FACILITATE ACCESS TO E-KNOWLEDGE FOR ADULT PEOPLE IN RURAL AREAS

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Abstract

Today's society especially in the western world is marked by life-long learning, because of an increasing technology development primary in Information Communication Technologies and because of an increasing need of up-to-date experts. In contrast to urban regions, the education in rural areas often is only possible virtually. Therefore, a various number of e-Learning Systems exist, that are oftentimes hard to use especially for less computer experienced users. For providing a facilitated access to e-Knowledge in such e-Learning Systems this paper describes an approach for developing an easy usable and understandable portal that furthermore aims to achieve a positive emotional feeling. These emotional aspects, subsumed in user experience, are a necessary factor if the user should be motivated and supported during his learning process.

Keywords: e-learning, learning strategy, learning in rural areas, e-learning portal, e-knowledge provider, virtual learning.

1   INTRODUCTION

Today's society especially in the western world is marked by life-long learning. This matter results in an increasing technology development primary in Information Communication Technologies (ICT). This technological development focus the creation of new effective and efficient systems that allow a higher productivity or quality and decreases the production cost, which is necessary for a stable and healthy company. But the goal of these new technologies is also to provide more possibilities for average users, so that they for instance can easily and cheap get updated about the status of their family members or friends over the internet. In this context ICT offers a wide range of possibilities, also for providing education with these technologies. Additionally ICT contributes to achieving universal education worldwide, through transfer of education and training, offering improved conditions for life-long learning, encompassing adults that are not participating to the formal education process and improving professional skills (UNESCO, 2009). And skills are today the main factor for wealth in a society.

A modern established method to provide flexible learning, especially for life-long learning for adults, is learning over the internet. By this kind of e-Learning, it does not matter where a specific user or student lives or tries to learn, the only requirement for accessing a huge amount of information and e-Learning materials is an internet connection. But in fact for this way of learning the user needs experiences in dealing with the internet and also with the learning platforms. Because of that fact often only younger students up to the age of approximately 30 years are able to use the existing e-Learning platforms in an efficient way. This young target group stands in opposition to the demographic effect that the average age of most of the European residents increases constantly. So it becomes a national and European challenge to support also the middle-aged adults for holding them up-to-date educated. But to provide an advanced education for these adult people is difficult, because it can be very time consuming and expensive, if they are trained on the traditional way with courses and tutors or trainers. So another approach is useful, next to the traditional advanced education.

In our paper we describe an approach to provide a facilitated access to e-Knowledge and to virtual learning. With the described approach we address especially older adults between the age of 36 and 50 to support them in advanced learning. This allows bringing them up-to-date, so that they can achieve a similar education level than younger once which e.g. coming from the university. For reducing the access barrier many aspects, next to the general strategy, have to be to regarded, e.g. usability and also user experience aspects to avoid that middle and older adults get overstrained, which results often in decreasing acceptance of the online learning strategy. So these technical features need to be hidden or so far reduced and abstracted that also these kinds of adults will

understand the usefulness. In this paper we also take care for such aspects and presenting a concept and implementation of an eLearning portal that is primary designed for supporting the needs and behaviors of middle-aged adults. The main contribution of this paper is the abstraction and reduction of learning functionalities, implemented in a well-known learning environment.

2   RELATED WORK

Today's e-Knowledge providers focus on portals, which enable a general and flexible access to the learning content. Most of these portals are generically designed, so that they can be adapted to many possible scenarios. But because of the flexibility and powerfulness for providing the feature of expandability they become very complex, so that especially non-experts have problems in using such portals. A well overview about exiting e-Learning Systems is given in the paper of Hauger et. al. [2], including the supported features, especially with focus on collaboration tools.

CLIX [5] is a commercial learning software solution that supports all kinds of teaching and learning processes, next to the administration of content. It also allows the management of users, roles and groups. The system can be extended by auxiliary features in dependence of scenario and project.

ILIAS [6] is an open-source Learning Management System (LMS) that regards the public available e-learning standards. The service-oriented character of this LMS is an exceptional feature compared to other systems. Current developments are done by a collaboration network of several universities and companies.

ATutor [7] is an open-source Learning Content Management System that is initially designed for people with disabilities. To regard this aspect, the system was not released before 2 studies that confirm this fact. Also the further planned features are regarding these aspects, so that most of the additional features will be barrier free too.

Moodle [8] is an open-source Learning Content Management System which counts to the most established and commonly used learning platforms. The contents are primary organized in courses.

3   USER REQUIREMENTS OF ADULT PEOPLE IN RURAL AREAS

The RURALeNTER project aims to support the building of ICT skills in rural areas. For creating new strategies to achieve that, in an early phase of the project a requirement analysis was conducted to determine the needs and behaviors of rural adult people. In that requirement analysis the target group of rural adult people was characterized with an age between approximately 36-50 years. The ICT skills of subjects were on a basic up to medium level and the professional profiles were diverse and depend on their homeland. Most subjects were workers or entrepreneurs.
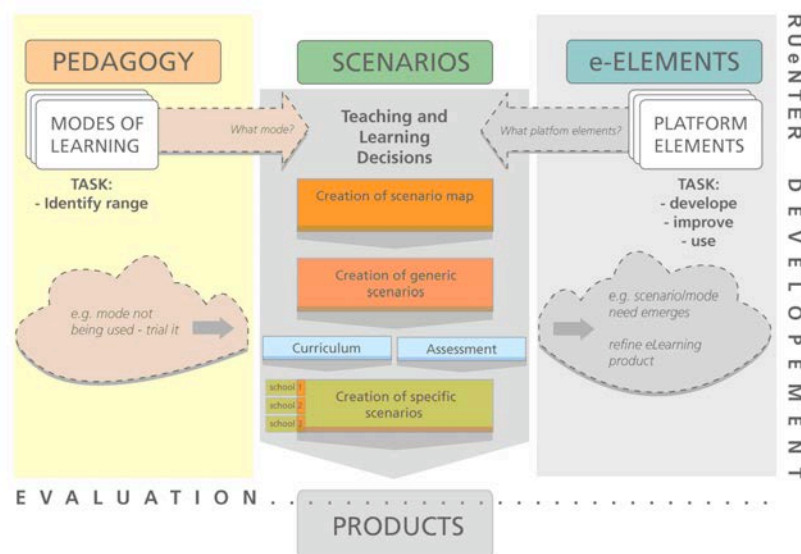

Figure 1. General project scope of RURALeNTER

Next to these different professional profiles also the personal opinion about which ICT skills should be improved and trained were diverse. But there are also some aspects that were ranked as necessary in all of the participating countries. The ICT skills that are relevant in all participating countries are the needs for: digital literacy, awareness regarding e-services, professional and economic development, to stimulate new learning culture, access to public services and access to computers and internet.

Basing on this extensive requirement analysis it is possible to derive general requirements for an e-Knowledge provider. Because of the low skills in ICT, the graphical user-interface (GUI) has to be designed clearly and easy understandable. The provided and visible functions for organizing the content, the learning materials have to be reduced on the relevant once, especially for the rural adult users. As far as possible, less relevant functions have to be hidden or set automatically by the system with default values or by automatic detection methods.

4   FACILITATION THROUGH SIMPLIFICATION AND USER EXPERIENCE

The default method for making the access to technical systems easier is to reduce its complexity and number of functions. But this practice is not effective, because by reducing just the provided functions, the system's use-case scenarios becoming decreased too. For avoiding still decreasing functions, the definitions of roles are useful [9]. This enables the possibility to regard different degrees of experiences in working with a system. For instance an expert, who deals as an administrator get the full list of functions. But a novice or a normal user gets just the basic functions for his work with the system. In the area of e-learning there are also kind of trainers/teachers, which need more functions and skills to submit learning content and training materials, but they need less functions than administrators. By a role-based approach the functionalities can be defined for the needs of every role. So every kind of user gets the functions according to their role respectively the needs for his work.

Next to this simplification, Hassenzahl [3] gained the emotional design term a significant attention in the context of Human-Computer-Interaction (HCI). This emotional design was initially identified as relevant by Norman [4]. By an emotional design, the focus lays on positive affective reactions and the feelings of users during the interaction with a technical system. For a so called "hedonic" interactive system Hassenzahl claims an understanding of the link between designable product features (e.g. functionality, presentational and interactional style, content), resulting product attributes (e.g. simple, sober, exciting, friendly) and the fulfillment of particular needs [3]. For ensuring such aspects like emotional designs, the established systematic user-centered design processes, like the approaches for usability engineering according to Nielsen [10] are not appropriate [3].

For ensuring the emotional aspects another design process is required that is focused on the target users' perceptions during the whole development process. This emotional aspect is a very important aspect of user experience. A development progress approach that is established especially in designing websites with a good user experience was published by Garrett [1]. Although this approach was initially focused on designing websites and web-applications, it is also easy adaptable to local desktop applications.

This progress (see Figure 2) starts with the first aspect, the strategy of the system. This includes the site objective and an analysis of user needs for the website. In the second phase the functional specification has to be defined. All possibilities which the website should cover will be defined in this phase, the basic functions as well as professional functions which will only be available to experts. Next to the functional specification, the content requirements have to be defined. For Instance: What should be shown on the website? What target group should be addressed – experts or novices? In the third phase, the structure phase, it becomes more practical. The specification of the interaction design defines the general form of interaction. The information architecture describes how the available content is organized and structured, in particular if there are different abstraction levels. The fourth phase specifies the skeleton of the website. This includes two important aspects: On the one hand the interface design, for instance the placement of the main content area and on the other hand the navigation design, for instance is there just one menu area or are there different menus with different objectives like a differentiation for legal information, content navigation and special topics. The most concrete phase and the end of the progress is the surface. Here the visual design is defined e. g. colors for a menu bar or the text style and color. After this phase the website development is finished.
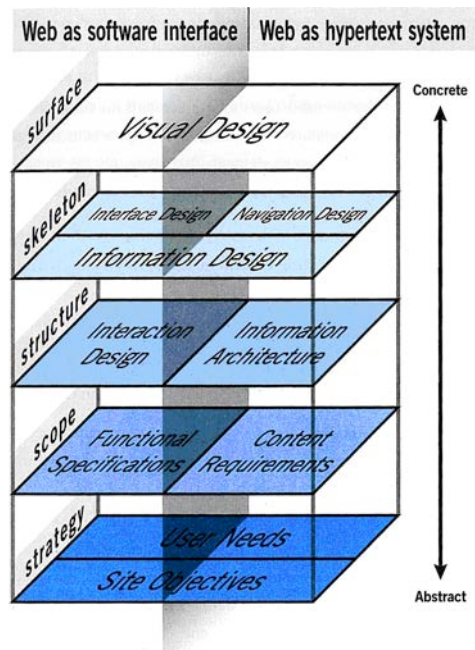
Figure 2. Progress to UX-supported software [1]

Sure, this progress is no guaranty that all aspects for a good user experience are regarded, but it is an established strategy to take care of the most important steps within the development process for a website. Because of our goal to create an attractive and easy usable portal for providing e-Knowledge to primary novice computer users, we decided to orient us on Garrett's progress. This ensures that the focus is on the needs of the final users during the whole development process.

5   CONCEPT FOR AN EASE OF USE E-KNOWLEDGE PROVIDER

For development of a portal that regards the specific needs of rural adult people, we focus on the aspects that were described in the previous section. For concentrating the effort on relevant aspects, we do not decide to create a new portal from the beginning. Instead we decided to extend an existing and well established e-Learning portal that includes functionalities for general extensions in the case of fundamental requirement changes. One of the most established and used e-Learning systems is the Moodle platform [8]. It provides the most relevant features for organizing e-Learning courses and corresponding content. Furthermore it is highly interoperable and thus allows a flexible reuse of created contents also in other portals and systems. In addition to our goal of creating a portal specially designed for rural adult people, it also allows the modularization via plugins and offers an easy understandable code structure, so that also basic changes are practicable with small effort.

The first aspect is a reduction of functionalities in dependence of the needs. In the previous section we introduced an approach by enabling different and additional kinds of features relating to a defined role system. The idea of this approach is that different roles are defined with specific functions that are necessary for an actor of this role. In our portal for rural adult people we define a hierarchical role-system (see also Figure 3). The lowest role level is the *unregistered visitor*, who only gets read-access for basic courses. For the *registered visitor* it is also allowed to write some answers or questions in a forum and to contact trainers regarding course contents. Both roles have a similar view on the data and similar functionalities. The functions are reduced on basic elements for working with the provided materials.

A bigger difference exists to the next role level, the *trainers*. Trainers can create courses, upload contents and organizing the course participants consisting of unregistered and registered visitors. The functionalities are extended for the support of course and content management functions. In difference to the default Moodle-settings, the organization options for making backups etc. are removed, next to some others. This avoids mistakes during the interaction, because most pedagogues are not familiar with the technical features like the backup function. Furthermore these features are not relevant for the organization of courses and contents. The highest role level of the portal is the role for *administrators*.

Here all available functions will be presented, also special functions for making backups or the feature for an import and export of courses.
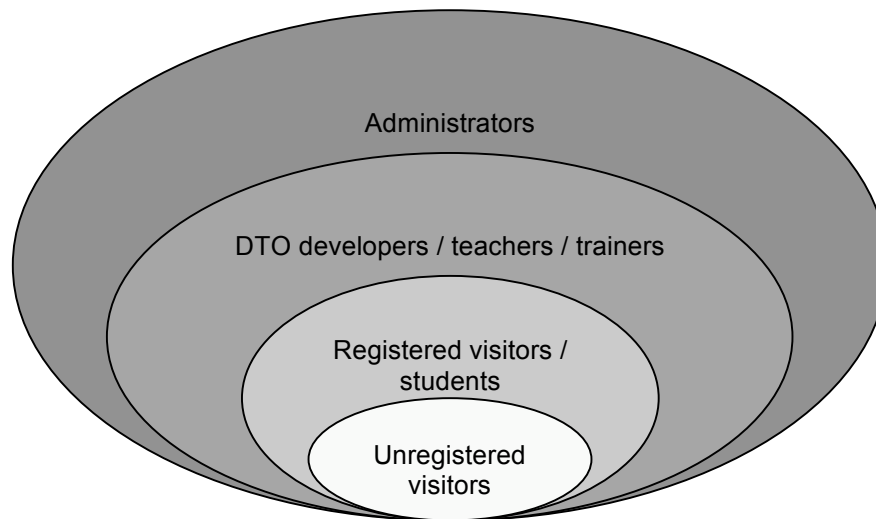

Figure 3. Overview about the existing roles in the portal

Another challenge is that sometimes users are acting in multiple roles. So an administrator can act as trainer and visitor too. For providing just the required features, every user can switch from his highest role level to a lower one. This also allows an evaluation if special permissions are given correctly to the course participants, e.g. forbid to answer on some forum threads.

To enable a positive emotional experience, the described development progress of Garrett should be regarded. In the first phase, we defined the site objective, users especially from rural areas should get access to learning materials e.g. for improving their skills to ICT. The access has to be easy to handle and has to support the learning process of the user, so the chronology of the provided contents grouped in courses and the typical process of a learning line of human beings must be similar. As site objective the portal needs basic features for showing the courses with its goal and the learning contents. These courses are generally structured in different categories, like the existing different languages of the content materials and the learners' skills level e.g. different courses for beginners, advanced users and perhaps experts. In particular for regarding skills level of the addressed users, the content has to be well designed to avoid overcharging and undercharging. The interaction design has to be clearly defined. Typically the computer is the normal used technical system of computer beginners so that the traditional interaction methods by mouse and keyboard are most relevant. To enable an easy understanding of the information, they are classified just by their category, which includes the skills level and the language of the course contents and the course names the main topic of it. Every course consist of different sub-topics that describe a single aspects. The skeleton is dominated by two aspects: (1) the interface design and (2) the navigation design. For beginners it is recommended to use only one menu and one content area, so that they will have an easy understandable page structure. The navigation design should group functions abstract and logically. It is also recommended to show a breadcrumb trail, which offers the user an easy understanding on the actual state and information level of the portal. The last phase of the development progress is the visual design. An attractive graphical user interface generates a positive emotional feeling when using a portal. Together with previously regarded aspects e.g. clearly defined navigation strategies, the user get a facilitated access to e-knowledge.

An additional feature for supporting positive emotions during the work with a system is the integration of social networking features like facebook. The work with the system becomes more interesting, if the users can do it with others together. Facebook allows people to communicate and share information about all their everyday activities and events. The integration of such social-networking tools provides an essential benefit. The typical forms of internal messaging services within community portals are sometimes very formal. The support of messaging through social networking sites like facebook offers a more informal and therefor direct communication that result in a better emotional feeling during the use of the portal and often a better feedback to questions too.

6   IMPLEMENTATION OF THE E-KNOWLEDGE PROVIDER

The implementation of the described progress orients strongly on the concept. Our focus is on supporting the needs of the rural adults and to support the learning process. For the general features we decided to use Moodle, so we do not have to develop all functions for user management, role organization, courses and contents management, etc. We still have to take care for the aspects of the facilitate access.

The main challenge was to provide a clear interaction and navigation strategy. So we created a new theme that collects the most relevant aspect in a single menu. The site starts typically in the native language of the country the visiting user comes from. Furthermore there is just a single content area. The entry page consists only of an introduction text, an overview of the available course in dependence of the users' language and a list of courses in other languages or for other skill levels.
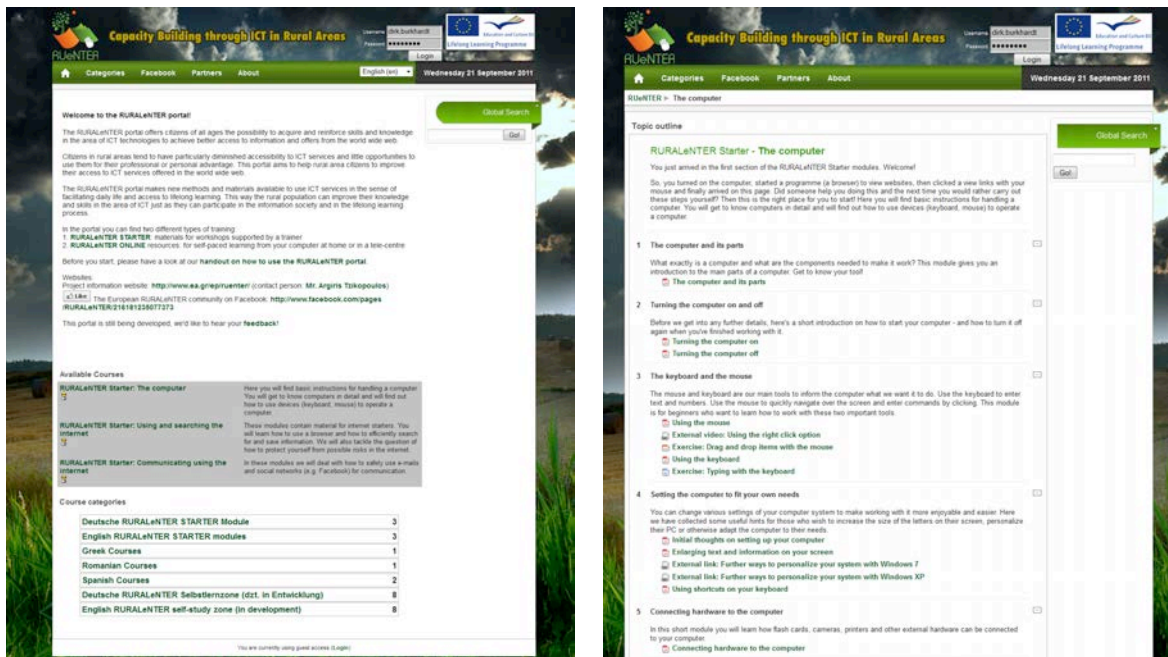

Figure 4. Screenshot of the RURALeNTER portal (left: entry page, right: course view)

The role system was implemented like it is described in the concept section. In connection to the active role, the menu changes the provided function (see Figure 5). This offers an adequate menu with just the needed functions for the typical work scenarios of the user.
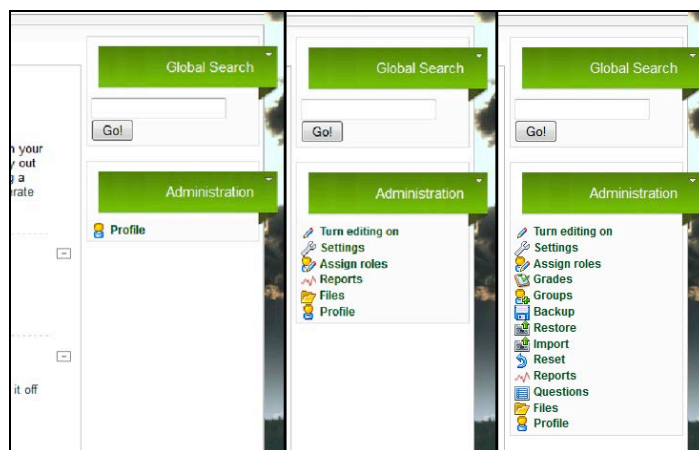

Figure 5. Adapted course menus to assigned user role

To support the social-networking tools we used a plugin that allows the integration of facebook and also a communication over facebook. Internally the portal account is linked with a facebook account that allows an individual configuration which communication should be done over facebook and which data should be committed to facebook.

The final portal is available under http://www.ruralenter.eu.

7   DISCUSSION

In the current version we only use default HTML elements for showing the information to the users. In one of the first drafts we planned to use an interactive visualization system, the SemaVis-framework[1] [11] which we developed for visualizing semantics data-sources. This system enables the possibility to show information with its semantic relations. In Moodle the data are stored in a metadata structure that is similar to common semantically based data formats so that the use is in generally possible. A challenge we noticed is, that most beginners have no experiences in working with non-list based visualizations. It was difficult for beginners to understand the usage of such interactive visualization, as long as they do not understand the general metaphor. In consequence we had to skip the integration of the visualization system for the RURALeNTER portal, because most of the users are computer novices.

On the one hand, these graphical visualizations are useful, as long as the user knows the underlying interaction metaphors. For these users the user experience increases and they also have a positive emotional feeling during the interaction. On the other hand, if computer novices have to be addressed, who do not know or understand these interaction metaphors, they will dissatisfied and have a negative user experience and emotional feeling. It is an important point, if an approach exists which makes such graphical visualization easier understandable for very computer novices, so that all user groups will profit from such a visualization system.

8   CONCLUSION

In this paper we presented an approach for providing e-Knowledge by a facilitated access. This offers especially computer beginners access to materials for improving there ICT skills or perhaps start learning the basics surround this topic. E-learning is an adequate way for considering special needs of rural adult people, who do not have the possibility of visiting adult education centers like it is possible in urban regions. But in perspective of demographic changes in the western world the adult people are a very important target group for the economy, because the need of experts increased in the last years, but the younger generations cannot assign all available experts positions. It becomes necessary to bring the knowledge of adult people up-to-date, so that they can fill some of the open expert positions. But learning concepts like they do exist in urban region by adult education centers are not appropriate for adult people in rural areas, because of the costs e.g. for traveling. An alternative strategy to provide an advanced training is learning over the internet by using e-Learning systems. But the challenge of most of the available e-Learning portals is that they are often hard to understand for adult users. Often basic elements like the structure of the website or the menu will not be understood so that users become dissatisfied.

To offer an easier understanding, we introduced a strategy to simplify the user-interface to relevant functions in dependence of the role. On this way the functions are limited to the needed one, so that users are not confused. Furthermore the paper introduces a development progress for developing systems with a high user experience. In contrast to usability, user experience aims also the emotional aspects, so that users will have a positive feeling during the work with technical systems. To support computer novices during their learning process it is important that the system provides a kind of "fun-factor" and offer a new experience to the user. To stay in contact with other people we also take care of the integration of social communities that offer an easy and direct contact possibility to other users. This integration allows users to share existing questions or experiences and supporting so each other mutually.

The finally created portal enables most required features for supporting learning of less computer experienced people in rural areas. Currently the project is in the evaluation phase, which also evaluates the technical aspects and feedback of test persons relating to the portal.

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[1] More information about SemaVis at: http://www.semavis.com

ACKNOWLEDGEMENT

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