



Knowledge Bases as a Support to the New Distance Learning Concept

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Abstract - *In this paper we deal with knowledge bases that can provide different decision making and participation in the system of distance learning. In addition to classical learning now it is necessary to acquire new knowledge and later in the workplace. The fact is that the employees who have been doing their job in one way now they have to perform it on completely different way and they must accept the new way of learning while working. The new concept of observing the system of distance learning that we propose here can to those who are thinking about organizing (implementation) and to those who wish to attend such an education in a faster and easier way reach the necessary knowledge on distance learning (e-m-Learning). For the knowledge base is used Protégé platform of an open source. The knowledge base is updated with the sufficient amount of knowledge in order to be fully able to look at the new concept although some specific knowledge will not be covered.*

Keywords: *Distance learning, knowledge bases, e-m-Learning*

I. INTRODUCTION

The educational system of a country is designed to prepare the upcoming generation of useful and successful members of the society in which they would live. Educational institutions (schools, colleges, educational institutions) do not fulfill that task in a satisfactory way for a long time now, especially in the segment of how to teach a student (student, attendant), to learn, that is to self-learn. Small number of curious people wants to know and understand everything and a growing number of those who do not know many details and links which we insert in the field of basic or general culture. Learning is seen as something for which there is no time and something that is burdensome and frustrating.

Experts in this field agree that it is high time for a different kind of learning. Now business owners expect of their employees to know the basics of working on a computer and to effectively use proper tools and telecommunication equipment. Employees seek that the educational workers have the ability to transform the information into knowledge and knowledge into practice. Castells (2001)[1] believes that educational system nowadays is unable and not ready for new forms of learning and that even there where there is a required technology lacks in trained teachers and in pedagogical knowledge in the area of education. It is certain that the use of the Internet in the educational process is in the significant increase, but studies show that the quality of Internet use in the classroom depends entirely on the quality of the teacher Bolta (2000) [2]. It is noticeable the imbalance between investments in information and communication technologies on one hand and investments in education and training of the teachers who need to handle these technologies on the other hand. The digital divide as one of the negative consequences of the introduction of new technologies leads to the increasing differences in the knowledge of those who are the first to have realized its potential and have had access to them and those poorer who have not grasped its opportunities fast enough or they haven't had the resources for its procurement.

The great advantage of distance learning is the possibility of choosing the manner in which you will learn ,when and where you will learn and the pace at which you will learn. To all participants it was allowed and facilitated to participate in the highest quality and most prestigious programmes that are offered and which they can choose. In the former Yugoslavia the distance learning system of the LINK groupe from Belgrade, which is based on the use of modern information and communication technologies in all elements of learning process, is very widespread.

II. DISTANCE EDUCATION

For education (learning) at distance there is no unique definition and they changed over time and very often depending on the development of technology by which they have been implemented Cotton (1994) [3]. With most of the definitions it wanted to include the science of teaching at distance and its final result the distance learning and it especially implies on the field of higher education, because there the distance education first appeared.

In the journal "The Quarterly Review of Distance Education" distance learning is defined as "institutionally based formal education where the groups that learn are separated and where systems for interactive communication to connect teachers, students and resources are used."

American Association for Distance Learning (The United States Distance Learning Association) [4] defines the concept of distance learning as "the acquisition of knowledge and skills through indirect information and directions, by using different technologies and other forms of distance learning".

Distance learning is in the English version of the Wikipedia defined as "a learning method which doesn't require that the students are physically present at a specific location during lectures." This kind of learning opens up new opportunities for a lifelong learning of interested of all ages. This gives them a chance to get specific degrees or certificates of almost every online organizer of such education.

In the action plan of the European commission e-Learning is defined as (e-Learning Action Plan: Designing Tomorrow's education (2001)) is defined as: "The use of new multimedia technologies and the Internet to improve the quality of learning, by facilitating access to sources and services as well as the exchange of knowledge and cooperation on distance." We can say that e-Learning is learning with the help of information and communication technologies.

Often the terms as online learning, online teaching, distance learning are replaced with the term distance education. This notion is wrong considering that the professors control the content and the mode of transferring the teaching material while the student is responsible for learning. Distance learning is the result of the distance teaching and learning and together they form distance education.

New technological solutions and especially the development of the Internet have enabled a great expansion and gave a new impetus to distance learning Holden (2006) [5]. Now that form of education is called "modern distributed learning" because the distance learning is the system and the process of connecting students with the distributed educational resources.

By defining distance learning Garrison (1987) [6] discusses about main characteristics of distance learning while emphasizing that: distance learning implies quality communication between professors, lecturers and students.

III. SOFTWARE FOR e-m-Learning

Educational software is a computer software or software for mobile devices designed for education. It can be used to create educational courses by lecturers and the students of the courses and also for monitoring of the work and progress of students. Those are the tools that should not be considered as the substitution for classic books and textbooks, but only as a complement to the educational process Miloradović (2010)[7].

In order for the materials created in one tool for e-Learning could be able to switch to another it is necessary that the both tools support the same standard. Currently there are four organizations which work on the standards for e-Learning, problem is that they do not work on unique standards rather than each creates its own.

Why should we use certain tools and standards? First of all, to ensure the following:

Anywhere, anytime, anyone – all those who teach can easily and simply distribute data and information necessary for learning. Lecturers (experts, professors and teachers) as well as students can access those materials from a place and at a time that suits them the most.

Quicker adjusting of the students to the educational process- by using these solutions the students do not suffer from the fear that they would make a mistake but they freely explore and test all the solutions which they consider to be good.

Consistency of data – these arrangements provide that all students see the same material regardless when they watch it. That is how is avoided the risk that the part of the students (users) saw a part of the material and the other part didn't. It should be ensured that all participants see the same material in the same way.

The possibility to measure efficiency – almost all solutions ensure the possibility of tracking the results of the work of students and it can be accurately and easily seen how one spent time on learning and how much his productivity has increased.

Reducing the cost of learning – according to Brandon-Hall.com organization engaged in measuring the performance of students that use e-Learning and with this education are realized savings from 40-60% for large business systems. According to their research IBM has achieved savings of nearly 200 million dollars in one year while using e-Learning.

Less time for learning – such solutions provide greater opportunities for studying the materials because each candidate can monitor and overcome materials at a pace that suits him best. In this way it is avoided the burden which exists with classical learning in a group wherein the individual has to adjust to the group.

Higher memory content- according to the research of the Research Institute of America it was found that 33 minutes after the completion of learning with the instructor in a whole the students remember about 58% of the material that was processed. Until the next day they remember about 33% and three weeks after the training they remember about 15% of the acquired knowledge. While with the instructors the students remember about 58% of the materials, here they remember about 25-60% of the material for a longer period. A larger quantity of remembered material significantly contributes to the profitability of this kind of learning.

The savings due to the elimination of travel costs – according to the Training Magazine the business systems generate savings from 50 to 70% by replacing the learning with the instructor with the learning by using a computer. E-Learning provides that the training can be divided into smaller units and as such can last for several days and even several weeks, thus the student (employee) does not lose the whole day as in other forms of education.

In Figure 1 "Tools and Standards" are presented basic knowledge of tools and standards for distance learning.

IV. E-LEARNING

Distance learning and the use of the global computer network in organization and implementation of this educational process takes an increasing significance.

The changes caused by the development of the computer network and information technologies have been so many that have effected all aspects of the society, including education. There was a justified need for the introduction of computers and the Internet in educational systems.

Distance education was developed parallel with the development of new technologies. The development of Internet technology has enabled the temporal and spatial separation of learning and lectures and the development of multimedia technology has enabled the realization of the teaching materials with the interactive elements.

Although e-Learning and distance learning often equalize, they are not the same forms of education: there are types of e-Learning that can not take place online, but there are also forms of distance learning which do not use ICT (eg. Correspondence distance courses via regular mail).

New technological solutions significantly affect the improvement of the quality of the education. They significantly affect the modalities in education and learning. Of all the concepts, the most important is the concept of electronic learning (e-Learning).

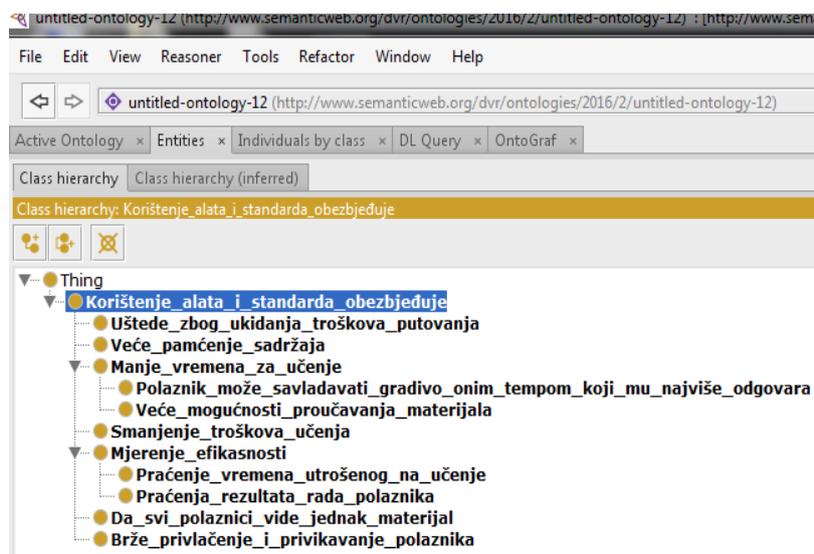


Figure 1 Tools and Standards

The concept of electronic education is often used in the combination with the traditional approach of teaching, whereby the resulting combination is called mixed learning (Hoic-Bozic, Mornar and Boticki, 2009)**Error! Reference source not found.**

Mixed learning to the professors and those who teach gives effective learning environment. Students who educate themselves according to the concept of distance learning can within desired learning adapt all activities to their own pace, learning style, time and location. In this way those who are being trained can be independent and gain confidence in learning. With the application of mixed learning, the students are encouraged to make decisions, to think creatively and critically, to investigate. Those who teach (professors, teachers and lecturers) have the role of the supervisor, organizer and give support to those they teach. Mixed learning increases the possibility for better interaction in the learning environment. It provides the opportunity to the students to be “also together and separate”.

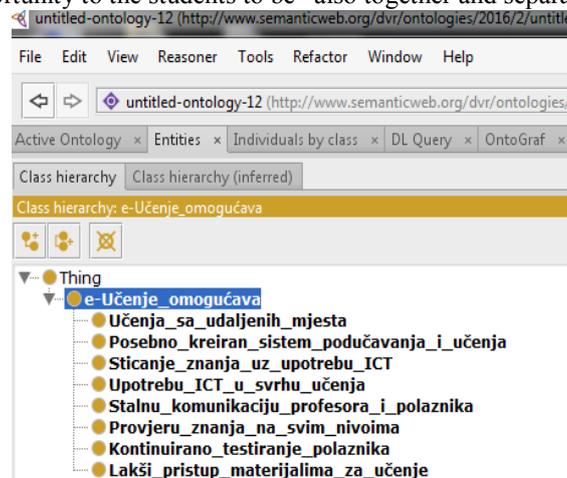


Figure 2 What does e-Learning enable

Online education (education - distance learning) is a narrower term from the electronic education (e-Education) and it includes educational programs that are entirely or in most part based on the use of Internet in the educational process. Their development relies on the development of the communication media. What does e-Learning enable is represented in Protégé knowledge base and it is shown in Figure 2 “What does e-Learning enable”

e-Learning compared to the traditional teaching brings a certain advantages: the distribution of the educational materials is faster and simpler, the access to the learning materials is easier, the costs of learning are lower (the study shows that the costs are less than 40-60%), the memory effect is greater through independent learning, it is secured a detailed insight into individual progress of every student, access to educational materials from the place that the student suits the most, technical support to the students all 24 hours every day. In Figure 3 are shown the advantages of e-Learning.

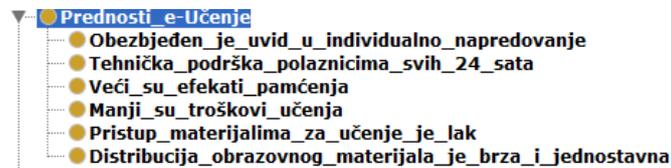


Figure 3 The advantages of e-Learning

e-Learning provides a lot of different ways of interaction among all students and among students and professors. New information and communication technologies allow more or less flexibility in time and space.

Moore (1989) [8] in the process of distance learning identifies three different types of interaction: Student-Content, Student-Professor and Student-Student. While some authors add also the interactions: Professor-Professor, Professor – Content and Content-Content.

Those who are going in the process of organizing of distance learning should ask who the students are, what is their intention, what skills, personal qualities and values they have or should have in order to be successful in the educational process. They are usually students who due to certain barriers choose this type of learning (students from rural areas, employees, students that have families and similar). In Figure 4 “Necessary abilities of the students“ are listed the abilities that the students must possess.

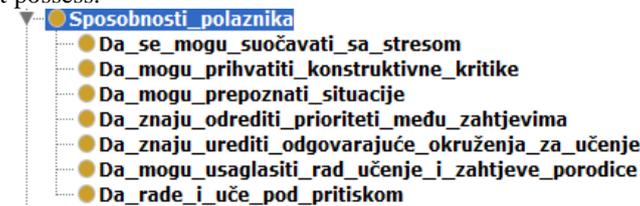


Figure 4 Necessary abilities of the students

In Figure 5 are listed all participants of e-Learning and they are: students, professors (lecturers), assistants, administrators and knowledge with which they have to dispose of in order that the process of distance learning could efficiently and effectively implement.

V. MOBILE EDUCATION (m-Education)

The rapid progress and development of new technologies is changing the habits and lifestyles of people and mobile technology is becoming indispensable part of all business and service processes and learning is not an exception in all this. Mobile learning is learning by using wireless devices (mobile devices) and it means a better access to the places of learning outside the classrooms.

The time now is such that learning becomes necessary and present in different parts of the day and different places [9]. This is the reality, however, it becomes clear that e-Learning needs to adapt to all this. It is necessary to provide to the employees access to all data, information and knowledge they need and from one device, regardless if it is a smartphone, tablet or a laptop and similar.

Regardless of the low level of development of quality mobile education in the area, nevertheless we can not say that it is not used and does not live in the practice. Students use mobile devices to repeat the material before the exam, engineers to check some technical details in a complex design, lecturers to remind themselves on the material they should present and similar. A good part of the formal and informal education and learning takes place while people are on the move. Some of the definitions of the mobile learning (m-Learning) are: “Any type of learning that occurs when a participant of the education is not on the fixed, predetermined location or a learning that happens when the participant uses the opportunities for learning while using mobile technologies“. (O’Malley, Vavoula, Glew, Taylor, Sharples and Lefrere, 2003)

“Mobile learning is learning through a variety of activities and events, with a focus on mobility of the participants in interaction with the portable technologies” (Kaleidoscope Network of Excellence, 2006) (Seta, Gentile, Taibi, Arrigo, Fulantelli, Novara and Di, 2008)

“Any service or a mean that enables the participant general electronic information and educational content that helps in acquiring knowledge regardless of location and time.” (Lavín-Mera, Moreno-Ger, Fernández-Manjón, 2008).

These definitions indicate that m-Learning is:

- Any service that fits in these definitions can be a part of mobile education,
- The inclusion of supplementary services with the provision of wireless infrastructure.
- Focused on information, knowledge or a content in e-Form.



Figure 5 Participants of distance learning

This excludes situations like learning in a cafe from a printed materials where mobility is clearly present but it is not a mobile education. It is not necessary that the service provides educational content – services that reduce the need of students for secondary information (such as deadlines for submission of papers, the terms of additional lectures, schedules in students' dormitories, even the schedule of the public transport) and help in education by reducing time and effort that are usually spend in order to obtain the necessary information.

On Figure 6 “Mobile learning“ in the knowledge base are represented basic terms in mobile learning. The theory of mobile learning must take into account the omnipresence of personal and shared technologies.

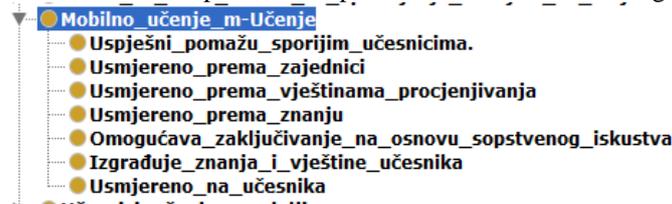


Figure 6 Mobile learning

New technologies, whose use is increasingly present in the improvement of educational process, can provide the concept of a lifelong learning and education.

This type of learning occurs when the learner is not on a fixed, predetermined location and the learning is conducted with the use of mobile technology.

Technologies of a mobile learning are already developed enough that they can provide it. A great use of the mobile devices in everyday life and their continuous development and improvement ensures basic preconditions for the satisfaction of the educational needs Laouris (2013). The quality of education acquired in this process is still not satisfactory and needs a lot of work to be done because the future of satisfying educational needs is going in the direction of e-m-Education.

In time that is coming, e-m-Learning will no longer be just a choice, but a concept that will be the dominant method of learning and ahead of all educational forms.

Study on the workplace conducted by the Cisco shows that for many people the work is not just a place where you go. Studies also show:

- The office is not needed – 60% of the questioned claims that they do not need to be in the office in order to be efficient (productive).
- 66% of the questioned wants to have a freedom over the selection of the communication device. They expect that the information and communication technologies will enable them to have a choice of the devices for the access to the networks of a business system, the applications, data, information and knowledge anytime and anywhere.
- 66% of the questioned has said that they want bigger flexibility in using the devices, the access to social media and mobility than a more paid job without that flexibility.

What is also important as a result of the research is the drop of the percentage of data, information and knowledge that the employees need to memorize in order to effectively do their job.

Now it is absurd to talk separately about electronic and mobile learning and we can observe it as a unique concept of e-m-Learning.

VI. NECESSARY INFRASTRUCTURE FOR DISTANCE LEARNING

Which infrastructure and environment for distance learning to choose depends on the specific concept of distance learning that is planned. When choosing a system for the management of new learning it should be considered many requirements, characteristics that the system should satisfy and on the basis of the criteria analysis of all factors decide which system to choose. Systems are constantly developing and changing but the basic functions must be satisfied, and they are: management of the content (delivery), verification of achievements (evaluation), tracking of achievements, management of the users and the interaction among all participants.

When choosing a system for distance learning management it should be taken into account all the requirements and choose a system that will be able to satisfy them. No matter which technology is planned to be used in its choice it should be taken into account the following:

- **Availability** – whether the technology is available to the students (television, radio, computer, Internet, multimedia, databases, and knowledge bases) and how it is suitable for a certain target group.
- **Costs** – while choosing a technology it should be planned a technology that enables a two-way communication and mentoring support although it is more expensive. The costs of the implementation of distance learning (electronic (e-Learning) or mobile (m-Learning)) depend also on the number of students and the nature of the institution.
- **Teaching and learning** – the selection of the technology depends on how the technology supports the mode of teaching and learning, what strategies of learning we use, what are the goals of learning, what the students have to learn and similar.
- **Interactivity and the flexibility of the students** – which level of interaction does the technology provides and how easy is it to use.
- **Impact on the organization** – what changes are needed in the organizational sense.
- **Contemporariness** – how much is the technology new and modern.
- **Speed**- how much quickly they can implement a specific seminar (course) and how it can be adjusted to the changes of the content.

In support of distance learning system we will use knowledge base updated in the software Protégé.

In Figure 7 “The conditions for the selection of the system for managing distance learning” is given necessary knowledge to all of those that have an idea to deal with distance learning and to all students of such learning system provide all necessary knowledge needed for such a process.

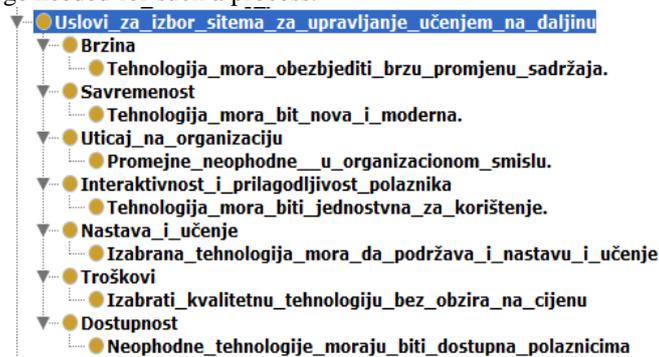


Figure 7 The conditions for the selection of the system for managing distance learning

When planning the activities of the educational process it can be focused on the student, on knowledge, and on the evaluation or the community. So we can observe four different approaches that are increasingly intertwined (Požarnik 2000)[11].

What knowledge is necessary for the activity of the educational process is presented in Figure 8 “Activities of the educational process” and that knowledge refers to: learning focused on the process of learning, learning focused on knowledge, learning focused on evaluation and learning focused on creating community.

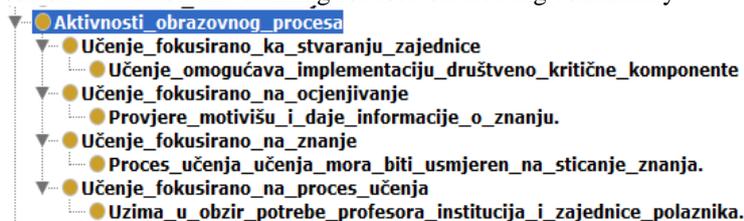


Figure 8 Activities of the educational process

What strategy to recommend or what strategy to choose depends on the participants of the education, their background knowledge, educational content that they should adopt, the purpose of education and practices which favor the professor or the institution. For the development of the curricula and courses for learning it is very often used model ADDIE (Analysis, Design, Development, Implementation, Evaluation), (Piskurich, 2006)[12].

VII. THE CHARACTERISTICS OF e-Education

An important feature of distance learning is that this kind of education offers various kinds of trainings and seminars to the students that are on a different place compared to the lecturer or the source of information.

Training programs, courses or lectures can be adapted to different students. Distance learning can be distinguished by the structure of the program, in the manner and degree of the supervision of the student, according to the degree of their knowledge, as well as the technology used in the realization of education. It should be kept in mind that in distance learning do not only participate the lecturers (professors, teachers) and students (students, pupils, employees) but also the people that create and distribute educational materials and administrators who take care of the technological implementation of the learning process.

Some of the characteristics of the e-Education are presented in Figure 9 “Characteristics of e-Education”.

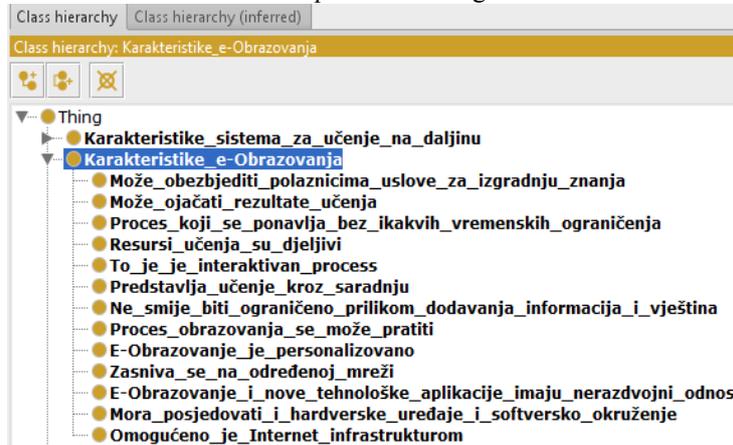


Figure 9 Characteristics of e-Education

The basic characteristics of distance learning is the distance between the professor and the student that must be taken into account in the preparation of the training itself and the learning. Here is a very important question on how to direct students that the professor (teacher, lecturer) does not see, how to track it and how to check the knowledge and similar. Some of the characteristics of the distance learning system are presented in Figure 10.

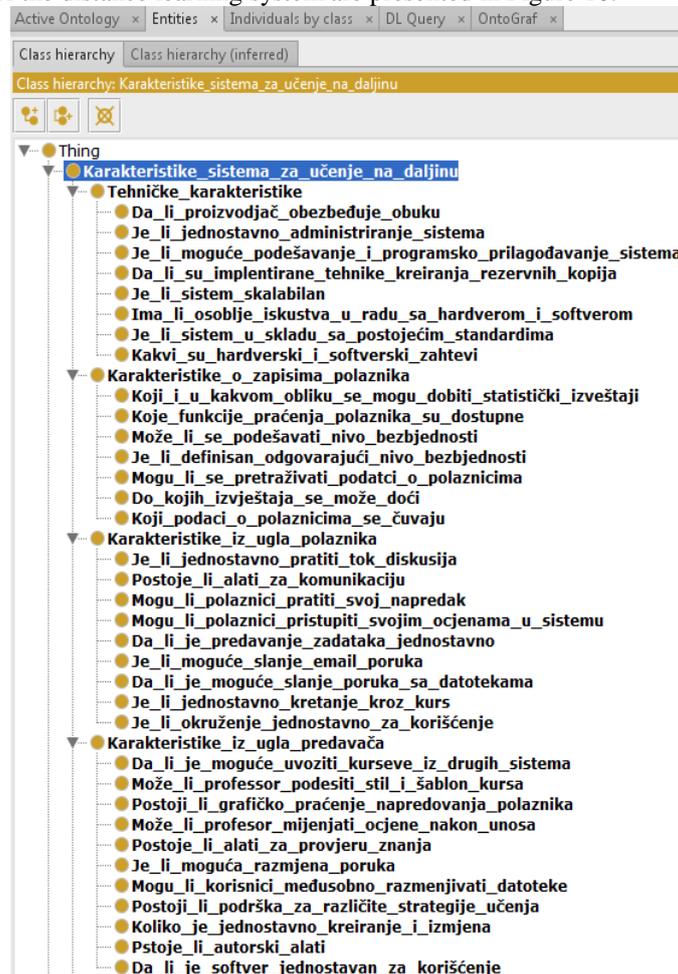


Figure 10 Characteristics of the distance learning system

VIII. CONCLUSIONS

In this paper, we suggested a new distance learning concept based on knowledge bases that can ensure a different decision making and participation in that system. This new concept of distance learning that we suggest here can to those who think about organizing (implementation) and to those who wish to attend this learning come to this necessary knowledge of distance learning in a quicker and easier way. In addition to electronic and mobile learning we suggest a unique concept of e-m-Learning. For the knowledge base we used Protégé platform of an open source which is updated with sufficient knowledge in order to be able to promote a new concept of e-m-Learning.

REFERENCES

- [1] Castells, M. The Internet galaxy : reflections on the Internet, business, and society. Oxford : Oxford University Press, 2001.
- [2] D. Bolta i R. Crawforda u knjizi Digital divide : computers and our children's future. New York : TV Books, 2000
- [3] Cotton, B. and Oliver, R. (1994), Understanding hypermedia: from multimedia to virtual reality. London. Phaidon Press ltd.
- [4] USDLA Distance Learning Definition, <http://www.usdla.org/>
- [5] Holden T. J., Westfall J.-P. P., An Instructional Media Selection Guide for Distance Learning, United States Distance Learning Association, 2006.
- [6] Garrison, D. R. Computer conferencing The post-industrial age of distance education : Open Learning. // The American Journal of Distance Education, 12, 2, (1997),
- [7] Miloradović R. Nataša, Integracija mobilnih obrazovnih servisa u sisteme elektronskog obrazovanja, Magistarska teza, Beograd 2010.
- [8] Moore, Michael Graham. (1989) Three Types of Interaction. *The American Journal of Distance Education* 3 (2)1–6.
- [9] <http://www.mobilearn.org/download/results/guidelines.pdf>
- [10] Laouris Y., Eteokleous N.: „We Need an Educationally Relevant Definition of Mobile Learning”, Cyprus Neuroscience & Technology Institute, Cyprus, 2013.
- [11] Marentič Požarnik, Barica, *Psihologija učenja in pouka*. Ljubljana, Državna založba, 2000.
- [12] Piskurich, G. M. Rapid Instructional Design: Learning ID Fast and Right, San Francisco, CA: Pfeiffer. 2006.