quality tested by relevant user groups, the number of which should not exceed 10-12 people. Based on the experiment, their behavior and the speed of access to the required information, which could be reduced to 2 seconds, were analyzed. Testing and research would lead to conclusive results with feedback from more users, and a smaller number of participants in the experimental group can identify key shortcomings of the system too.

When building a quality system, the focus is on its user interface and functionality. Of particular importance is the development of a clear visual hierarchy within each page, structuring of elements within individual pages, convenient navigation, limiting the use of non-essential components, clickability of working links and accessibility to key elements for providing information. Taking these criteria into account, a prototype interface for an electronic student profile has been built according to global conventions for a well-defined, clearly structured and useful application. The prototype has been developed for future implementation in educational institutions.

3. An Overview of Current Online Learning Systems

Nowadays, a large number of quality and secure e-learning systems have been developed and implemented. They are designed and developed by proven specialists. The advantages of these systems are associated with the possibility of flexibility, manageability, lightweight usability, providing a variety of pedagogical practices and learning opportunities, stimulating innovation in educational technology and ensuring a collaborative, and continuous way of working between learners and trainers.

The following is an overview of some of the popular e-learning systems used in the academic and research communities.

3.1. ATutor

ATutor is a web-based learning management system used to develop and deliver online courses [16].

The system provides administrators with the ability to easily update data, customize topics, and extend individual features with additional modules.

Educators can publish, archive, import, and redistribute learning content as well as deliver online courses.

ATutor's main goal is to implement an adaptive learning environment that can be used by every student. Of particular importance is the ability to provide functionality for blind students to access and use the system.

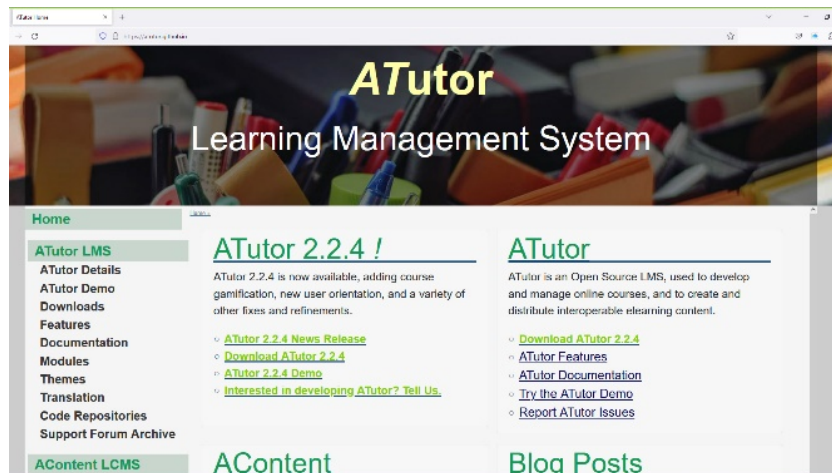


Figure 1. ATutor home screen [16]

The advantages of this system are associated with easy accessibility, security, social networking, my courses, current activities and services, incoming messages, communication tools, student profile, file storage, feedback, course search and contact databases.

3.2. Claroline Learning Management System

This is a web-based multilingual course management system and, in particular, a learning management system compatible with OS Windows, Linux and Mac, operating for more than 20 years.

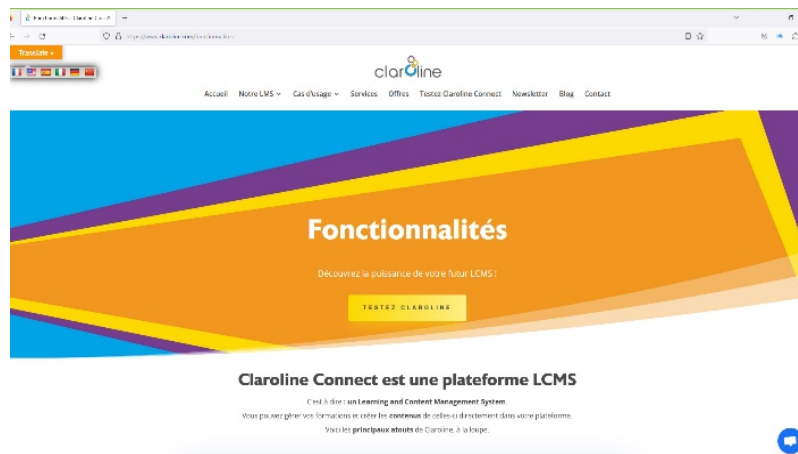


Figure 2. Claroline home screen [17]

Claroline provides the ability for organizations, businesses and schools to create and manage courses, interact with the web space [17]. The University of Belgium developed its original version, but its extension has subsequently involved specialists from all over the world.

The system includes 'authoring tools' and 'template tools' as aids for creating self-study tests, describing courses and syllabi, editing texts, conducting discussions, chatting, and more.

Conveniently, discussions can be sorted by date and time.

Another important functionality is the possibility of presenting learning resources in a certain sequence and arranging them according to set criteria [17].

3.3. ILIAS

The ILIAS system was developed under the VIRTUS Project at a university in Germany [18]. It is a web-based learning management system providing the ability to create, edit, and publish learning materials and courses.

The system is multilingual for the convenience of learners from different educational institutions around the world.

The advantage of ILIAS over other similar systems is that it contains tools for collaboration and communication through discussion forms, news and chat.

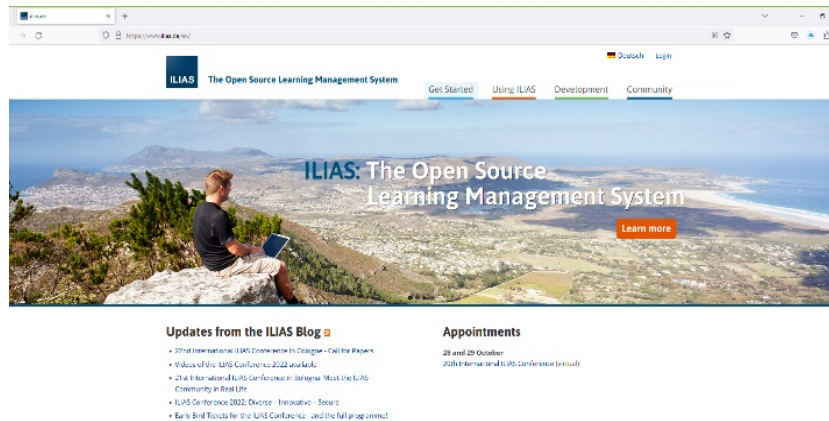


Figure 3. ILIAS home screen [18]

The system has basic functionalities to provide information about new e-mails, courses attended, personal quizzes and resource printing feature, curriculum and course management, user administration interface, SOAP interface for content, group system for user collaboration and more. Last but not least are functionalities related to learner assessment and testing [18].

3.4. Sakai LMS

The multilingual Sakai LMS software is designed for e-learning, research, and collaborations spanning the global academic community. A team of users, developers, and university institutions in the United States developed it collaboratively [19].

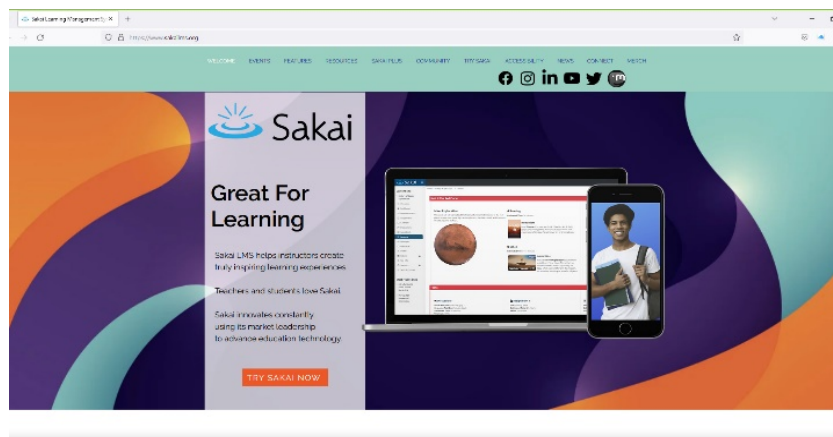


Figure 4. Sakai LMS home screen [19]

The Sakai system includes a set of integrated tools, the 'Connect tools', which can be used by teachers, students, researchers and configured with them as needed. Examples of the tools included in the system are grade books, lesson creation, different types of file formats, quizzes and questions, custom functions, administrations, and work sites. The Gradebook tool is used to process the grades of the respective students. Virtual rooms assist faculty and students in organizing faculty committees and student groups by providing them with tools to work with calendar, assignments, chat, tutorials, Dropbox, and Wiki.

Globally there are other popular LMS such as Absorb, Cypher Learning LMS, Docebo, iSpring, TalentLMS [20], [21], [22].

The following features are significant in order to analyse the learning platforms: the technological profile, the types of video lectures and the audio-video metadata for the video content itself. The advantages offered by the different systems are:

- Collaborative platforms for communication functions;
- Learning management systems in terms of the support for quizzes and course design [23].

Personal features, design, usability characterise each LMS, having both advantages and disadvantages from the users' point of view. They are accessible at any time on the web, providing the opportunity to implement modern pedagogical and organizational solutions that support learning and teaching mechanisms – in the performance of a variety of tasks. Possible problems that could arise when working with the listed systems are related to the lack of experience and practice on the part of users, weaknesses in maintenance and not good quality documentation.

4. Analysis of Existing Systems with Access Through an E-Student Profile

The paper presents and compares existing systems in educational institutions in Europe [24], [25], [26], and the USA [27], [28].

Discussions and interviews were conducted with students studying at the respective universities.

Access to profiles is only active for active students during the entire period of study, via key or registration.

Features such as nice user interface, simplified design, lightweight usability are reported. Many of the users of such profiles are from the new generation, which has preferences and critical requirements. This is a prerequisite for enforcing persistence and continuously engaging their attention in the process of using the systems.

Modern and applicable technologies and standards such as HTML5, JavaScript, TypeScript, CSS, C#, React, Bootstrap, PHP and others are used to build the applications. The benefits of H5P for the development, sharing and reuse of interactive learning content create conditions for engaging, motivating, immersive and pervasive education for today's digital learners [29]. The electronic profiles published on the web aim at a specific target group of users, namely students of the respective institutions, which is numerous, often reaching several thousand users.

The purpose of each profile is to make available basic information related to the learning process and its accompanying services. For convenience, the electronic student profiles are provided not only for desktop screens but also for mobile environments. The basic information provided to students is structured according to the guidelines summarized in Table 1.

Table 1. Example of information included in student profiles

E-resources and schedules	Services in the learning process
- Schedule of classes	- Issuance of examination reports
- Exam schedule	- References and services
- Courses studied	- Calendar of current events
- Study resources	- Student feedback
- Exam tests	- Time reminders and notifications
- Exam results and credits earned	- Assisting the learner in daily study activities
- Assignment of electives and optional subjects	- Other
- Research activity	

In order to access the electronic system of an educational institution, registration with the data of the current study is required. After accessing the respective system, it is possible to use it – only during the study period. Once the student has graduated, access to their account is restricted.

Each of the student profiles has a uniform arrangement of elements and a simplified design. In most of the developed systems, the name of the platform, a horizontal menu and brief details of the student such as ID or faculty number, full name, status, major, form of study and work mail are displayed at the top of the screens for convenience. A vertical navigation is included on the left hand side providing links to the required information (Figure 5).

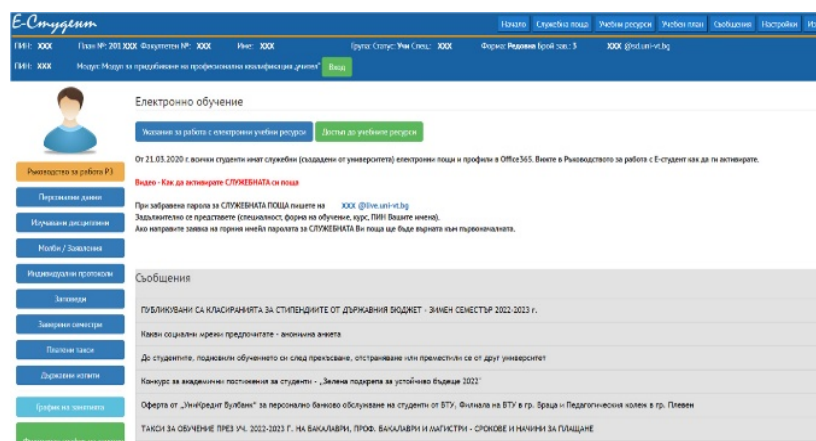


Figure 5. Desktop views of an E-student at university in Bulgaria [24]

For anytime access to relevant e-profiles and from any possible geographic location, mobile versions are also being developed incorporating a pleasing design (Figure 6). The preferred way for students in Austria and Bulgaria, as well as other European countries, to

access information in their student profiles is via mobile devices. On the other hand, desktop versions of applications designed for PCs and laptops are preferred for sending solutions to current and exam tests.

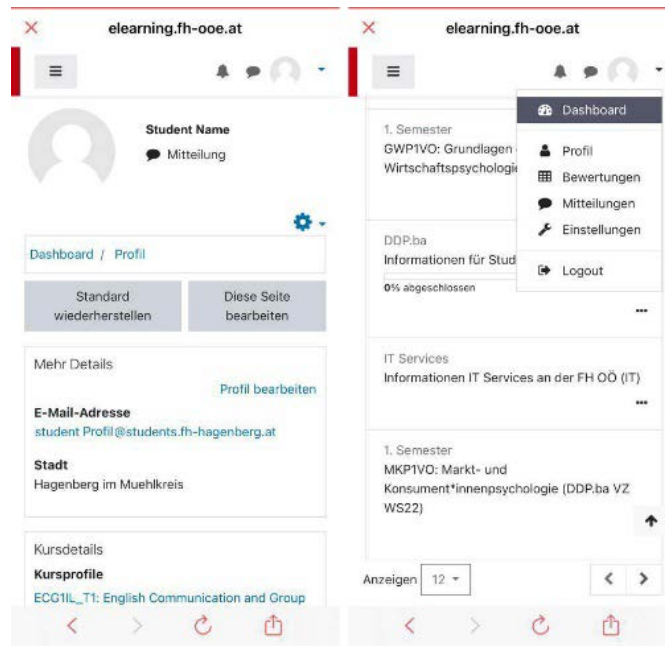


Figure 6. Mobile views of an E-student at university in Austria [25]

Learning Management Systems have also been developed as Web Content Management Systems (Figure 7).

As a rule, the left side provides information from the Dashboard related to courses, programs, calendar, office mail and other useful services.

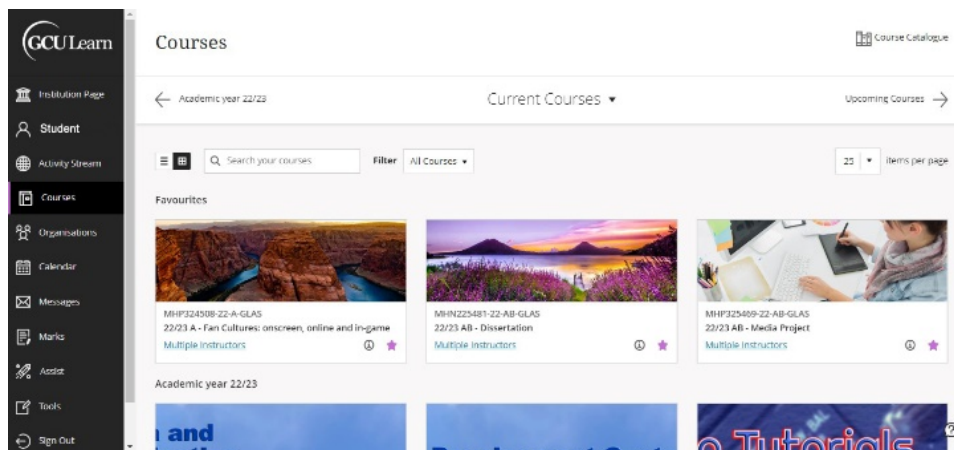


Figure 7. Desktop view of E-student and Dashboard at university in Scotland [26]

At the beginning of each semester, one of the most requested is the information, related to the class schedule. In many of the applications used, this information is displayed in the central part of the web page, mostly in table form. The use of block elements, in particular tables, is a good possibility to structure the result of the searched reference. Data visualization in the form of a statistical table is the preferred way, but not always the most optimal.

Possible problems would arise with more voluminous information in which users would get 'lost' in using it. Certainly, the system has many positive features. One of them is the possibility of sending short text messages from students to lecturers. This communication, internal to the system is secure and ensures that the recipient will be aware of the new message received (Figure 8), unlike e-mail correspondence, where it is possible for an e-mail to end up in a spam folder.

A useful feature that would be good to integrate into the learning system is to extend students' online activities with the possibility of receiving real-time notifications that guide learners on in-class role [30].

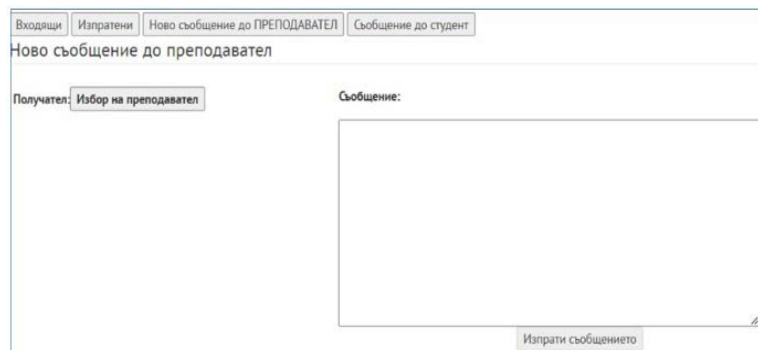


Figure 8. Interface of the messaging system [24]

In Figure 9 below, the data is structured in a more condensed version with the option to link to the underlying information.

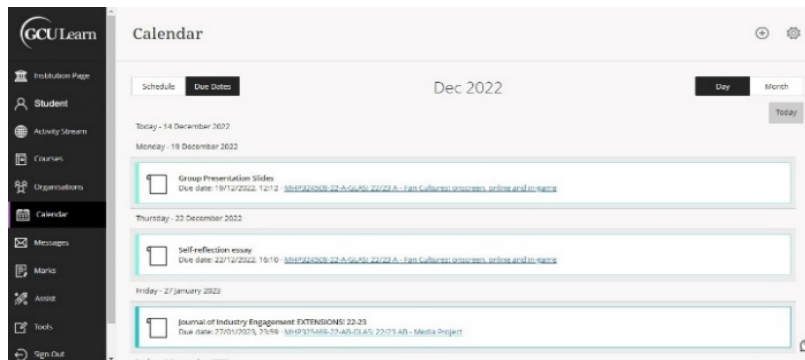


Figure 9. Desktop view of an e-learning timetable at university in Scotland [26]

Possible problems, according to the students, are connected with the way of access from different devices, as well as possible bugs. In terms of design, however, the learners have no specific preferences. In all educational institutions, access to the electronic student profile is through registration – an identification number and a password. Only student learners are allowed to access the system. Once accessed, students are entitled to access information about educational resources and services, see Figure 10.

The individual categories of information are structured as block elements with a nice design and easy usability.

The proliferation of smartphones has increased manifold in the last 10 years. According to Statista [31], over 6.5 billion smart mobile devices were active in 2022. This suggests that modern students are deploying and using smartphones in their daily lives to aid the learning process as well. In this regard, university mobile applications giving access to E-student resources are particularly useful for them.

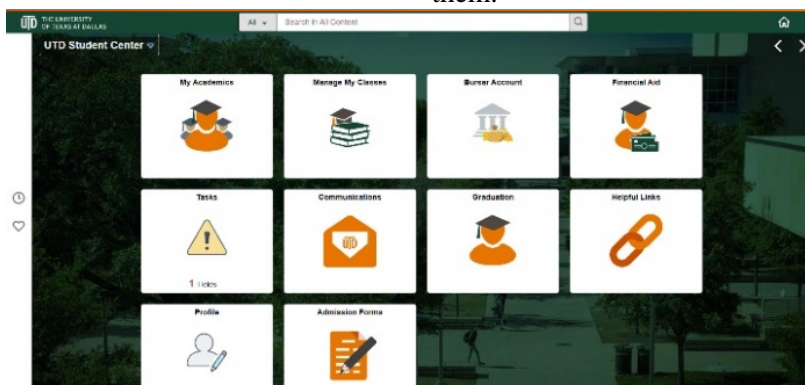


Figure 10. Desktop view of E-student and Dashboard at university in the USA [27]

This paper is not intended to highlight the advantages that the mobile app has over a mobile version accessible through a browser of a smartphone. The more significant benefits can be summarized as follows.

- The ability to send/receive *notifications* on the student's smartphone at any time. Thus, learners would not miss a homework deadline, an e-meeting or any other important task related to the learning process. A good mobile application allows for the customization of *notifications* according to the student's preferences (Figure 11).

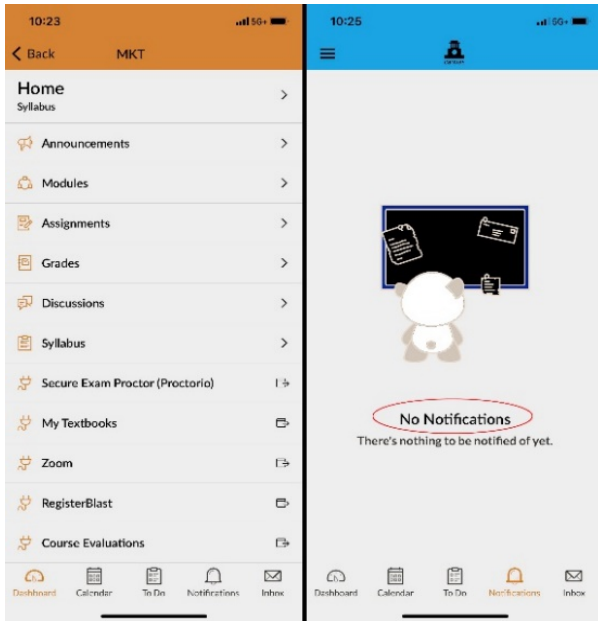


Figure 11. Mobile application for accessing E-student in the USA [28]

- The ability to connect the study schedule with the smartphone calendar. In this way, learners can also monitor their busyness through the smartphone's built-in calendar. Thus, they can easily balance their personal commitments with those at the school.
- The mobile application can use the smartphones built-in GPS. It can thus successfully navigate first-year students to a specific building, floor and hall.
- Additional security and identification of learners. Once installed on the smartphone, the mobile application can access the student's GSM number and connect seamlessly with it. Any attempt to access the account through another device can be verified by the mobile application. This achieves a higher level of security without the need to send/receive an SMS with an access code every time.
- Modern smartphones make it much easier for disadvantaged people to access electronic resources. A detailed description of the ways in which smartphones help disadvantaged people is made in the paper [32].

Some of these possibilities are illustrated in photos from the applications of the American university (Figure 12).

For each of the considered universities, it is important that after the completion of education or its interruption for various reasons, access to the relevant student profile is restricted. Some of them retain the possibility to review the course, information about studied disciplines, and educational degree acquired.

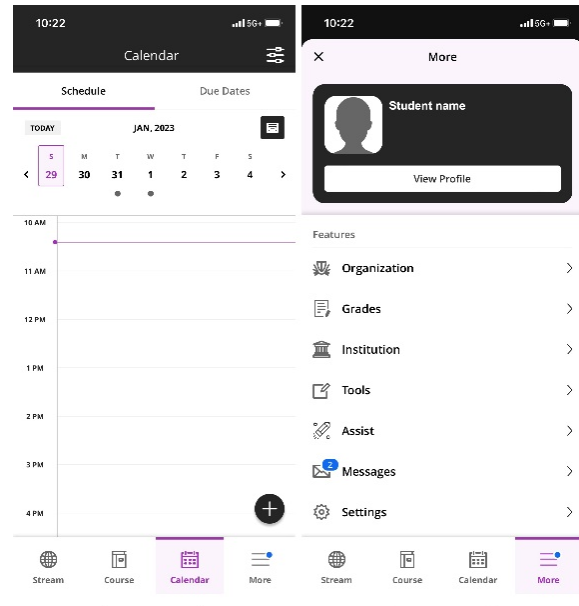


Figure 12. Mobile application for accessing E-student in the USA [27]

5. Functionality and User Interface of a Learning Management System Prototype

A learning management system developed for an academic setting is presented below. For convenience, the system could be used for different mobile and computing devices and at any time to facilitate the learning process and communication between learners and instructors.

One of the most common challenges in the field of online learning is how to recommend quality learning materials to students and have them access them through their e-profiles. Wide use of modern mobile phones and tablets facilitates access to educational materials not only of text type, but also of video materials, which has become very popular. Video learning has become an increasingly popular method of teaching, and it is contributing to innovation in learning methods [33].

For the development of the system, an anonymous survey was conducted with students from a Bulgarian educational institution, following the example of similar surveys conducted among students from educational institutions abroad [34].

The survey covers questions related to academic, technological and administrative services accompanying the learning process.

Each of the questions asked provides the opportunity for three responses. The survey was conducted with 220 current students.

5.1. How Often do you Use E-Learning Platforms and Student Profiles?

The prevailing opinion is that the student profile is used at least several times a week, but according to 15% of respondents, this only happens during examination sessions.

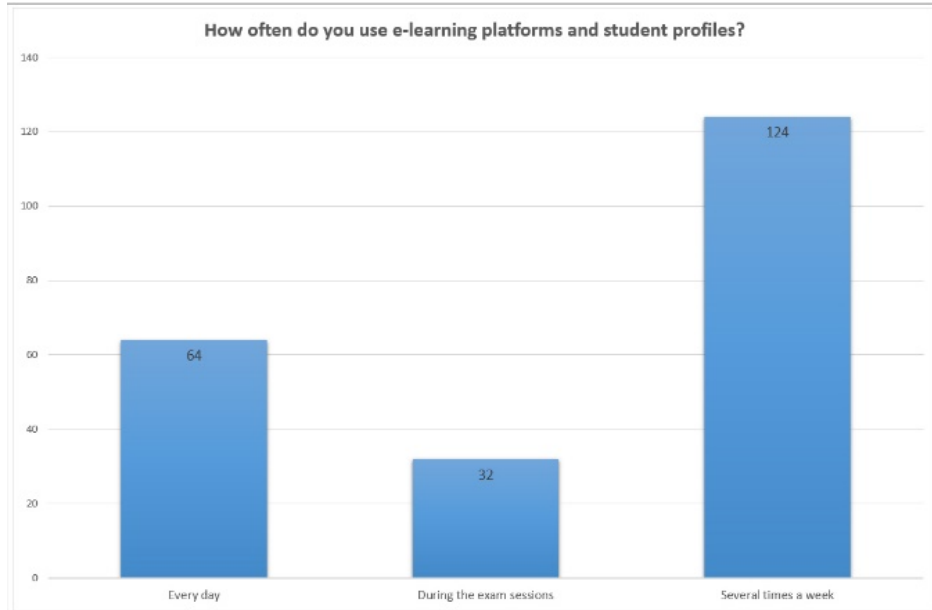


Figure 13. Frequency of using E-student

There has been a gradual return to face-to-face teaching and assessment, which was replaced entirely by online learning during the COVID-19 crisis. In this regard, student profiles are primarily used to view educational resources, submit assignments, and for information on current events.

5.2. What is the Method you Use to Access Electronic Platforms and Student Profiles?

The majority of respondents noted that they use both devices due to time and place independence. It is noteworthy that the percentage (3.64%) of learners who use only a desktop or laptop configuration is minimal (Figure 14).

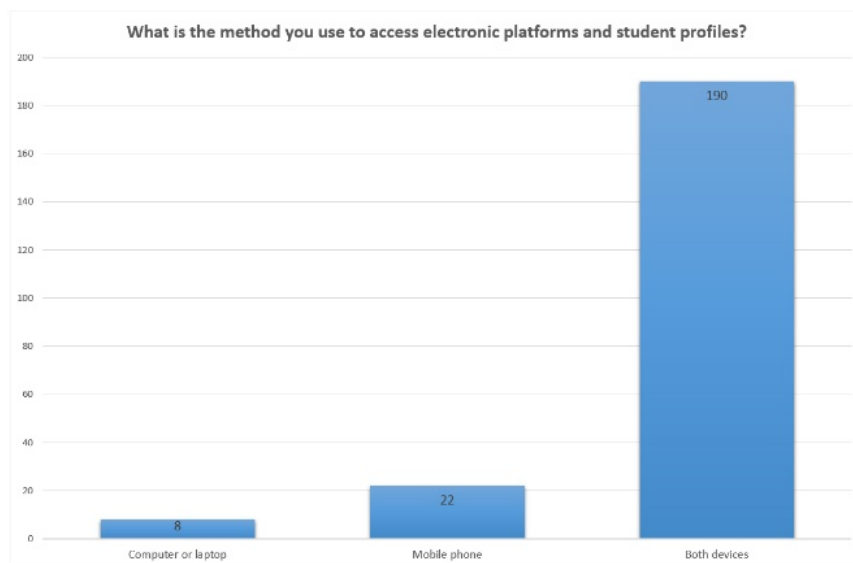


Figure 14. A device used to access the electronic platform

5.3. Would you Prefer to Use a Developed Mobile Application for an E-Learning Platform?

About 72% of the respondents expressed a desire to use a mobile application, in case one is developed. This confirms the trend of improving university teaching through the use of mobile devices and

applications indicated by Saračević et al. [35]. One-fifth of learners say they do not have a preference yet.

5.4. Would you Like to Have E-Resources for the Subjects you Study?

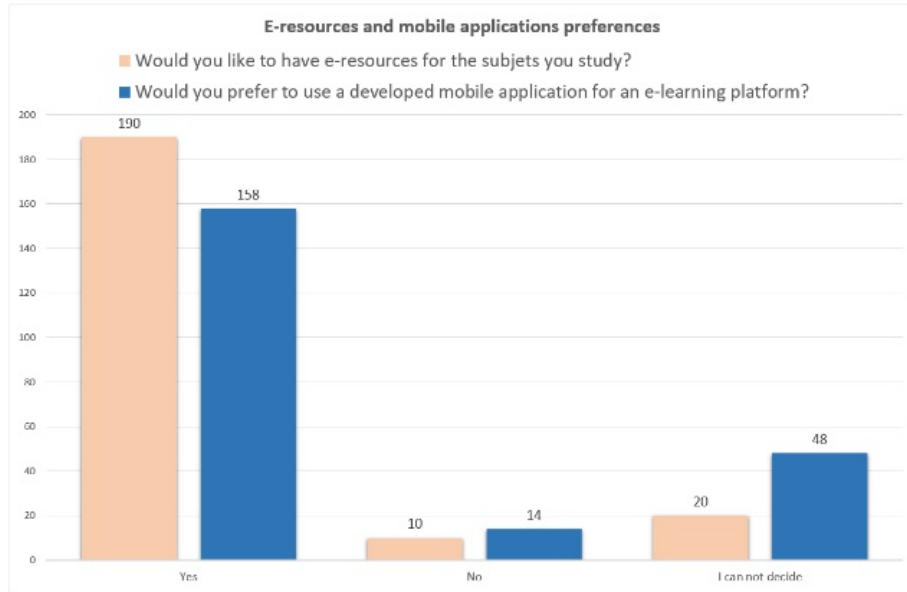


Figure 15. E-resources and mobile applications preferences

Over 85% of learners would like to have online access to electronic resources to support their learning. This is one of the implications following the two-year period of learning in an e-learning and blended environment during the pandemic. Only 4.55% refused such an opportunity – the reason for this could be their satisfaction with face-to-face (in-person) learning.

5.5. Do you Encounter Difficulties in Accessing E-Resources in the Subjects you Study?

A majority of 82.73% have no difficulty accessing resources in the subjects studied. The results confirm the opinion that e-learning can improve student academic performance and the lecturers must improve the way of learning when using cloud based learning media.

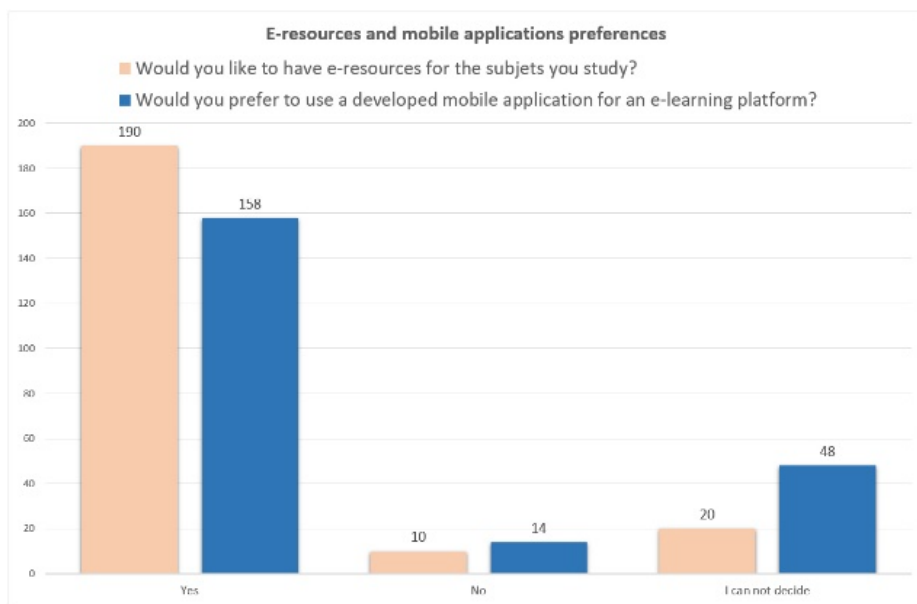


Figure 16. Difficulties in accessing e-resources

Around 9% indicated that they have problems with accessibility through their e-student account, with the remainder having no formed opinion on this issue or not reporting it as a problem.

5.6. Do you Encounter Difficulties When Submitting Exam Papers and Coursework into the Electronic System?

Only 50 responded that they had no difficulty submitting exam materials or coursework into the electronic system through their individual student account. Three times as many respondents noted that problems sometimes arise on this criterion.

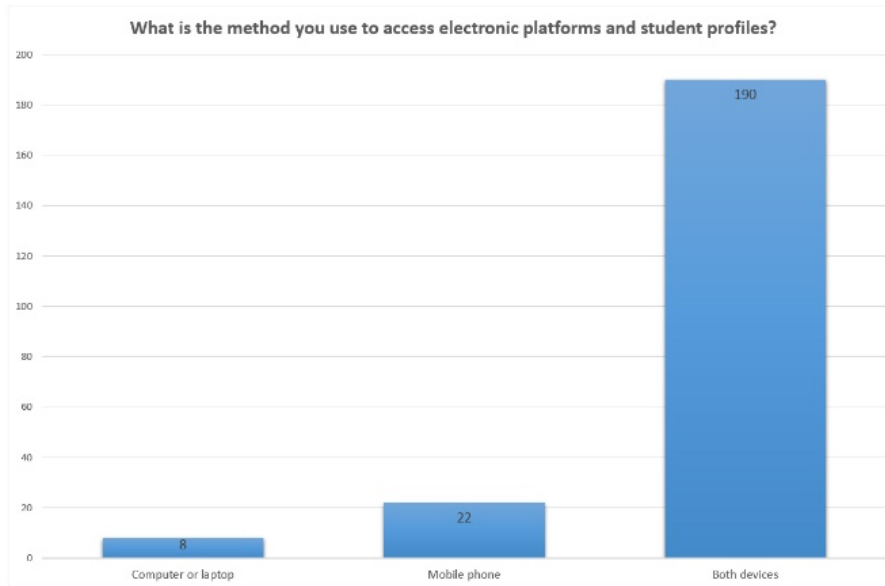


Figure 17. Ease of submitting exam assignments and coursework

Often students encounter problems when working with the electronic system, independent of their training and skills. These may be a technical malfunction, a communication problem or an overload of server components.

As a result, the summaries show that most of the surveyed students had difficulties in using their e-profiles during the exam sessions and in sending the developed tests and projects, especially during the remote access training via COVID-19.

A common difficulty is filtering students, by group and displaying their study schedule according to their respective seminar or lab groups.

The summary result of the survey highlights how a student perceives the use of e-learning systems and what his/her behavioral intentions are as a significant impact on learning outcomes. Students' behavioral intention to use e-learning systems for learning is greatly influenced by several factors such as perceived enjoyment, usefulness and ease of use of an e-learning system [37].

This in turn increases learners' behavioral intention to use e-learning systems for learning. Of particular importance are also the advantages, complexity, testability and review ability, and perceived compatibility. 'Perceived enjoyment' in usability refers to how learners perceive different activities or services as enjoyable for them, regardless of any intended consequences.

In this way, learners' enjoyment resulting from using the e-learning system in a manner that enriches their learning experience is considered a perceived enjoyment [37].

The assessment of the quality of the long-term user experience is according to the UX Curve method, which provides rich qualitative data describing the quality of the long-term user experience. It also identifies the key individual experiences that would change students' attitude towards the system. According to the study by Kujala et al. [36] the UX Curve method also provides quantitative data – in addition to qualitative data – on user experience trends over time.

Based on the analysis of existing profiles and overcoming the problems accompanying the process of their use by users, a prototype system is proposed.

Some of the imperfections of the analyzed systems are related to the access of users with 'Learner' profile to administrative and organizational activities. These can be various announcements and normative documents, information about scholarships – terms, conditions, internship opportunities, instant announcements about events, scientific forums, interaction with foreign students, etc. The implementation of the project is the result of the completion of a task set as a course project on the studied technologies.

The technologies used are HTML5, CSS3, TypeScript, React, as well as the libraries Bootstrap, Angular, Front Awesome and jQuery. The development includes a calendar implemented using the 'Pignose Calender' plugin.

The system prototype seeks to address the need for pleasant and useful interaction with learners, teachers and administrators – the users who will primarily use the application. The system consists of four main elements: groups of users, individual profiles, a list of courses and a module to manage them.

Access to each element can be restricted, with minimal changes to the functionality of the other modules.

The 'List of Subjects' and 'Subjects' pages are part of the 'List of Subjects' element. The 'Directories' page is used when creating new subject lists and managing them. The 'Subjects' page displays only those in the directory that the user is allowed to access.

Student profiles are accessed through a login form, part of the programming code for which is presented in Figure 18.

```

<div class="container">
  <div class="row">
    <div class="col-md-4 col-md-offset-4">
      <div class="login-panel panel panel-default">
        <div class="panel-heading">
          <h3 class="panel-title">E-Student</h3>
        </div>
        <div class="panel-body">
          <form role="form">
            <fieldset>
              <div class="form-group">
                <input class="form-control" placeholder="Email or Name" name="email" type="email" autofocus>
              </div>
              <div class="form-group">
                <input class="form-control" placeholder="Password" name="password" type="password" value="">
              </div>
              <div class="checkbox">
                <input name="remember" type="checkbox" value=""> stay signed in
              </div>
              <!-- Change this to a button or input when using this as a form -->
              <button href="#" class="btn btn-lg btn-success btn-block">Log in</button>
            </fieldset>
          </form>
        </div>
      </div>
    </div>
  </div>
</div>

```

Figure 18. Fragment of the E-student login form html and css code

The Home page is set up according to the different roles that users have. Figure 19 shows a

view of the home page accessible through a learner profile.

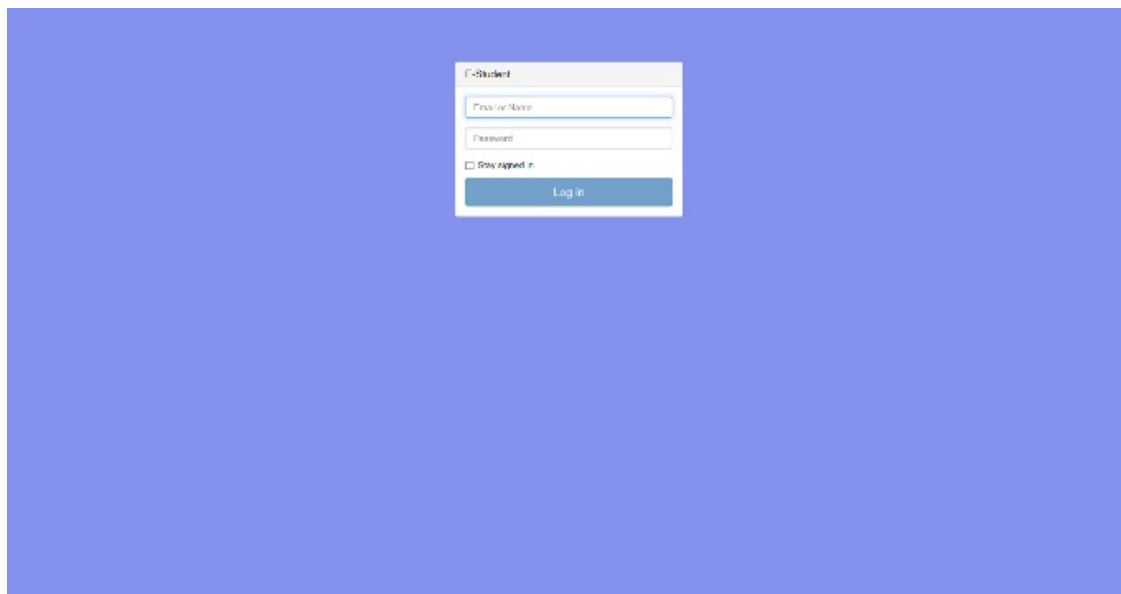


Figure 19. Screen with a login form

The home page for the manager profile, e.g., gives him/her access to all elements of the system, since

this role extends the rights of users with the educator role.

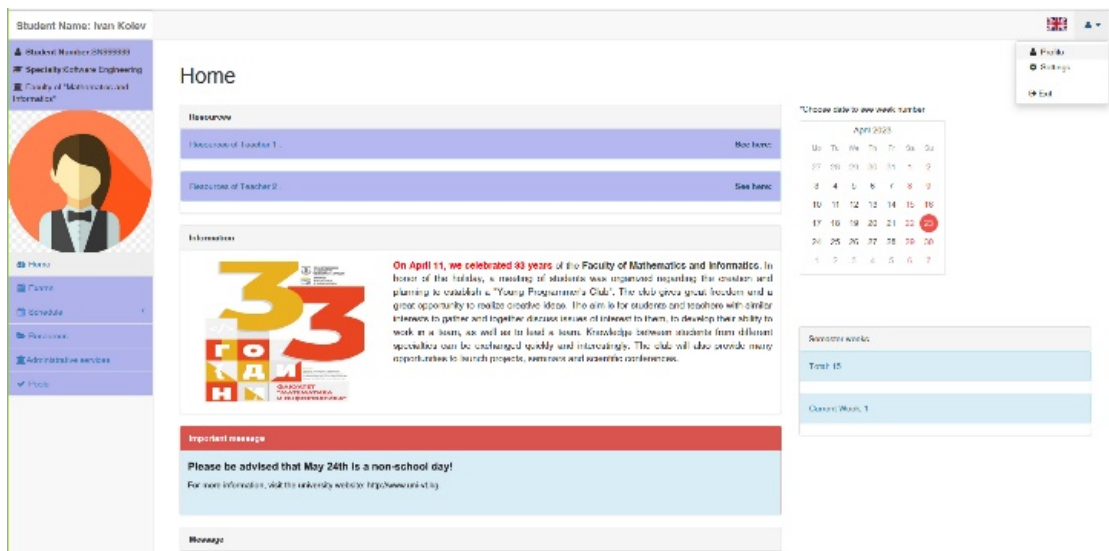


Figure 20. The Homepage screenshot accessed by the learner

The navigation menu is organized on the left-hand side of the screen as vertical element – for the users' convenience. The menu is easily and quickly accessible, as are the hyperlinks to selected items.

The system's prototype, accessible through an 'Administrator' profile, allows its users to be managed as well as the object directories to be viewed.

A mobile version has also been developed for accessing the system from different devices.

In the developed system, problems such as lack of redundant block elements and unnecessary navigation, outdated current information, visualization of two large tables that lead to confusion and ambiguity are overcome.



Figure 21. Program code for the navigation menu

The availability of developed mobile applications would facilitate access to e-resources and e-profiles at any time and from anywhere.

6. Conclusion

The Internet has made it easier to access information in our time. In this regard, access to electronic learning resources is becoming increasingly sought after, more reliable and mainstream, thanks to computer and mobile devices.

For the benefit of the users of these devices, in recent years, specialized software applications aimed at education have been developed, including electronic student profiles.

In the current study, the emphasis is on the applicability of electronic student profiles as a modern way of accessing educational resources in educational institutions and as an integral part of modern education.

This is important in increasing the rating of an educational institution, as well as a reason for it to be preferred by learners.

The most important aspect of any software is the fact that it is designed for users. The way it works and looks is of prime importance. The software should be useful to people and serve them specific tasks, with as simple, interactive and intuitive design as possible. The user interface is critical to the desired functioning of the product, so it must be designed in a way that is understandable, pleasant and easy to use. With mobile and desktop devices in widespread use, the property of UI adaptability becomes a must.

In recent years, there has also been an increased deployment of mobile devices in training. Learners prefer to use modern educational applications with the help of laptops, mobile phones, or tablets. Thus, the traditional learning process is being supplemented with alternative methods. The evolution of information technology has contributed to the widespread adoption of e-learning, which became the preferred option especially during the COVID-19 pandemic.

It subsequently led to the mass adoption of mobile learning as a modern method. Its main advantages are the accessibility and availability of educational resources, regardless of time and place – for learners as well as trainers and administration. As a result, the education sector is facing new challenges to meet the demands of learners across the globe, which make extensive use of mobile devices for accessing the information they need in the teaching and learning process.

Convenience and preference for accessing student profiles via mobile devices will be a driving factor for learners.

Today's learners use tablets and mobile devices to access video and interactive materials, not just text or static sources. Delivering video lessons is a key feature of innovative learning methods these days.

The present study confirms the importance of student profiles in online and face-to-face learning for the interaction with both lecturers and the learning materials provided by them in their respective disciplines. Educational institutions are a source of information with the guiding principle that people have the opportunity to develop at a higher scientific and professional level. Dedicated electronic systems provide the necessary learner-centred information that is an important prerequisite for gaining experience, knowledge, and skills throughout the learning process.

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