Actual demands based knowledge intensive technological model for lifelong learning development in Vidzeme Region

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***Abstract*—** Nowadays in extensively changing environment lifelong learning is becoming an integral part of everyday life. All regions in Latvia face a challenge that the capital city is attracting many well educated residents to work there. There is no all-inclusive technological support or roadmap available for adult education in the regions of Latvia that could foster identification and acquisition of required knowledge, skills and serve as uniting element for learning, work and personal time. Thus it is significant to develop a framework encompassing identification of required competencies, technological support for lifelong learning and make it as part of an ongoing process. The goal of the paper is to design a required knowledge and competencies identifying technological model that would serve as a roadmap for lifelong learning stakeholders in the Vidzeme region. The focus of the paper is identifying the major steps and elements required to design and incorporate latter mentioned lifelong learning process and particularly adult education perspective supporting technological model in the Vidzeme region. Literature review has been conducted regarding different adult education supporting technological platforms and adult education processing in European Union's regional context. The necessities and development directions of the Vidzeme region's municipalities in line with national and European Union level initiatives have been researched for the aim of enhancing the efficiency and quality of the region's adult education perspective and capacity. The paper represents the theoretical prerequisites for the qualitative advancement of lifelong learning process in the Vidzeme region and presents lifelong learning stakeholders inclusive technological model that would equip the lifelong learning process with ongoing technological support and sources of actual knowledge and management information.

***Keywords*—**Lifelong learning, knowledge, regional development, technological model.

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I. Introduction

In the end of last century one is an eye-witness of a historic change from the industrial age to the information age. Industrial age is related with such elements as development of material products, consuming them, following fixed procedures and routines. On contrary information age is tied with production and usage of information, deployment of ad-hoc solutions and being accustomed to use a wide variety of information types for decision-making purposes. Creation and usage of information has grown very rapidly over these years. People have experienced such phenomenon as information overload. Work equipment and machinery become more complex and sophisticated. Accordingly this requires more skills and knowledge to operate them. Thus it leads to acknowledge that knowledge has become a highly valued asset. A way of obtaining new knowledge and skills already for a while has been seen as an actual aspect of adult and continuing education and it shows no signs of losing its importance. In contrary new directions for adult and continuing education are looked at [1].

Adult and continuing education is also actual in the context that all regions in Latvia face a challenge that the capital city is attracting many well educated residents to work there. It is a problem that there is no all-inclusive technological support or roadmap available for adult education in the regions of Latvia that could foster identification and acquisition of required knowledge, skills and serve as uniting element for learning, work and personal time. Similar situation related with loosing well educated individuals in regions also is observable in other European Union (EU) countries [2], [3]. Professor P. Juceviciene [2] from Kaunas University of Technology in Lithuania (i.e. a neighboring country of Latvia) states that 'in the recent two decades Kaunas has faced brain drain and extensive emigration of skilled laborers. On the one hand, people are leaving to other countries for economic reasons; on the other hand, young people tend to leave the city for better employment opportunities and a more diverse cultural life in other places of Lithuania, above all – Vilnius as the capital'. Prof. Juceviciene is involved in the project with a goal to work out a roadmap for city of Kaunas to be a sustainable learning city. One of the focus points is educational sustainability. There have been other similar projects focusing on regional

development (e.g. in South Denmark Region, Stuttgart region, Rhône-Alpes, region of Lombardy, Pori region, East Sweden and Dorset region) and particularly also on adult continuing education and lifelong learning as such [4]. Based on Hansen et al. [4] there has not been a fundamental conception of how lifelong learning is vital for regional development all together. As per Gray cited by O`Grady [3] in some regions lifelong learning is regarded as a neglected subject and it is pointed out that lifelong learning is both critical to lives of residents and supportive to tackle important economic, social and political tasks in regions.

Based on Interreg IVC analysis report by Galjaard [5] especially in EU areas with declining population it is huge problem to maintain high-quality education systems. Thus there is a need for new and innovative approaches towards adult education and distance learning. This also is regarded as the actual focus point of this paper. The goal of the paper is to design a required knowledge and competencies identifying and fostering technological model that would serve as a roadmap for adult education stakeholders in the Vidzeme region. The overall focus of the paper is identifying the major steps and elements required to design and incorporate latter mentioned adult education process supporting technological model in the Vidzeme region. Valuable experience is gained by Kainu region in Finland by developing e-learning strategies in sparsely populated areas with focus on usage of ICT for training employees of regional companies [5]. Based on OECD [6] report Iceland developed its approach to support residents in their country with sparse population. It is based on distance-learning made available by twelve lifelong learning centers serving all education levels. The question is what are the building blocks forming a roadmap and technological support solution in Vidzeme region to combine actual learning needs and serve as a uniting element for adult and continuing education?

This paper is related with a broader research focused on development of lifelong learning strategy framework for Vidzeme region. This broader research encompasses several projects. At this stage of the research this paper reports on results of one particular project and focusses on actual demands based knowledge intensive technological model for lifelong learning development in Vidzeme Region.

II. Theoretical Background

Basic notions of adult related learning approaches are identified before to focus on different adult education supporting technological platforms. Based on The Canadian Encyclopedia [7] adult education is regarded as both a field of study and a field of practice. 'According to UNESCO, as a field of practice adult education denotes the entire body of organized educational processes, whatever the content, level or method, whether formal or informal, and whether the processes prolong or replace initial education in schools, colleges, universities or apprenticeship systems' [7]. More specifics are given by stating that the term "adult" typically relates to someone beyond the legal school-leaving age, and that term "lifelong learning" is also used to refer to adult education. Livingstone [8] regards to adult education as adult learning and identifies several basic forms of learning (e.g. further education and informal learning) which are contained by notion of adult education. Knowles [9] states that adult education is also regarded as andragogy and that andragogical theory is based on several assumptions making it different from pedagogy (i.e. changes in self-concept, the role of experience, readiness to learn and orientation to learning).

Adult education can be viewed via different methods of learning such as face-to-face learning, distance learning (i.e. mainly in online environment) and blended learning. The latter one tries to combine both a traditional way of learning and distance learning benefits and advantages, and in the same time excluding any shortcomings of both latter mentioned learning paradigms [10]. All three of noted learning paradigms make use of ICT solutions support.

Usage of ICT for support of adult education initiatives has become rather widespread. In last couple decades different adult education supporting technological platforms have been researched and developed. There are several terms [11], [12] [13], [14] used to regard different type of education supporting technological platforms (e.g. learning platform, e-learning platform, e-learning system, learning management system or virtual learning environment). Ardito et al. [11] states that e-learning platform is education supporting environment encompassing tools, services and several attributes. It is a teaching and learning toolset to foster a student's learning experience by involving ICT and Internet solutions in the learning process [12]. In comparison to latter mentioned e-learning platform a one with more functionality equipped is named learning management system (LMS). LMS assembles and delivers learning content, helps to automate reporting on training, administration and tracking [14].

There are taken several approaches to come up with technical solutions for e-learning platforms, LMS and for other type of e-learning systems. Several research paths follow the idea of using artificial intelligence (AI) methods and techniques to develop software solutions including e-learning systems supporting applications. Among several such approaches there can be pointed out genetic algorithms [15], neural networks [16], fuzzy logic [17] and software agents based e-learning systems supportive functionality, [10], [18], [19].

E-learning support systems have been considered also in light of knowledge management and particularly personal knowledge management system [20], [21] based on software agents and mobile technology solutions. The notion of knowledge management usually is viewed in the context of an organization and it is defined from several perspectives such as process perspective, organizational perspective, systematic and formal perspective. However personal knowledge management is viewed in the context of an individual noted as a knowledge worker performing a knowledge work. Different stakeholders,

involved in the process of adult and continuing education, are knowledge workers as well each one focusing on their own perspective of knowledge.

There are developed e-learning platforms based on mobile solutions [22], [23]. Another adult and continuing education supportive technological solution focuses on already existing skills of learners for learning purposes. Particularly a well-rounded approach is developed by Kapenieks et al. [24] focusing on multi-screen e-learning development entitled "eBig3". This is a technology supported new lifelong learning education paradigm utilizing and combining widely used technologies of Internet, television and mobile phones [25], [24] in a one combined solution.

Altogether there are a number of more widely used e-learning platforms and learning management systems supportive technological platforms – both commercial and open-source ones. Thus it is not an easy task to choose the best-rounded platform. Several e-learning platforms and LMS comparisons and evaluations have been done. Based on qualitative weight and sum (QWS) approach 36 platforms have been evaluated according to minimum criteria [26] and afterwards nine of them have been looked in more details. These nine platforms selected out by Graf and List [26] are ATutor 1.4.11, Dokeos 1.5.5, dotLRN 2.0.3, ILIAS 3.2.4, LON-CAPA 1.1.3, Moodle 1.4.1, OpenUSS 1.4, Sakai 1.0, and Spaghettilearning 1.1. Evaluation results are based on several categories (i.e. Communication tools, Learning objects, Management of user data, Usability, Adaptation, Technical aspects, Administration, Course management) each having a number of subcategories. Within this work among other evaluation categories focus is on platforms' adaptation options. The result of the study shows that Moodle LMS outperformed all other platforms and did well also in adaptation category [26]. Another open-source e-learning platforms evaluation is done by Saeed [27]. In this case for a detailed comparison are chosen +CMS 2.0.0, ATutor 1.5.4, Claroline 1.8.1, Dokeos 1.6.4, Drupal 5.3, Ilias 3.8.3, Mambo 4.6.1 and Moodle 1.9. In this research the following categories and their subcategories are used: Security, Performance, Support, Interoperability, Flexibility, Easy of using, Management, Communication tools, Administration tools, Course delivery tools, Content development. The best results are reached by ATutor 1.5.4, Claroline 1.8.1, Ilias 3.8.3 and Moodle 1.9. However also in this comparison Moodle outperformed the other platforms.

One more comparison of open source learning management systems is performed by Cavus and Zabadi [28]. They picked six platforms: ATutor, Claroline, Dokeos, Ilias, Sakai and Moodle. In this research Claroline has showed some good results, but Moodle is a leading platform also in this case. Overall analyzing different open-source LMS comparisons done so far [26], [27], [28] Moodle stands out as the best-rounded LMS.

III. Approach

The research conducted and described in this paper is part of a larger research containing several projects. At this stage of the research this paper reports on part of results of one particular project. It is regarding developing a technological solution to support a lifelong learning process in Vidzeme region and particularly focusing on actual demands based knowledge intensive technological model for lifelong learning development in Vidzeme Region.

Several constraints have been identified and evaluated to take into account while conducting the work with subtasks within this part of the project.

As it is stated by Luka [29] in regards of Lifelong learning in the national perspective of Latvia so accordingly it also is applicable in the Vidzeme region – i.e. lifelong learning is provided by the initiative and support of local governments, the only regional higher education institution – Vidzeme University of Applied Sciences, couple subsidiaries located in Vidzeme of other higher education institutions of Latvia, private education centers, non-governmental organizations, etc. Thus the offer and availability of adult education and lifelong learning in general is fragmented and lacks uniformity. In addition there is weak collaboration among adult education providers [29]. Thus one of the constraints and targets is to develop a technological solution that would serve as a one stop area for people involved in adult education in Vidzeme region.

Republic of Latvia issued "Education development guidelines for 2014-2020" [30] where among other aspects of education are given milestones for lifelong learning aligned with Europe 2020 strategy [31] guidelines. Concerning adult education among others as most important ones there are following development indicators set: number of involved persons in education (age group 25 to 64 years), number of adults from total which are involved in continuing education or are returning in formal education, and number of persons whose competences outside formal education have been evaluated. Another milestone is to reach 15% of adults (age group 25 to 64 years) to be involved in continuing education by year 2020 (i.e. in line with Europe 2020 strategy). One more is related with the number of adults being employed right after finishing continuing education courses or continuing to work in their current positions with enhanced set of competences. Also adults should have opportunity to take part in adult education process as close as possible to their place of living. There is also set a requirement that within this European financial planning period the adult learning requirements and initiatives should be assessed locally in regions and aligned with national and European guidelines. Then there should be adjusted the current adult education study courses and programs based on this regional assessment of actual demands of labor market.

The research done has been divided in several steps in order to encompass latter mentioned constraints and milestones: to research European, national and regional strategies, guidelines and other related documents; to

participate in yearlong Vidzeme Planning Region [32] project to evaluate current development status of Vidzeme region and to work out a VPR sustainable development strategy for 2030 including the aspect of lifelong learning which is of a particular interest for us; to research several adult education supporting LMS and e-learning platforms; to combine found results and to develop actual demands based knowledge intensive (i.e. aligned with regional demands) technological model for lifelong learning development in Vidzeme Region.

IV. Developments

By performing latter mentioned steps and combining found legislative constraints and LMS platform available functionality options there has been designed a required knowledge and competencies identifying and fostering technological model to serve as a roadmap for adult education stakeholders in the Vidzeme region (see Fig. 1).

This is adult education stakeholders' inclusive technological model that equips adult education process with ongoing technological support and sources of actual knowledge and management information. Local stakeholders including local governments, companies and individuals are used as the source data providers for adult education needs requirements (i.e. aligned with European and national guidelines) for a set period of time. There is used a specific approach to acquire demanded skills and competences information – demands acquisition system (DAS) to perform required competences data acquisition from involved parties. The details of the DAS are still being worked out. As the result there is obtained a list of adult education required skills, knowledge and competences demanded in Vidzeme region per county, based on different types of involved parties (e.g. individuals, legal persons, etc.) and total list. Local governments set clear demands for adult education service providers for a set period of time based on

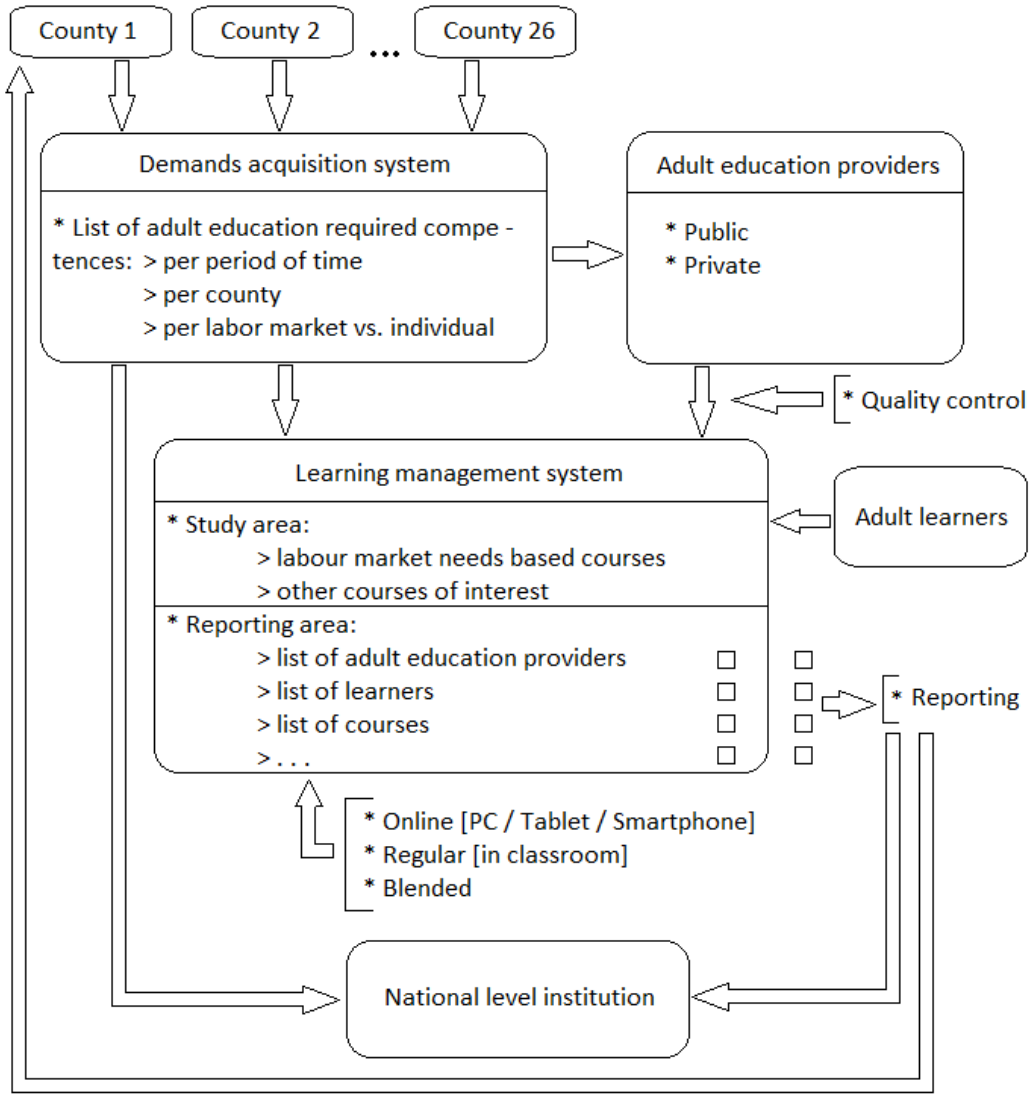

Fig. 1 targeted knowledge fostering technological model for adult education development in Vidzeme Region

acquired list of required competences. It is especially so in case of competences demanded by labor market as Vidzeme region can forward this information to national government which in turn may consider to provide a financial support for running accordant adult education courses. In turn adult educators will be suggested to adjust their offer so that they match with labor market identified competencies needs and especially in case if educators plan to apply for financial support to national government. These acquired skills, knowledge and competences then are clearly stated in the study course and program descriptions hosted on the chosen LMS platform.

Based on previous evaluations, comparisons of different LMS and requirements set by the project funding municipality of Valmiera (e.g. that the LMS should have well developed support for mobile technology users) the Moodle has been chosen as the learning management system and technological component for this technological model. This model implies that Moodle is not just used as a platform for hosting adult learners' profiles, different adult education providers' profiles and their offered study courses in Vidzeme region, but also it is adjusted to provide valuable statistics and reports for local governments of the region and for national government as well (see Fig. 1).

As the result of the conducted research and developed technological model several major steps have been identified to incorporate latter mentioned adult education process supporting technological model in the Vidzeme region. These include: acquiring as much as possible support from involved and interested local government of Vidzeme region, to clarify and to develop DAS in partnership with other stakeholders, to adjust and properly configure chosen LMS platform for adult education study purposes and for reporting and statistics acquisition purposes, to introduce LMS platform with adult educations providers, to introduce quality control mechanism.

V. Results

The developed adult education supporting technological model combines several areas of adult education process in Vidzeme region: involvement of different type of stakeholders in the development process, competences and skills demands acquisition system, public and private adult education providers and the study process, several reporting options and statistics. Such technological framework helps to plan and to perform education activities, and to evaluate obtained results of Vidzeme region adult education process for a larger period of time.

VI. Conclusion

Deployment of the developed adult education supporting technological model in Vidzeme region can build a new, more efficient approach to the next generation technologically enhanced lifelong learning process management.

It is the next step to introduce developed adult education supporting technological model as a working prototype in Vidzeme region. This next step involves developing the demands acquisition system (see Fig. 1) and the quality control mechanism, and accordingly to configure chosen LMS platform to support both study process and extended reporting process.

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