eLearning as an information system

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Abstract: More significant application of ICT in education alters the position of certain education process elements as to their function as well as structure. The speed, quality and quantity of such changes lead to the need of re-defining the usual forms of context organization in which education is done. This paper considers the consequences of such changes stressing the need for systematic approach, i.e. the need to treat education as an informatics system. It is also stresses the position of knowledge as a product of education and the consequences of information processing in a multiple-structured manner. Important is the need of parallel or reference relation to contents from both the aspects of the student and teacher. Effort will be made to give replies to the following questions: Should education be treated as an information system and which arguments are necessary for such an approach? Are education phases from the basic, expert to high education parts of such a system? Is the paradigm of whole-life learning the initial point for defining education as a continuous process? How does the context in which education is carried out determine eLearning as an information system?

Keywords: eLearning, eTeaching, Education, Information System, ICT

I. INTRODUCTION

Learning is an obligatory and unavoidable part of man's life. Learning varies as to form, manner and goal, depending on age. When we ask the question: Why do we learn? – It is the goal that is stressed. The reply may implicate several facts of which the pragmatic side of learning is stressed as the most significant: learning for one's vocation, and what was usually called as learning for one's walk of life. If we observe learning from this point of view, the need for continuity is obvious and also for maintaining the necessary knowledge and skills. The need for all life learning is therefore often stressed in recent literature. The mentioned continuity is not treated as a novelty but there is stress on its importance and necessity. The individual does not end his education by acquiring the certificates set by society. On the contrary, he is placed in a position where he needs to improve his knowledge and skills, bring them into coordination with current practice and scientific achievements.

Traditional education (obligatory, compulsory, formal and informal) is realized through education as a process[1]. Learning by itself requires organization of the process as well as methodological and material backup. Furthermore, each process may be observed as concrete realization of entity relations that form the system in which such a process is carried out. In this the quality of realization depends on several factors.

More significant ICT implementation into overall human activities has resulted in computer appliance into the education process as well. Computers today are a necessity. However, ICT as a blessing requires re-organization of the existing forms of carrying out concrete activities. Thus education has the same fate as all activities where ICT is applied. New forms of education realization backed up by more significant ICT implementation is recognized today as eInstruction or mLearning.

The paper considers the need for treating education as a system and especially – as an information system. By stressing the position of knowledge as a product of education, it is indirectly stressed that there is need of a parallel of reference relationship

towards the contents from the aspect of the student and the aspect of the teacher. There will be efforts made to give answers to the following questions: What arguments are necessary in order to treat education as an information system? Are realization phases the usual education phases of such a system? How does the context in which education is carried out determine eLearning as an information system?

II. EDUCATION AS A SYSTEM

In order to define education as an information system we will set several theses and try to prove their authenticity and viability:

1. Education or any organized form of business represents a business system where certain resources are spent and where certain business results are achieved.
2. All business systems must possess their higher projection carried out in the belonging information system.
3. The specific sides of a business/information system are determined by factors such as sources of information, information form, manner of collecting, processing, storing and use, etc.
4. ICT involvement in business/information processes makes an influence as to the system's quality and quantity, but it does not necessarily determine it.

On basis of the given assertions, taking into account the specific sides of eLearning as a system, we wish to come to conclusions on basis of which we claim that eLearning should be treated as an information system in all its segments.

II.1. Education as a business system

In general sense a system is usually defined as a group of independent mutually tied entities, real or abstract, tied into a whole, the common task of which is to achieve some goal. Achievement of a goal is done through corresponding carrying out of the system's functions in the form of a process. The system's functioning is set by the system's structure and its position in the environment.

For the needs of later assertions it is important to stress that a business system in literature is often changed for synonyms firm and enterprise.

Depending on the area width it covers the system's business or function may be observed differently. The idea of a business system is not as general, but it inherits the general definition stressing the specific difference through function definition as a sustainable and profitable business.
The exact definition of a business system stresses the final business products, goods and services through which profit is realized [2]. How should then we define education and education?

From the aspect of the before mentioned, education may be observed as a system. The basic elements of education and the area it is performed in may be determined by the following vector:
$E = \{S, T, Co, G, Cx, L, Tm\}$ (1)

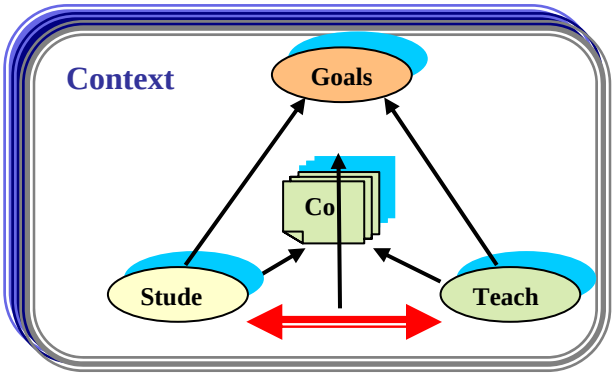

Figure 1: Modified Pratt's model of Education

The first five components are Pratt's model of education entities [3], whereas the last two determine the time and place of realization. The inter-dependency of the elements in space and time is evident and determines the structure and quality of education.

However, a job may mean carrying out professional work and activities within one's profession, but also one's occupation and service use. Therefore, education as realization of the education process must be observed as a system. Even more so, education should be observed as quite a specific business system. The teacher appears in the role of the one who provides services, and the student as service user. However, the roles are not strictly divided. If we observe the position of education contents, we can easily observe its bivalent quality. It usually represents the product raw material, but it may also be the final product. When we try to set the entire mentioned into context, the specific points become even more prominent. Although the

differences between education in a kindergarten and within a doctor's dissertation are very significant, both jobs inherit education as an abstract form of the same system. The significance of education as a business system becomes even more prominent by stressing the need for whole life education. Everything mentioned also applies to eLearning as a specific type of education.

II.2. Education as an information system

When defining information system in literature it may often be encountered that and information system is part of a business system. The relationship between these two ideas has symbiotic characteristics more than any other. An information system does not exist by itself, but is usually linked with a business system for which it is a backup providing good quality realization of business processes and business functions in their overall aspect. Therefore it is necessary to define an information system as a higher business system projection where information processes reflect the business process information dimension.

Also, it often occurs that the terms information system and computer backed up information system are mistakenly taken as synonyms. An information system does not necessarily need to use ICT although this is the usual situation where possible.

From the operational point of view an information system is a system that collects, processes, stores and delivers necessary information to all business system users that have the necessary rights, to organizations that wish to use it and have the necessary authorization. In cases where information quantity and the complexity of their processing are great, ICT application is obligatory.

To what extent is education then an information system and to which business system does it belong to? Education is a system where all the necessary information is divided into two groups: information that is subject to processing and raw material with the help of which the final product of education is formed – the certified participant/student/pupil and information necessary for education to be functioning as a system (in a way this is auxiliary or service information). The usual process of collecting and storing necessary information that falls into the group of education contents has its specific sides. Education contents and their forming into corresponding forms are the precondition for education to function as a system. Processing of such information is also specific as to time as well as to space. The organizing of education/information processes in traditional education requires area and time articulation. The time factor does not have the same value for the teacher and the student. The fact is that time as a concrete moment of realization in some institutionalized setting such as, for instance, in a classroom, has the same significance for both the teacher and student, but time observed from the point of view of age differs as to meaning.

Storing and keeping of processed information has its specific sides because the final goal is for them to be learned by the students, i.e. they need to be understood and memorized. It is even more important to implement exploitation in everyday working and living activities. Formal keeping of education contents is a minor problem.

There is the opinion in recent literature that the information system is the information image of a business system process realized through data models, process models and user models. The same definition is applicable to education and does not differ much from our viewpoint that the information system is a higher projection of the business system.

When we consider education as an information system we must keep in mind an exceptionally important fact – synergy. Education is a system made up of two synergic-linked systems of education and learning whose complementary sides provide for the synergy effects. The mentioned leaves the possibility of treating learning and education as separate systems and in the education area as a complete system. But this does not fall into this paper’s issue.

III. WHAT HAPPENS WHEN WE INVOLVE ICT IN EDUCATION?

The more significant ICT development and the growing use of computers could not skip education. However, it is necessary to acquire computer knowledge and skills by learning. Indirectly this means that computers are obligatory in education as the subject of study, as well as the education means. Improvement of computers, software tools and their growing cheaper due to mass production are reasons

for ICT implementation into education being overdue and to a certain extent implemented in a backward manner: firstly from business environment to high schools, and only then towards secondary and primary education. Additional reasons for this are the users', teachers' and students' informatics skills, and their inertia is significant. We are only mentioning here the economic side as one of the reasons for slower implementation dynamics.

What alters with ICT application in education? In fact, it changes everything. Computer use, communication technologies, the web, PC-s, digital devices bring education to a level of other business systems using ICT. Therefore, we have reason enough to call eLearning an eJob because it is usually defined as education with ICT application. If we look at the education definition we see that the two last components of vector E are set as relative. In recent literature eLearning and mLearning are defined as independent as to time and space. However, time and place remain as components through which education is set; there is only greater liberty in defining in them the basic twosome – the student/the teacher.

The position of the student in eLearning is more stressed through virtualization and individualization, better possibility of communication with the teacher and other students through the all present web [4]. Thus the student is placed in a position of the ICT backed up system user and organized in a manner that is the same as the information systems with computer backup.

The position of the teacher is altered in a significant manner. The teacher remains an active eLearning user the same as the pupil, but his competencies are changed through the need to acquire skills from the ICT and control area.

Contents are an education element that undergoes changes in the field of eLearning only as part of the package. Besides adapting to students' and teachers' needs prepartion of education contents requires an approach similar to that of making application software. This is a position where eLearning acquires more prominent characteristics of an ICT backed up information system. Preparing an adequate eContents means to prepare as a team the eCourse of lectures that is a software application in respect to all its characteristics. Going out into the digital environment does not mean passing over of pedagogic and didactic contents preparation standards and direct education. Although called a system, LMS and CLMS are applicative solutions that must reflect the throughout quality and meet all eLearning pedagogic and didactic standards as a system [5]. Access to the Internet and to open systems provides for the user student and/or teacher choosing education contents according to their own choice and in correspondence with the needs set by education goals. At the same time the wider possibility of choice opens the problem of selecting and eliminating solutions that are not the best ones, and this requires time.

The context in which education was carried out to traditional extent was the place where the borders between formal and informal education were clearly set, or there were borders set by certain age of the involved. In today's framework eContext somehow sets the borders of eLearning as a business system and positions the rest of the elements in a dependent manner in respect to the system in general.

IV. A REASON MORE FOR TREATMENT eLEARNING AS AN INFORMATION SYSTEM?

eLearning is the evolutional continuance of former education forms determined and directed by ICT development. In a certain way ICT application globalizes education as a system and as a process. Following in a way the Sorbonne, Lisboan and Bologna Declarations eLearning has de-contextualized the traditional class of students. The class of today is a web environment that must provide the same conditions for everyone, and the web is the information system. In such a framework eLearning is an information system. Preparation of eCourses as an organized form of eLearning requires certain design approaches. In such circumstances the best thing is to turn to checked practice of organizing project tasks usual for developing information systems. Evaluation of design and final solutions is necessary in cases of solution inflation or over-extensive offers. ICT application has changed the education system methodology development.

The usual names for such methodology are educational Systems Design (ISD), Instructional Systems Design & Development (ISDD), the Systems Approach to Training (SAT), or simply

Instructional Design (ID). The element characteristic for all the mentioned systems is the application of the step-by-step approach for determining and evaluating pupils' needs, the development of educational material and the evaluation of education efficiency. One of such methodologies is known by its acronym ADDIE (Analysis→ Design→ Development→ Implementation→ Evaluation) [6]. The analogy with design and information system development is obvious. As the whole education cycle in classic education is led by one person – the teacher, it is assumed that there will be experts included in eLearning coming from various fields.

Maintenance, development and revision are separate life cycle phases of an information system. eLearning has analogous phases in its life cycle because by being linked to ICT it must follow-up with the changes that will take place in the area. In a certain way the late ICT application in education has protected education and eLearning from problems that have been experienced by information system designers in individual development approaches. In contemporary turning to object oriented approach and paradigms included eLearning is developing and is carried out as a system that best of all promotes the said paradigms.

V. CONCLUSION, RECOMMENDATIONS OR BOTH

An old saying in Croatia is «Dip your finger into the sea and you will be connected with the whole world». Let us re-phrase this saying: «Connect with the Internet and you will find yourself in the world's biggest classroom». eLearning is the natural continuance of previous changes in the field of education, but alters more significantly the relations between basic elements by which it is determined. Even if there was no ITC application, education should be treated as an information system where very important information is collected, sorted, designed, processed, stored and delivered to users and it is of exceptional importance for both the students and the teachers. eLearning is also a business environment where certain products are produced, the consuming of which is of exceptional importance for both the individual and the society as a whole.

Planning, producing and combining such products require a systematic approach and project organization. Application of good theory and practice from the information system development area can answer requirements from this area. By reforming education into corresponding eForms, we have determined eLearning first as a type of software application but also as an eJob. In making conclusions we have generally used analogy as to certain phases, activities and eLearning and information system parts. Although we can treat education as both a process and a method, it can also be taken as a system. But regardless of how it is taken, the treatment needs a serious and systematic approach to education. Perhaps the overall load and seriousness in respect to jobs linked with education may be understood on basis of the old Greek saying «Gods make teachers out of those they hate». However the pleasure in working with students in eLearning contradicts this.

Let us quote Bruner at the end of this paper «In order to improve education teachers are needed who understand the anticipated improvements and who are for them with all their hearts. Regardless of the education plans deliberateness, a central part for the teachers must be planned because they will be the ones carrying out the plans».

VI. REFERENCES

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