TOWARDS E+LEARNING, OR HOW TO INCREASE THE LEARNING INTO E-LEARNING

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Abstract: It is discussed some changes in the traditional e-learning notion on the point of view of R. Koper's question 'where is the learning in e-learning?'. We put a focus on the conception of learning as a management process and present the project Bulgarian Educational Site (BEST) – a possible answer to Koper's question. The BEST is a virtual learning environment, based on the following principles: learning is a goal-directed and didactics-managed process; learners may define their own learning objectives, monitor and regulate the learning process; collaborative e-learning is more effective; etc. The BEST is based on two famous e-learning systems (Moodle, LAMS) and Plovdiv e-University (versions 1.0 and 2.0). The paper brings up a mater about the new 'electronic' pedagogy and proposes an approach for pedagogical modeling and interpretation of e-learning applied in the BEST.

Keywords: e-learning, management of the learning process, didactic methods, Moodle, LAMS

ACM Classification Keywords: K.3.1 Computer Uses in Education – Distance learning, K.3.1 Computer Uses in Education Collaborative Learning, H.5.3 Group and Organization Interfaces – Asynchronous interaction, Web-based interaction

Introduction

The educational process is based on pedagogy – the methods used for teaching and learning, and the 'teaching objects' in a course, such as assignments, learning activities, objectives, prerequisites, etc. There are three options for any learning technology when it comes to model didactic approaches: *pedagogy-neutral* (supporting no pedagogy at all), *pedagogy-standard* (supporting a single pedagogy) and *pedagogy-driven* (supporting a diversity of pedagogy). A great part of the contemporary software tools and technologies in the e-learning field can be characterized as *subject-dependent* (reorganized for specific fields and users) and *pedagogically neutral* (they don't support or provide any kind of methodical strategies and more specifically they don't specify ways for interpretation of learning content and objectives that are dependent on other conditions). They are 'neutral' especially in relation of the logic of interpreting of the course content while no learning requirements are specified. On the other hand, there are hundreds of different pedagogical models and strategies. As recorded by many authors: learning is different from consuming content learning and the implementation of one pedagogical model/strategy is not the right direction for e-learning researches and standardization. For example, the course may consist entirely of activities without any learning content and thus its implementation in or transfer to a 'pedagogy-neutral' or 'pedagogy-standard' system would be difficult.

On our point of view, the topic of the day for the e-learning researches could be expressed with the concept 'e+learning'. The term '*e+learning' is used by us* to note e-learning principles, technologies, means and tools but with potentialities to be applied in a wide spectrum of subject domains and according to different pedagogical strategies.

In the paper is presented a project for development of a virtual learning environment, named *BEST*[1]. The goal of the project is to implement the e+learning idea.

Didactics: from e-Learning to e+Learning

In nowadays, the e-learning educational paradigm gains more and more popularity, both as an alternative or as an integral part of the traditional learning. It is natural that the e-learning educational paradigm has to adequately reflect the well-known didactic principles of the traditional learning, but at the same time it has to implement some

[1] **B**ulgarian **E**ducational **Si**te

fully own, specific characteristics that could be showed out by the comparison of the main elements of the learning for the two paradigms (Table 1.).

Element	Type (in respect to the educational paradigm)	
	Traditional	E-learning
Main objective	Preparation for life and work	Providing of an environment for self-determination and self-realization of the personality
Knowledge	From the past (''school of the memory")	From the future ("school of the thinking")
Learning process	Teaching the learners certain knowledge and skills	Creation of own world model with active work of the learners
Learner	Object of the pedagogical activities (effects)	Subject of the cognitive activity
Type of the relation teacher – learner	Monological	Dialogical
Learner activity	Reproductive, "reactive"	Active, creative

Table 1. Main learning elements for two educational paradigms

The e-learning essence and characteristics summarized in the above short comparison, together with the fact that the e-learning pedagogical technology is based on virtual learning technologies and wide use of ICT in its implementation and delivering, shows that some additional ***didactic principles*** should be further formulated for the case of e-learning:

- *communication* (openness of the communication forms and tools);
- *interactivity* (indirect personal interactions student-student, student-teacher, etc.);
- *control* (strict regulation and management of the activities using ICT);
- *suitability* (avoidance of unnecessary and pedagogically ungrounded use of ICT);
- *flexibility* (e.g. choice of time and place for learning);
- *practical orientation* of the content and the activities;
- *case studies* (the interaction during the learning process has dialogical and case oriented nature due to virtual simulators and communication);
- *problem-oriented nature* of the content and dialogical nature of the interaction during the learning process;
- principle of the supporting *motivation*;
- *module-block principle* in the educational programs and the learning activities.

We will go further analyzing the recent changes and challenges affecting the pedagogical aspects of e-learning environments and thus giving the grounds for investigations related to e+learning.

The contemporary e-learning courses are purposed mainly not to present the pure scientific knowledge, but to solve vocational training tasks. The main criterion for the choice of the taught knowledge is its applicability to specific professional tasks. As a result, there is a transition in the process of creation of the course learning content – it is not based on the subject principle. In the same time the requirements to the educational methods and forms are significantly changed as well as to the preparation of the teachers for their new role in the teaching/learning process. For example, various individual and group learning activities (working with learning materials and information) become predominant. The nature of the relationship teacher-learner during the learning process is vastly changed together with their typical behavior.

The importance of universal (methodical) knowledge for assessment and prognosis of the future is increasing. The requirements to educational organization methods and forms and in particular to the preparation of the educators for their new role in this process are changed significantly. Individual and group forms of active work with the learning materials and information become predominant. The type of activities performed by educators and learners is vastly changed together with the nature of the relation between them during the learning process. There is a tendency for the learner to become a full-fledge subject during the process of solving learning and professional tasks – with the support and collaboration of the educator.

The discussed changes in notions related to the personality, as well as the experience gained in the implementation of the new educational forms through e-learning environments allows the formulation of some *specific didactic principles* definitive for the e+learning platforms:

- *organization* (the content of the learning materials and the organization of the learning process should be built on the basis of the major learners' activities);
- *support* (creation of a user-friendly environment for learning process support);
- *effectiveness* (optimal combination between the different management forms of the learning activities of the learners, economical suitability);
- *modularity* (learning courses represent subject fields and for that reason the curriculum may consist of different courses depending on the individual and group educational necessities);
- *individualization* (of the knowledge and grading of specific learners);
- *openness* (participation of learners with different input level, without interruption of the work; with specific educational needs, etc.).
- *personality-oriented* nature of the educational curricula (marketing approach, consideration of the educational necessities of the learners);
- *activeness and independence* of the learners as major subjects in the learning process;
- *reflexivity* (learners' awareness of the content and the ways to participate in the learning activities, and especially – of their own personal development and acquisitions);
- *variety* of the educational curricula – the learning content should reflect multiple viewpoints to the problems and their possible solutions.

The reasoning expressed above is forced by the R. Koper's question 'where is the learning in e-learning?' [Koper, 2001b]. In the following sections, the changes in the traditional e-learning notion are discussed on this point of view. We put a focus on the conception of learning as a management process and present the project Bulgarian Educational Site (BEST) – a possible answer to Koper's question.

E+Learning: Concepts and Background

The proposed approach to development of e+learning platforms means that they should provide:

- *for the teacher* – tools for expressing the above didactic principles according to different pedagogical strategies, appropriate for the regarded subject domain, teacher's preferences, learners' profile, etc.;
- *for the learner* – possibilities for personalized, adaptive and active learning according to its knowledge level, learning results and preferences related with time, way, psychometrics characteristics, etc.;
- *as a whole* (for all players in the e-learning process) – comprehensive and complete support for the e-learning process during the whole life cycle, including portability and reuse of materials and courses.

In the last years a number of projects related to this approach are performed, for example, *EML* [Learning Activities, 2006], *Moodle* [Malikoff, Dougiamas, 2005], *LAMS* [Ghiglione, 2005], *PeU* (Plovdiv electronic University) – ver. 1.0 and 2.0 ([Totkov, Doneva, 1998], [Totkov, Somova, 2002], [Totkov, 2003]), etc.

EML (Educational Modelling Language) is a semantic notation of complete *units of study* developed as a mean for expressing various pedagogical models in order to support reuse and interoperability [Koper, 2001a]. The modeling is done with use of the UML [Unified Modeling Language, 2004] and the binding is in an XML schema. A unit of study is the smallest unit providing learning events for learners, satisfying one or more interrelated learning objectives[2]. The unit of study could be a course, a study program, a workshop, a practical, or lesson, that is delivered through online learning, blended learning or hybrid learning.

Moodle is an open source course (and content) management system in which activities are at the heart of the system. *Moodle* was designed on base of social constructivism. Constructionism asserts that learning is particularly effective when constructing something for others to experience. The students could be considered as actively engaged in making meaning. Teaching with that approach looks for what students can analyze,

[2] It can not be broken down to its component parts without loosing its semantic and pragmatic meaning and its effectiveness towards the attainment of learning objectives.

investigate, collaborate, share, build and generate based on what they already know, rather than what facts, skills, and processes they can parrot. *Moodle* has modular design that makes it easy to create new courses, adding content that will engage learners. This modular object-oriented dynamic learning environment possess intuitive interface that makes it easy for teachers to create courses. Teachers and students require only basic early acquired from Internet browser skills to begin learning, which makes last one very simple and user-friendly platform.

LAMS (the Learning Activity Management System) is a software tool for designing, managing, and delivering online collaborative learning activities. The system is based on the concept of Learning Design theory [Dalziel, 2003]. *LAMS* has an intuitive interface with a visual authoring environment that allows users to create sequences of learning activities with very little effort [LAMS, 2004]. *LAMS* offers lecturers a structure on which to build their lessons. The person delivering the lesson does not necessarily need to be a subject expert thus making a case for using LAMS for cover lessons.

The *PeU* [3] is a contemporary e-learning platform for cooperative development of learning materials, dynamical generation of courses and automated learning, managed by the previously developed plan of the learning process. The special graph representation of the learning process (plan) allows expressing appropriately the learning process according to different didactic methods. This *PeU* feature shows its key difference from some e-learning systems offering content-centric learning models.

We will omit the detailed comparison of the all existing regarded systems and will point out only fucntionalities that are realized in *LAMS*, in *PeU*, or in both:

A. *Both in LAMS and PeU*: models of the learning process, learning management with different interpretations (depending on the user) of one and the same model, etc.;
B. *In LAMS, but not in PeU*: open source, possibility to include learning activities of communication type (Chat, Forum, etc.) in (linear) order of activities, support of several klinds of weekly schedules; 'simple' design and user friendly interface based on common conceptions and rules, etc.;
C. *In PeU, but not in LAMS*: not linear structure of a learning course (and of learning materials too) using logical and control structures (*and*, *or*, *case*, *while*, *join*, *split*, etc.), and as a result – the system is adaptive to the learners; learning based on concepts (including generation of a learning plan based on a given Concept Map in PeU 1.0); powerful test system based on pedagogical requirements; wide user typology (authors, teachers, managers, local and system administrators, guests); administrative subsystem (including learning process management of student groups with different curruclum), etc.

The BEST Model of e+Learning

The crucial moment in realization of the unique characteristics of the e+learning platforms is the possibility for implementation and individualized interpretation of different pedagogical strategies. To deal with this the BEST platform supports two key models – the well-developed *adequate model of the learning process* and the *model of the knowledge in the studied subject domain* (SD).

Model of the Learning Process

The *necessity* of modeling of the learning process ensues from the following observation: the learning process does not consist only of ''absorption" of learning content, learners that are not active in the learning process do not learn well; therefore the adequate modeling of the teaching/learning process, in all its completeness and variety, is essential for the success of the e-learning.

The BEST model/plan of the learning process[4] (MLP) is an explicit *representation* of the learning process logic ('learning flow') depicted visually by a graph structure. The MLP graph *consists* of interlinked learning objects (LO), where an LO could be: a content element (core learning material or additional learning material as dictionaries, useful links to virtual libraries and other electronic resources, software tools for creation and solving problems, writing homework, constructing texts and so on), a learning activity (self-assessment, examination, group activity – consultation, forum, discussion, etc.), a teacher impact (feedback, marking, etc.) or a control (decision-point, sequence, choice, parallel combination etc.).

[3] Plovdiv Electronic University

[4] Called by some authors "learning design"

Thus, the MLP *allows* the both:

- The *definition* of the 'learning flow' in a e-learning course, i.e. it could be considered as dual specifications, specifying the didactic logic and in the same time the content and active objects (all tools for the educators and the learners accompanying the learning process);

  The described BEST 'pedagogical meta-model' allows courses to be created for different didactic methods. This feature expresses the key difference from some e-learning systems offering content-centric learning models and is the merit to call the *BEST* approach 'pedagogically-driven'. The high level of abstraction and flexibility makes the BEST MLP a very powerful tool for expressing very different learning scenarios, including personalized learning.

  In addition the MLP include *metadata* elements describing the modeled e-learning course on a meta-level (as the course learning objective, the learning outcomes, author, creation date, etc.).

- The *interpretation* of the e-learning course, i.e. execution (on-line learning), registration and control of the course 'learning flow'.

  The process of MLP interpretation allows the learning content (electronic materials which are actually static) to be presented to the learner in a proper manner. But what is more important it provides a complete on-line support of the complex *virtual learning* process, characterized by dynamics and variability, adaptation to specific learners, asynchronous or synchronous participation in the elements of the learning (e.g. in team work), subjective (done by the teacher) and objective (done automatically) assessment and marking, etc.

  The interpretation is performed on the basis of the MLP but also using the explicitly supported *model of the learner* (including its profile, preferences, etc.). Thanks to this could be said that BEST supports and individualized and adaptive learning (e.g. the results of the learner's assessment or activities are able to influence the virtual learning process). The learners may define their own learning objectives, monitor and regulate their own learning process and not the last, their learning is embedded in a social context; (collaborative learning).

  A significant difference between the BEST approach and the previous works lies in the possibility to interpret the MLP of a given course from the *different viewpoints* (e.g. the viewpoint of a teacher, a learner, a guest and so on) and thus provide necessary services for different types of users. This means that using one and the same MLP for example, the teacher can test and check the course, the learner can learn the course.

  Another important application of the MLP interpretation is the quality assurance of the modeled e-learning course – measuring of the educational quality on the basis of the MLP metadata and the learner's results and marks.

Model of the SD

This model is a representation of the knowledge in a scientific or application SD (e.g. mathematics, cultural science, economics, psychology, electrical engineering, law, etc.) that could be a subject of the teaching/learning. According to the BEST approach this model is developed applying the methods of the *Conceptual Modeling*, therefore it is called Conceptual Model of the SD (CMSD). The BEST CMSD again has a *dual purpose*:

- *Representation* of the knowledge in the subject domain as ontology, structured according to the basic concepts of the SD. The elements of the model are coherent parts of the knowledge content called *reusable learning objects* (RLOs). RLOs are described by corresponding *metadata elements*, characterizing its entity regarding different points of view: informational (author's name; subject; file name, data and time), descriptive (study level, learning hours, etc.) and conceptual (concepts from the SD presented).
- Automatic generation of an e-learning course in the modeled SD using (in addition to the CMSD) a definition of the course subject, the learning objective, the study level etc., all expressed in the terms of the SD concepts.

Other BEST Ideas and Principles

The BEST platform implements the following *additional important features* that give the merits to classify it as a virtual e+learning system:

- full independence of the supported e-learning from the application field – studied subject field, learning activities, form and mode of learning, educational necessities of the learners, learning and teaching methods, etc.;

- intelligent support to the process of creation of learning materials and assessment tests (including multimedia tools, automated linguistic processing, test generation, etc.);
- web-based on-line learning, teaching, authoring and administration supported by various collaborative and communication tools;
- conversion to standard formats suitable for export to other e-learning systems, including conversion to e-books for autonomous browsing;
- automatized forming of groups of learners (thanks to the models of learners) according to similar educational needs and/or level, for studying the course or for team work, etc.

Finally we could summarized that the BEST environment provide complete support of the virtual e-learning process in all its dimentions, for all players and during the whole life cycle.

Conclusions

The *BEST* system is realized on the basis of three of the already mentioned systems (*MOODLE*, *LAMS* and *PeU*) and is fully integrated with LAMS (in relation of activity and course format, web-services, database, LAMS repository etc.). The experiments with the beta-version of the *BEST*, are encouraging, and confirm the correctness of the project decisions.

The new approach discussed here changes the traditional e-learning notion, in the center of which is the learning object (material) and puts a focus on the conception of learning as a management process. The paper brings up a mater about the new 'electronic' pedagogy in e+learning systems and proposes an approach for pedagogical modeling and interpretation applied in the *BEST* virtual environment.

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