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Mitigation of Social Exclusion in Regions and Rural Areas – E-learning with Focus on Content Creation and Evaluation

M. Stočes, J. Masner, J. Jarolímek

Department of Information Technologies, Faculty of Economics and Management, Czech University of Life Sciences Prague, Czech Republic

Anotace

Výukové materiály a vzdělávání obecně se v současnosti posouvá do online prostředí. Tento článek se zabývá celoživotním vzděláváním sociálně znevýhodněných obyvatel. Velkou skupinu zde představují obyvatelé venkovských oblastí. V kombinaci s dalšími faktory, které působí zcela obecně, vniká zásadní disproporce digitální propasti. To je potřeba dále řešit. Jako hlavní cílové skupiny byly zvoleny ženy na mateřské dovolené, senioři a nezaměstnaní absolventi. Jedním z hlavních zaměření příspěvku jsou studijní materiály – jejich vytváření a sdílení. Mezi cílovými skupinami bylo provedeno několik výzkumů, především ve formě polo strukturovaných rozhovorů a dotazníkových šetření. Výsledky ukazují řadu požadavků na e-learningové systémy a materiály. Na základě těchto požadavků byly vytvořeny prototypy aplikací pro web a mobilní zařízení.

Klíčová slova

Celoživotní vzdělávání, vzdělávací materiály, online, LMS, e-learning, WWW, mobilní zařízení, aplikace.

Abstract

Study materials and learning in general is moving online nowadays. The paper deals with lifelong learning of socially disadvantaged people. Inhabitants of rural areas represent a substantial group there. The fundamental disproportion of digital divide emerges in combination with other factors, which impacts generally. The problem requires a solution then. The main target groups selected for the study are women on maternity leave, seniors and unemployed school graduates. One of the main focuses was on educational materials and their creation and sharing. Several researches such as semi-structured interviews and surveys have been made among the groups. The results show several requirements for e-learning systems and materials. Taking the everything into account, prototype e-learning applications have been developed (web and mobile).

Keywords:

Lifelong learning, educational materials, online, LMS, e-learning, WWW, mobile devices, applications.

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Introduction

The importance of lifelong learning is still growing in contemporary society. Rapid technological development calls for changes in working life as well as in retirement and leisure time in general.

Lifelong learning according to European Commission is described as "all learning activities undertaken throughout life with the aim of improving knowledge, skills and competences within a personal, civic, social and / or employment related perspective" (EC, 2001). Lifelong learning paradigm is focused on student-centred, active, autonomous learning (Bryderup et al, 2009) that is demand driven and flexible (Kendall et al, 2004).

According to Çilan et al (2009), there is a significant level of digital divide in the EU. Overcoming digital divide and mitigation of the social exclusion of threatened groups of citizens belong to priority areas of Digital Agenda for Europe 2020.

Elderly, as a group of students, are motivated

to continue learning by different ambitions than job promotion or improved qualifications. Their interest lies in learning to know more and to continue improving as individuals; individuals who should be included in todays changing society (Escuder -Mollon, 2012).

The distant education is focused above all on education of elderly people in regions who cannot participate in lectures in the attendance form in seats of universities for various reasons (distance, health and time reasons, financial costs for transportation and so on). Availability anywhere and in any time is the biggest advantage of the virtual courses (Jarolímek et al., 2010a; Jarolímek et al., 2010b).

Companies tend to re-qualify their older employees (50+) by using distant learning methods. Employees over the age of 50 demonstrate high degree of motivation and interest in further vocational training by means of distance learning methods (Hoenig, Stummer, 2013), willingness to contribute and to learn ICT skills in order to remain active both socially and within their work environment (Lam, Chung, 2010). Growing occurrence of online study material usage puts higher demands on user interface usability on various types of end user devices.

Users of e-learning system can be divided into three main categories. Users who work with the system to study (students), to teach (tutors) and those to create the educational materials (lecturers). The latter two categories being mutually not exclusive, so for the purposes of this study, they are merged into one single group (lectors). For all user groups it is necessary to provide easy to use, intuitive control mechanisms that do not require assistance of system administrator to function. The basic principles of web application usability and accessibility (Benda et al. 2015) are therefore of high importance.

Typical users who fall into the tutor/lecturer category are for instance:

- Teachers from schools and other educational facilities
- HR employees from companies
- Requalification officers from employment departments
- Creators of multimedia content

Based on the initial study of available research materials DAE 2020 and experience obtained at Department of Information Technology while completing other projects, the following socially disadvantaged groups were defined:

- Women returning from parental leave
- Elderly people
- Unemployed aged 50 or more
- School graduates
- Ethnic minorities
- Immigrants

For the primary testing of e-learning educational system and study materials, the following groups were selected:

- Women returning from parental leave
- Unemployed school graduates
- Seniors

Each of the selected groups has different motivation for educations, different initial knowledge and set of skills and different level of ICT literacy.

Education process is divided into five stages:

- Motivation – elements that spark the personal interest in studying
- Exposition – steps providing the initial obtaining of knowledge
- Fixation – occlusion of obtained knowledge
- Diagnostics – feedback by determining the actual level of retained knowledge (usually by testing)
- Application – usage of received knowledge by the student in practice

For each phase, different set of suitable tools is available within the e-learning environment. Partial goal of this study is to determine how useful each tool and component is for particular testing group of students. (Gutierrez-Santiuste, Gallego-Arrufat, 2015).

Education stage	Components and tools within LMS
Motivation	Files, texts, multimedia content, links
Exposition	Files, texts, multimedia content, links
Fixation	Tests, files, texts, multimedia contents (exercises with solution for instance), links, discussion forum, chat, videoconference
Diagnostics	Various tests and polls, file upload, online chat, videoconference
Application	Files, texts, multimedia content, links

Source: own processing

Table 1: Education stages and LMS components.

LMS (Learning Management Systems) allows to create materials that combine sever components using format SCORM (Sharable Content Object Reference Model) and others.

Internet and the World Wide Web environment usage has rapidly spread among the population during past. There are currently around one billion web pages online (Internet Live Stats, 2015). The past decade has brought a rapid departure from classic printed media formats. Newspapers, magazines, books, handbooks and generally any printed publications are now mostly stored digitally and published online (Tewksbury, Riles, 2015). Due to a development of internet technologies, especially Content Management Systems (CMS), even users without knowledge of required technologies (HTML, CSS) can access and manage online content (Brown, 2014). Besides that, the educational content is still stored in a static way (usually PDF format). Usage of software which utilizes SCORM standard is on low level.

A large study of e-learning portal usability brought up design and usability flaws and confirmed an intensive need to design and improve ways of e-learning platform usability evaluation (Granica, Cukusic, 2011). The evaluation of influence of mobile platforms in the learning process is also a current topic. The evaluation of mobile user experience with regard to preferred type of study (Hyman et al., 2014), identification of main interests and requirements of students and teachers, and factors of successful adoption of mobile learning platforms seem to be important perspectives as well.

Educational materials produced by the lectors group needs to be carried out to the student group. The online educational portals and LMSs are the fastest and most flexible way of study. The specified groups of users have special requirements on such portals. The quality of educational materials is one of the crucial aspects in general. The WWW and digital environment offers many opportunities, with the interactivity being one of the main benefits.

Many educational materials are currently produced as PDF or other printable document types. In recent years, this format was most widely used. Based on current trends in society, there is a significant growth in usage of mobile devices such as smartphones and tablets. So, the form of the materials is becoming unsuitable for display on aforementioned devices, thanks to the lack of responsiveness and interactivity.

The educational materials can be stored in the SCORM format. The SCORM is a collection of standards and specifications for web-based electronic educational technology.

There are currently many LMS software solutions, which corresponds with the diversity of needs of various user groups. People of age 50+ needs simplicity while unemployed graduates are familiar with modern devices. The sector of socially disadvantaged groups and rural areas in general needs an open and cheap solution. The focus needs to remain on both user groups - lectors and students. Most existing LMS software solutions do not meet these specific requirements.

Usually, the main part of the content creation utilizes WYSIWYG (What You See Is What You Get) editors. The WYSIWYG editors allow users to work with the content without knowledge of the required technologies the same way text processors do.

Materials and methods

Methodology of the research consists of several investigations and a long-term research done by Department of Information Technologies.

Several semi-structured interviews were done. Members of both user groups (students, lectors) were involved. Two interview guides were designed. The semi-structured approach was chosen because in each group there were various types of users. Moreover, several target groups with specific needs were involved. Each interview can bring new needs, requirements and ideas to light.

The interview guides for both groups include several main topics/questions. The most important are the following:

Learners

- Do you use any LMS? If so, which one?
- In which form your materials are?
- Do you use smartphone, tablet or similar devices?
- Do you prefer to have your materials printed or digital?

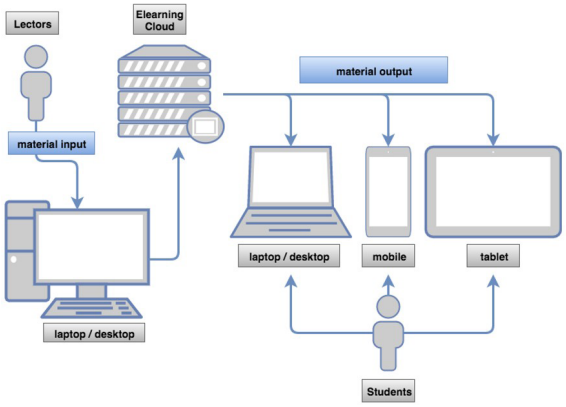
Lectors

- Do you use any LMS? If so, which one?
- In which form your materials are?

- Do you use tablet for content creation?
- Do you have any statistics about learning process?
- How do you get feedback?

The department has made several research surveys among various target groups such as students, farmers in rural areas, seniors, women on parental leave etc. These surveys covered several topics which are important for the research goals. Surveys that were used for the creation process of the prototype were (Figure 1):

- ICT in Agricultural Enterprises in the Czech Republic, held regularly since 2000. This survey focuses mainly on the issue of ICT equipment and usage within agricultural companies in Czech Republic (Vaněk et al., 2010)
- ICT equipment of students at Faculty of Economics and Management – survey is held between several thousand students of the faculty from various regions of Czech Republic. It is focused on usage and availability of ICT equipment
- Survey of ICT knowledge for women on parental leave – respondents of this survey were women involved in the project "Effective return of economically educated women to the job market after parental leave" (2015).

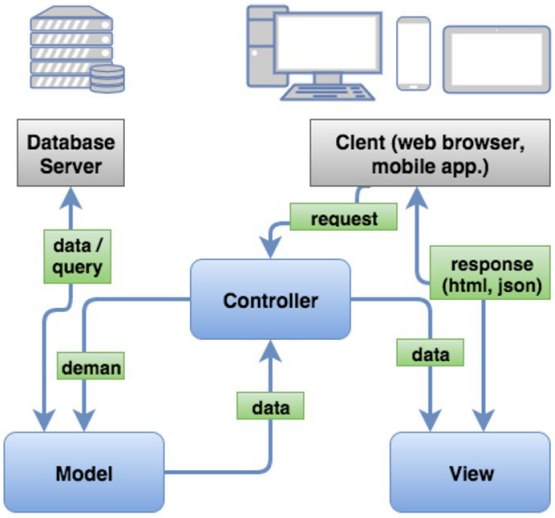


Source: own processing

Figure 1: LMS as cloud service.

Prototype development

Several modern technologies were used to develop a prototype application. Firstly, MVC (Model View Controller) framework Nette (Nette Foundation 2015) for the main development scope (Figure 2).



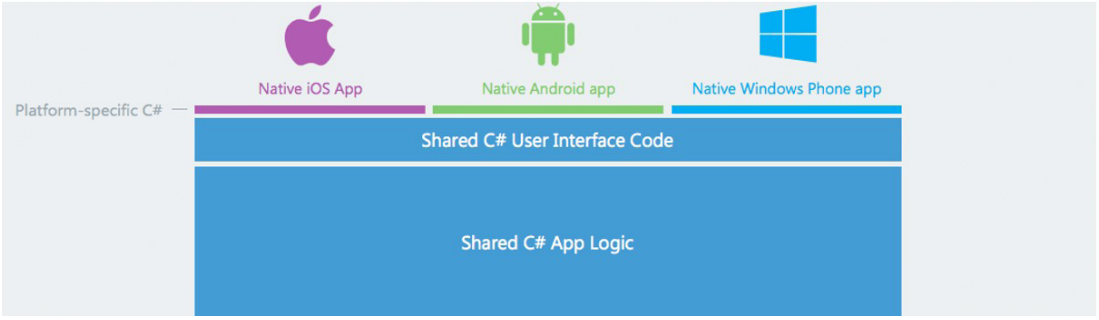
Source: own processing

Figure 2: MVC model.

Backend part (model, controller) uses PHP language. All data is stored in MySQL database. Nette framework consists of several parts working together. Nette\Database is an advanced database layer. It supports caching, simple selections and projections. Development process is supported by Nette\Tracy debugging library. It helps with debugging, performance optimizations and app monitoring.

The frontend part of development is supported by Nette\Latte template engine library. It consists of simple syntax, content-aware escaping and caching system. The template code is translated into pure PHP code and cached for better performance. The main client-side part utilizes HTML5, JavaScript library jQuery and CSS3. Everything is wrapped within the Bootstrap 3 framework. The framework sufficiently supports the modern "mobile-first" approach.

The application for mobile devices was developed using Xamarin platform. It allows to deliver native mobile applications for major operating systems within a single development environment (Figure 3).



Source: https://xamarin.com/platform

Figure 3: Xamarine architecture.

Results and discussion

All the surveys, interviews and other long term researches yielded interesting and valuable observations. As a result, requirements for the software solution have been determined.

Interviews among lectors

When the participants from the lectors group were asked about the LMS, the majority of them were unsatisfied with their current solution. 90% of them commented, they do not have own IT specialists for administration or development. The majority said that they use mostly Microsoft Office Word for educational materials content creation. The materials are distributed in PDF format afterwards. Most of those who were interviewed indicated that tablet device is too uncomfortable for creating materials. On the other side, some of the respondents commented that they use it to manage courses, check test results and statistics.

When asked about the learning process statistics, 90% of the respondents reported that there are many limitations. Talking about this issue, interviewees mostly reported that they miss deeper statistics about usage of educational materials. As one respondent said: "We can get some feedback from our students, but it is always difficult and needs a lot of time".

Several respondents pointed out they would like to have more features than just learning in their LMS. There were some suggestions for feature to organize events such as field trips, workshops etc.

Interviews among students

Majority of student group users does not know which LMS they use. Some of them commented, that they do not care. When talking about materials and devices used for learning, wide range of needs and habits were reported. While people aged 50+ prefer printed materials, many younger participants use tablets, smartphones or just computers. The form of materials can be limiting then. Respondents were asked to give suggestions for future education. Many participants expressed the belief that these modern devices are the future of learning and printed materials will disappear.

Defining requirements for LMS system:

- Online access using a client (e.g. web browser) from different platforms and devices
- Cloud based – no need for own server and LMS management. Current trend is to use application services that do not require installation of any specific software onto the client device. (Figure 1)
- Possibility to access materials offline – since the internet coverage in Czech Republic is not ideal. Some educational materialscan be large and require higher connection speeds to function properly. Users of mobile internet are also limited by their FUP (Fair User Policy). So it is preferred if material can be downloaded (for instance through WIFI) and then used without internet access.
- Accessibility – application should be usable by handicapped people.
- Possibility to print materials – suggested mainly by senior students and women on parental leave.
- Statistics about the learning process – important so that the lecturers receive feedback in form of statistics about the learning process of their students. Based on these, it will be possible to determine quality and usability of various educational materialsin regards to end user

device.

- Social networks integration – especially younger users are used to communicate and share their knowledge through social media. Social networks can be integrated and serve as a communication tool between lecturers and students or even students among themselves.
- Easy management of the course – control and administration should be easy and intuitive in order to allow lecturer to spend most of their time with educational activities rather than system management
- Creating educational materials – one of the key requirements lies in the area of educational materials. Studying has to be possible on various (mobile) devices. The materials should be stored in some standardized, exchangeable and reusable form. The SCORM format have been developed for this purpose. The system should support this format and should be "SCORM compliant". Moreover, the lector does not need to know anything about it. The system should guide him to create the material to fit in the format. On the other side, it still should support the traditional ways of uploading printer-friendly materials. It is necessary for some target groups. The key factor in this area is User eXperience, since the lectors are usually not experienced computer users.
- Progress of studying – statistics of students for students – to help self-evaluation and increase motivation of students
- Simplicity is preferred (over the feature rich solution).

Conclusion

A prototype application was developed to evaluate the obtained results. The Xamarin platform allowed fast development of the mobile application for all major platforms – Android, iOS, Windows Phone, Windows 10. On the other side, the user experience is not on a good level. The development experiences suggest the use of Xamarin platform for simple applications or prototypes. Applications where the User eXperience is a crucial requirement should be developed by native tools.

The study has identified requirements for e-learning of socially disadvantaged groups of people. There is a need to focus on mainly three user groups with different approach to the LMS. The student's group has different needs then the lector's group.

One of the main focus areas was the process of creation and presentation of materials. There was a need to support both creation processes. The traditional one – uploading printer friendly format and the modern way – creation of materials online in digital interactive format. This allows rich evaluation features such as monitoring of learning process, monitoring of certain parts of educational materials and their evaluation, etc.

What is now needed is evaluation of the prototype applications. The feedback from target groups will be collected. A further study could assess the long-term effects of using mobile devices and applications in life-long learning. Internet and the modern devices are changing how the humans brain behaves and learns. There is a need to evaluate educational materialsand their effectiveness in general.

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Corresponding author:
Ing. Michal, Stočes
Department of Information Technologies, Faculty of Economics and Management
Czech University of Life Sciences Prague, Kamýcká 129, 165 21 Prague 6 - Suchdol, Czech Republic
E-mail: stoces@pef.czu.cz

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