Electronic Textbook in Electronic Porfolio: a New Approach for the Self-Regulated Learning

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***Abstract*—This article explores new way of instructional design in elaboration of the electronic textbooks. The intention of this article is to propose a new approach of the design the electronic textbooks for virtual learning environment. The idea generated by the teachers' and students' new roles in the concept of a humanist paradigm is based on new approach for the self-regulated learning. Our hypothesis is: electronic textbooks can be considered an effective source for developing the self –regulated competences of the students included in the learning environment, if at the end of each module the condition Ka ≥ 0.7 will be respected.**

***Index Terms*—electronic textbooks, instructional design, self-regulated learning, technology enhanced learning environments**

I. INTRODUCTION

Constructivism requires student – centered learning environments. In the learning environments "instructor might need to be a chair, host, lecturer, tutor, facilator, mediator of team debates, mentor, provocateur, observer, participant, co-learner, assistant, community organizer, or some combination of these"[1]. The students need to "take on a more proactive role, exercising greater autonomy in the learning process and assuming greater responsibility for their own learning"[2]. As a result, disputing the view of constructivism: new philosophy for education, new theory of learning or new pedagogical strategy, the knowledge formation is a process in which knowledge cannot be taught, but must be constructed by the learner through active searching and processing the information from the real world [3, 4, and 5]. In the Knowledge Society the knowledge formation cannot be effective enough without total or partial inclusion of the student in the process of building their own cognitive products. A variety of products from concept map to electronic portfolios is analysed in the scientific and methodological literature [6, 7, and 8].

On the other hand, electronic textbooks are considered the "main component of system resource for learning"[9, p.173] and "informational – actionable model of the process of learning unfurled in the didactical system and that include the all necessary condition for realization"[10, p.12]. But, "didactic, declarative, dogmatic and monographic electronic textbooks" [11] are, first of all, source for the ready knowledge and not a source for the knowledge formation as constructivism requires. A lot of examples of adaptive, intelligent, static, or interactive electronic textbooks could be providing [12, 13 and 14].

With our contribution, we aim to propose an approach to the design of educational environment which combine the electronic textbooks with the electronic portfolio. These issue concern condition to obtain the value of coefficient of assimilation Ka ≥ 0,7 as necessary for including the student in flexible and dynamic strategy. For a pedagogical point of view, our proposal is based mainly on a constructivist approach to knowledge; with remark that constructivism is result of the self –regulated competence. The proposed approach achieves better results in real learning because the obtained knowledge and skills has become important for student and student is able to demonstrate it.

II. E-PORTFOLIO: AN EFFECTIVE TOOL FOR LEARNING AND ASSESSMENT

Electronic portfolio, also known as an e-portfolio, or digital portfolio, is a collection of electronic evidence assembled and managed by a user, usually online. Personal and Professional Learning Portfolios support the particular needs of individual learners in their individual growth processes [7]. The electronic portfolios can be all – inclusive or selective. All- inclusive portfolios represent a collection of the total work that provides a complete record of the student's achievement for the faculty members and for the student to review. In contrast to the all – inclusive portfolio through which we examine the entire body of the student's work, the selective portfolio is developed to achieve a particular goal. The students know the goal of the portfolio ahead of time, and they review their work and select pieces to include based on the goal. From other point of view, electronic portfolio is an effective tool for assessment and serves to enhance computer and technology skills [8, 15]. Our question is: do all the students motivated enough and enjoy building and their own portfolio?

If the new knowledge is build up, based on the previously acquired one, by means of personal reflection and social inclusion, by abstracting concepts and consciously applying them to the solution of new problems, tools need to be "provided and activity suggested, so as to help the learning develop meta-cognitive abilities, that is, awareness and regulation of cognition (which includes planning, monitoring and self –evaluation of learning)"[16]. Our point of view about learning, hence, is learner –centred, but nevertheless, in the virtual learning environments the electronic textbooks have the main role in the process of the developing the self – regulated competence of real students, introducing concepts and guiding their understanding, self –assisting through self – assessments tests and keeping the student's motivation in building the own technological product.

III. WHY COULD ELECTRONIC TEXTBOOK BE INCLUDED IN ELECTRONIC PORTFOLIOS?

To live in a highly technological world needs to use instructional and communicational technology to create, share and research things. To construct the knowledge in the constructivism and humanistic paradigm needs to use the real and pragmatic context and feedback. The educational framework which arises from this pedagogical view is summarized in the idea: if the tasks are designed according to Bloom's or Bloom-Anderson's taxonomies, only cognitive abilities can be developed. Knowledge is forming according to three domains: the domain of the cognitive educational activities, the domain of the affective educational activities and the domain of the psychomotor educational activities. The result which emerges from this characterization as developing from educational activities of three different kinds of tasks: behaviorist, cognitivist and constructivist. In every case the technology plays a meaningful role by offering non-trivial working tools, supporting self –assessment designed by teacher, as well as personalized learning materials prepared by every student according to his /her individual needs.

A methodological framework that uses existing technologies of the design the electronic textbooks seems to be non - effective. Electronic textbooks as sources of information or/and assessment is not a representative collection of one's work that electronic portfolios are. And, if the learning is view as "a constructivist process in which the learner builds an internal representation of knowledge, a personal interpretation of experience", as was described by Stacey (2005, p.143), the learning environment can be "a place or community in which a number of activities are occurring with the purpose of supporting learning and those actors can draw upon a number of resources when doing so" (Bonzato, 2005, p.42). In this type of environments the instructional context is a generator of sources for the knowledge formation, materialized in a total or in a representative collection of the students' work.

The instructional context cannot be prespecified, because the learner must construct his/her own understanding based on the real-life experience and *a priory* cognitive structure. Dispute the extension of the structure is strictly individual, the key concepts are fundamental for all structures. As result the student will learn to be reflexively aware of the process of knowledge construction and to think like the expert and not to reproduce, or apply, or create the similar or the new version of presented information. Also, the core of central knowledge could be defined, "even though the boundaries of what may be relevant to the learner cannot be defined by the teacher" (Bernar, 1992 cited in Stacey, 2005).

To solve the above maintained problems there was proposed to include electronic textbook with a special functional structure in electronic portfolios, built individually by the students in the process of learning. As result the content of the electronic textbooks will be similar for all students, but the context will be different.

IV. THE DYNAMIC AND THE FUNCTIONAL INSTRUCTIONAL STRATEGY

Self –regulating strategies link to positive emotions. From our point of view instructional strategy aims at developing the process of acquiring the self –regulatory competence and this process is established by the system of display the information in the electronic textbooks content and context.

Research also indicates that the information often is presented inductive or deductive. Both variants contribute to activation of the metacognition: in inductive variant there are sistemic hastening of processes of integration the knowledge from separate facts to generalization, and in deductive variant there are periodic hasten through concretization of instructional context with real and practical examples. From other point of view in the instructional design of context for learning can be applied the heuristic – algorithmically methods. In this case in the initial stage is used algorithmically procedures, and then - heuristically methods. According to the algorithmically methods the main notions are defined and then are presented the rules of solutions the practical problems. Controversy, in heuristically methods of the design the informational context, the rules and the successions of actions, applied in the concrete cases, are not explain and the student independently, by the probe and mistakes must to discovery it.

In the case of the electronic textbook context heuristic – algorithmically methods can be efficient; if at the initial stage (first module) will be presented the procedures for forming the algorithms of learning, and at the second stage – the algorithmic and heuristic procedures that will validate the technological product - performance. The design of procedures requires a strict integration between reproductive and productive activities. The situation is, however, made particularly difficult by the fact that students have different levels of knowledge and the activities need to undergo a suitable preparation with exploratory activities on recognition of the environment's features before they can be integrated from teacher and student point of view. Practically, this means a new variant of presentation / demonstration the knowing of instructional context (figure 1).

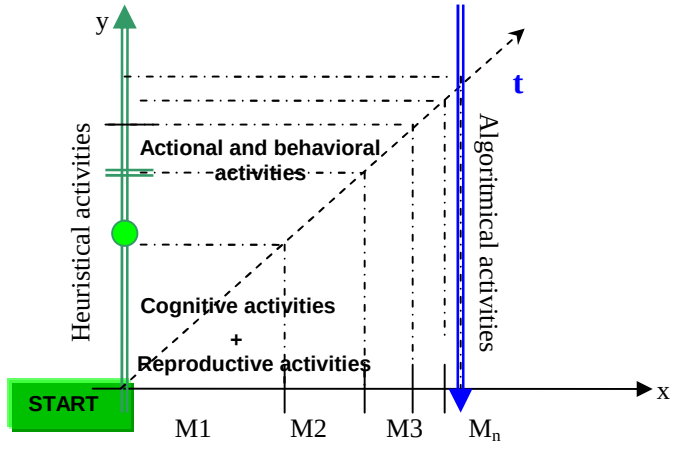

Figure 1. The system of prezentation the instructional context in elelectronic textbook.

In order to face complexity of the educational situation we decided to put at student's disposal a variety of resources apt to help students to control of their own learning: virtual museums, virtual encyclopedia, and self –regulated assessment tests and these resources will be part of student textbook. Moreover, we structured the students work by

integrating individual activity with dynamic and flexible instructional strategy maintained by the electronic textbooks. These mean that the most voluminous module will be the fist module (M1) and in this module will be included the main concepts of the domain. In the second module (M2) it is more important to apply the notions in the real, pragmatic and personalized instructional context. The idea is fixed on the concept of extinction the cognitive scheme, proposed by Piaget and Bartlett. In the following modules the number of new notions is reduce at minimum and at final stage it is more important the student initiative.

V. The Content and the Context of the Electronic Textbooks

Students use the context of the electronic textbooks to form knowledge / abilities / competence in an individual manner. The electronic textbooks include multimedia technologies or educational models of guided the students understanding. As was observed by Brusilovsky, 1999 the core technologies are: "curriculum sequencing, adaptive presentation, inteligent analysis of student solutions, interactive problem solving suport, adaptive navigation support, and example based problem solving and interactive collaboration support".

On the other hand, the theory of the instructional process is, mainly, behaviouristic or, in some cases, can include elements of Cognitive Theory or Artificial Intelligence. Nevertheless, the process continues to be chaotic and form a structure in the students' knowledge only theoretically. Adaptation of the instructional context to student's psychopedagogical characteristics doesn't mean the adaptation of the student to the reality of the external environment. What is the solution? We propose to design the functional instructional context that will generate the individual cognitive structure. The core concept of the functional instructional context is structure – context methodology. By structure – context methodology we mean the principles, methods and techniques used as catalyst of understanding in the real process of study the domain. In is really possible if the content and context of the electronic textbook.

VI. Informational and Communicational Technologies

Analysing the course curriculum for informational and communicational technology one concept of the first hierarchy and four concepts of the second hierarchy was identified. Also, a lot of notions common for all modules were observed, for example the window, menus, toolbars, buttons, options, etc.

As learning requires methods and techniques for structuring knowledge there was proposed to include the common notions in the first module and to consider it the base notions. Learning the base notions is based on the interdependence between the curriculum objectives and real important things for students. Accent was made on motivation. In the process of study the domain is not difficult to construct artificially the important concept for each student. There are a lot of examples: analysing the history of computers will be more interesting, if the student visits at least one of the virtual museums "History of Computers"; studding hardware and software components will be more real, if the student will saw a video and will answer at questions: what is the role of the hardware/software for computer and what are the specific characteristics of this component.

Moreover, at the beginning of the second module the student will be asked to choose one theme important for him. In future the text will be completed with pictures, diagrams, tables, references, hyperlinks, statistics dates and will serve the base for Power Pont Presentation. The number of the pages will increase and finally the student will have electronic portfolio. In addition, the structure of students' knowledge will increase: step by step the student will learn Word, Excel, and Power Point …. In our case the Power Point is the last module, but we predict really that the student have competence for studying independently Access, SPSS or other computer programs.

VII. The Pedagogical Experiment: Measurement, Data Collection and Analyse

During the academic years 2005-2007 I decided to include my students into a pedagogical experiment. Taking into account individual students preferences 11 different experiment groups each of 10-12 students were formed. The laboratory classes were designed for four hours. At the beginning of the course the students were asked to self-evaluate with a mark the computer literacy. Since they had already spent one year together most students knew each other thus we can consider the obtained results adequate to the real state of art. The hypothesis was confirmed by computer assessment.

This phase of experiment was initiated in September 2005 and it was repeated in January 2006 and September 2006. In September 2005 29.9 % of the students were marked with 8.0 and 70.1 % - less then 7.5. At the second and at the third stages the obtained results were similar: only 27.2 % and 28.8 % had the marks more that 8.0. Efforts were made to help students include into the learning environment according to his/her level of knowledge. As result, each student had the possibility to choose one of the variants: A) to setup E-portfolio tool and B) to create e-portfolio on disc D: with the help of the real teacher.

The fist group built portfolio individually and sent the results through FREE OPEN SOURCE MOODLE, but the second used the platform after the finish of the first module. Attractive, relevant and motivating sources for example: video "Computer Ergonomics", Power Point Presentations on different themes, Internet connection, computer formative and summative assessments and the teacher's electronic textbook were proposed.

To analyse the quality of the outcomes, a quantitative research was adopted, which consisted of a questioner and portfolio analysis. The results were analyzed and the process was statistically investigated. The majority of students choose the variant B. The path for electronic portfolio was D:/TIC/my name/chapter. The rationality of this decision can be explained in details. A more advanced group (group A)

was formed by seven students who had relevant knowledge in setting and using the computer programs. The group B was formed by the majority of the students who needed at the beginning teacher help for a rapid inclusion in the learning environment. For student included in group B began were establishing the condition: to study the second module, if the Ka ≥ 0.7 and this mark can be demonstrated through the computer assessment with generative tasks. As was analysed by Bespalco, if the student obtains mark 7 and more he / she is capable to self-regulate own learning.

We cannot study for school, but for life, Seneca says, and this philosophy was combined with the constructivist approach in new proposed technology. All information became important for the students because the students were actively involved in planning and assessment of there own learning and the task is selected by the student based on core concepts included in the instructional content. As result the instructional context had relevance to students' real activities: job, personal life, future specialty, social environment etc.

VIII. CONCLUSIONS

The dispute of the final module of electronic textbook provides only one chapter with four sentences included general principles of elaboration the presentation; the module confirms hypothesis and the students performance was marked from 7.8 to 8.9.

The increasing level of marks, demonstrated at the final exam is a result of the obtained powerful learning environment in which the teacher and student are partners in common process developed in learning environment. In the design of the proposed technology the main points are: the student motivation, actively inclusion of the students in planning and assessment of their own instruction, individual and collective methods of knowledge formation, learning environment.

Future research can give us some indications. Also, further research is needed at the intelligent task analysis. Each e-portfolio is individual and at the moment only teacher can analyze and note students' performance. There seems to be a serious problem in broadly applied e-portfolio for the personalized learning.

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