

ON A VIRTUAL LEARNING ENVIRONMENT

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***Abstract.** Education in the Information Society is based on asynchronism in time and space, interactivity and virtual restructuring of the educational space. One way to implement such a model of training is web-based - use of the WWW as a virtual environment to access educational materials or to organize the learning process. This work presents a virtual learning environment (VLE) developed for students and made up of modules of dynamically changing content implemented by authorized users. The aim is, through advanced technology for e-learning, testing and self-testing to stimulate students' activity to focus their potential on the acquisition of the necessary knowledge, skills and competences. The VLE was developed under the Human Resources Development Operational Programme.*

Keywords: education, web-based education, innovations in education, virtual learning environment

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Introduction

Educational theory and practice accommodates all innovative achievements in science, technology and culture, through which it can improve the process of building learners' personality: creative, reasoning and possessing creative qualities. One of the major innovation models is the technological one; it is oriented to a replicable training cycle involving reproducible learning outcomes: from rigid fixation of clear and pragmatic educational goals to providing models for acquiring and processing the material by the learners, through the diagnostic control and correction procedures to reaching the reference outcomes [2, p. 36].

Innovations are seen as novelties, as renewal that has an implementation and applied nature, "the result of systematic work and targeted search for new opportunities" [5, p. 14]. According to some authors, innovation is "purposeful, planned and controlled change, which is a key way to solving organizational and content problems of education" [10, p. 26]. Innovation lends itself to a qualitatively different, in fact significant, changes and innovations that pave the way for progress towards development and improvement of human activity. Innovation networks spring to life all over the world stemming from the challenges of the so-called "post-industrial society in the 80-ies of XX century, including all agents in the process of innovation (from R & D to placement of new products on the market) - research institutes, universities, companies, enterprises, government institutions and NGOs and their interdependence and interaction. Education is dominated by the impact of the on-going processes: globalization, information

society, labour market, information and communication technologies (ICT); knowledge based economy. New technologies set new challenges in education provision: more flexible and time-saving process of learning and teaching (switching from a discrete to a continuous model of learning), access to information and diversity of knowledge from a wide range of sources. Web-based learning and teaching is one of the ways to obtain new knowledge, skills and conduct patterns related to the development of science and scientific achievements and their continuous study, technical means of communication, information and telecommunication technologies.

Informatisation in the educational system: web-based learning and teaching

Informatisation is aimed at reconstruction and enhancement of the information and communication foundations of functioning society and its component systems. According to A. D. Ursul, "informatisation is a systematic and activity process of mastering information as a management and development resource using the means of informatics to create an information society and on this basis - a further continuation of the process of civilization" [11, p. 137]. According to the author, the process of informatisation is related to solving the tasks of social development and to significant rise in the intellectual level of society, as the focus is on the educational system - the most important factor in laying the foundations and development of heuristic, innovative, lateral thinking of the individual.

Informatisation of the education system is necessary because the classical model of education, based on the educational paradigm created by Jan Amos Comenius, has actually been exhausted from the substantive and procedural point of view. A new set of philosophical, psychological and pedagogical ideas creating the intellectual foundation for modern schools are needed. The rapid influx of informatisation in the educational system will create conditions for:

- Access to information resources and specific knowledge for students living in remote villages;
- Cognitive learning and teaching and intellectual collaboration among learners;
- New perspectives on learning and teaching of children and youth with disabilities;
- Advanced technologies enhancing the educational outcomes;
- Freedom of the learner from time and space frames.

Informatisation calls for a transition to a student-centred model of learning and teaching; a gradual replacement of print technology with digital multimedia technology and telecommunications. Hence the relevance for the acquisition of a new type of literacy, viz. multimedia literacy, i.e. the ability to read, write and communicate through encoded digital multimedia materials containing text, graphics, animation, video, sound. The quality of teaching improves when learners are not just passive consumers of information but also "active content creators,

making it accessible to all Internet users" [8], they must be motivated and committed to participate as authors of online materials. Such an approach "allows students to reflect on the educational process they are involved in, which results in learning from mistakes and missed opportunities, in higher motivation resulting from minor or major achievements ..., in more degrees of learner autonomy, etc., to name a few" [9]. Education in the Information Society, according to some authors [1, p. 27-29] is based on: asynchronism in time and space, interactivity and virtual restructuring of the educational space. One way to accomplish such a model of learning and teaching is web-based education - use of WWW (World Wide Web) as a virtual environment for learning materials or to organize the learning process, in view of some of the following roles: holding training sessions in a virtual classroom, discussions on topics from the curriculum; communication between trainees and trainers and among the learners; working together on projects, access to additional learning resources.

Modern educational systems are increasingly using information and communication technologies and computer telecommunications in their practice. They provide new and unique opportunities for implementing learning objectives and tasks from the perspectives of new methods and innovations. It is necessary to determine the leading activities in the complex process of learner development, they should be perceived as a single whole, ignoring the structure and composition of the constituent elements of their personalities. The high level of development of communication resources opens new horizons before rational humanity in the field of education.

Internet-based environment for learning, teaching, and creativity

The socio-economic realities in the country in recent years, the destruction and the clumsy birth of a new system of values, have created behavioural and psychological preconditions for the development of aggression and violence in society. The aggressive pattern of behaviour seems to replace the communicative style that is calm, good-mannered, and respectful for the personality of others. To reduce aggression in children, it is necessary to have understanding between teachers, parents and society as a whole. The joint efforts will lead to emotional comfort in children. Education, self-education and teaching and upbringing of children are likely to focus their energy in a creative direction and thus they can learn to transform their aggressiveness in competition, self-expression, and self-control. Each student is the subject of a system or subsystem characterized by organization and structure (i.e. a "knowledge" subsystem in the sense used by Euclid, Plato, and Aristotle). Unconscious activities and actions towards bringing about new connections and transforming the existing ones between the elements of the system is self-organization [4]. According to S. Grozdev "the self-organization of a system of learner capabilities incorporates self-education as a consequence" [3, p. 62], i.e. using appropriate tools to direct self-organization towards systematic knowledge. By learning and teaching, based on new techniques and technologies in

a virtual environment, learners would learn to share activities and spaces to transform the accumulated aggression in cooperation and mutualism.

This work presents "Web-Based Environment for Learning and Creativity" developed under project № BG051PO001/4.2.03-0091 "Educational integration system for knowledge, tolerance and prevention of aggression", implemented under OP Human Resources Development. The design of the environment took into account one of the specific objectives of the OP: increased investment in human capital through better and more affordable education. The beneficiary of developing the virtual environment is the Private Specialized High School "Academician Lyubomir Iliev" - Plovdiv, and partners are: the Mathematics High School "Academician Kiril Popov" - Plovdiv and the High School of Mathematics "Baba Tonka" - Rousse. Project activities include:

- Creating conditions for the development of the potential of each child, their intellectual and personal development, comprehensive integration and subsequent career;
- Improving the quality of education through innovative and unconventional approaches in accordance with the needs of the labour market;
- Educating highly motivated and responsible individuals;
- Providing options for learning and teaching in various areas of science where every student can demonstrate their potential;
- Making the school an attractive area for experimentation, education, personal and scientific growth of young people and for deployment of their creative potential;
- Creating lasting habits for self-education and self-upbringing;
- Creating a model for prevention of aggression in schools.

The Internet-based environment is built of separate modules of dynamically changing content which is created by authorized users. Initially, these are teachers who have been trained to work with this environment, eventually they themselves become trainers of other groups of teachers who are to add content and involve groups of students authorized to access protected materials. The Faculty of Mathematics and Informatics at Plovdiv University "P. Hilendarski" is the organization providing training to the future educators. The modules are grouped into: public area, administrative module, protected content, and are as follows:

Registration module - roles in Internet-based environment

Different participants have access to the resources of the environment upon request stated by completing a registration form. The system administrator is the one who makes the decision whether to permit or deny access. An applicant can complete only one registration form depending on their belonging to one of the defined target groups:

- Coordinators - have access to all modules and to the full functionality of the system (administration of the portal and coordination of information in the system);
- Educational advisors - administer the information in the system associated with the "Tolerance" and "Trust" virtual clubs;

- Teachers – have access to: Personal Teaching module (information for improving both the work of teachers with the environment and their teaching); E-Library (publishing supplementary materials or links for students), Learning Content module (structured in units of training), Test module (publishing test problems in various fields and complexity, additional authorization is required to sign in); Discussion Forum;

- Students – have access to: Learning Content module (using the information in the training courses to which they have been added as participants by the respective teachers), E-Library (search for additional materials for learning and teaching and entertainment according to their individual interests), Test module (using all the tests and activities for self-control, self-evaluation and testing), Discussion forum;

- Visitors - have access to unprotected elements of the structure of the system and Discussion forum (add topics, add comments, send and receive personal messages within the forum).

User Information module

Every visitor to the online environment has access to the User Information module with a portal interface, providing access to all unprotected modules of the system after authorization. This module features publicly accessible menus providing information on: the leading institution who organized and funded the project, partner schools, news, events and notices, available materials in the e-Library; addresses to contact the project organizers and administrators. After registration approved by the administrator, visitors have access to a Discussion Forum and rights to participate with posts and topics.

E-library

Provides facilities to generate electronic content for the benefit of a target group of students. For easy retrieval of specific information, the materials are structured into categories and subcategories. The structure is dynamic, i.e. new elements can be added at any time. For convenience, there is a Search facility allowing search by specified criteria. Materials in the e-Library can be in different formats - doc, docx, pdf, swf, ppt, html, etc., as it is possible to post links to external sources – redirecting to other Internet sites and resources with electronic learning content. Users from the system coordinators and administrators groups are eligible to adding materials and links.

Learning Content

This module is designed for publishing learning materials provided by registered teachers. Materials are published in the form of Training Courses, where each teacher can create their own courses and materials thereof. Training courses and materials are authorial so that every teacher will see and will work only with their own courses and materials. While it is possible to see the names of other training courses and their authors, access to them or to the published materials is not provided. The author of each Training Course selects the students who are entitled to having access to it. Students can be either from one administrative unit (class) or from different classes.

Students, in turn, can also see the names of all training courses, but can use the learning content only of those for which they are authorized. For simplicity, the number of training courses can be filtered in order that only those for which the student has access remain on the screen.

Where appropriate, training courses may be assigned a number of properties in order to be filtered - author, field, subject and others.

Test module

This module is a system designed to automate the process of generating test items, generating tests, administering tests, competition or self-check, results tracking and assessment.

Creating test items

Registered teachers can generate a set of test items, broken down by application areas and subjects. The items have different difficulty indexes, parameters and ranges thereof, which leads to the generation of different numerical conditions on the same task, thus avoiding the problem with cheating among students. The tasks are of two types: self-control and test, thereby avoiding the possibility to include self-check and self-assessment items in an examination test. Each teacher who has created an item is treated by the system as its author and without their permission other teachers cannot view or use this item; editing and deleting can only be performed by the author.

Generating tests

The generation of tests is carried out in two ways - group and individual:

- Batch Test mode is used for conducting tests. Within a selected course, the following are selected: the area from which to take tasks; the number and complexity of test tasks; a list of test takers. The system automatically creates randomized tests for each participant. The value of the parameters within the range is randomly chosen, thus each test taker receives a personal and unique test;

- Single Test mode is used to create tests for individual testing, self-control or self-assessment. The principle of generating the test is the same as in Batch Test mode, as the student chooses the field of test tasks, the number of questions in the test and their difficulty.

Test taking

Whatever the mode of test generation, each student will receive their own test. To solve the test, it is necessary to enter a username and password for the student to be identified by the system. There is an option for solving problems in an appropriate test order and sequence through a convenient and intuitive interface. Once the test is completed, a report is produced showing test statistics; correct answers are provided for wrong responses.

Test assessment

In conducting the examination tests the teacher has the opportunity to monitor the status of all test takers in real time. A table displays the following information for each testee – start time, remaining time, finish time, time of completion of the test, number of correct answers, number of wrong answers, percentage.

Discussion Forum

This forum is meant for registered users from all groups. Several key topics of the forum are set up: Tolerance Club, Trust Club, Student Forum, General Forum and others. The idea of the forum is to initiate dialogue between different groups commenting on the problems and reaching decisions after each group has expressed its views and opinions.

The Web-Based Environment for Learning and Creativity is published on a web server with the appropriate domain (<http://vois.webdev.kodar.net>); they are taken into account modern technology and development tools to interfaces, they have met the basic principles codified in the [7]. The target changes resulting from the developed virtual environment under the project "Education for knowledge integration system, tolerance and prevention of aggression" are:

1. Filling the free time of students with activities beneficial to their development, including holidays.
2. Improving the quality of education using innovative techniques and approaches.
3. Providing essential additional training for students, contenders in informatics, mathematics and other subjects.
4. Providing access to all students wishing to use materials from the e-library.
5. Involving the maximum number of students with different interests, development, education and future career in project activities.
6. Build students' own citizen standpoint.
7. The project will be useful for the maximum number of students.
8. The modular structure of the portal allows replication of the project, providing an opportunity for expansion, improvement and enhancement.
9. The project proposes complementing existing services for students and teachers; it complements the national education portal on the site of the Ministry of Education, Youth and Science featuring published materials from the mandatory training on various subjects. The focuses of the virtual environment are extracurricular activities, workshops, schools and others.
10. The development of such a portal contributes to the implementation of the National Program for Sustainable Use of ICT in Education.

Conclusion

The impact of innovations on society at large and on certain domains requires thinking about its relationship to changes in the paradigms in a number of theoretical and applied areas, education in particular. The consistent change of paradigms is the essence of each deep revolutionary change in scientific theories, pressing ahead with their development. Development and application of recent advances in scientific and technological progress have led to the use of ICT in education. The developed Web-based environment provides support for the education process, creates conditions for developing the potential of each child, of

their intellectual and personal development. Analyzing the acquired knowledge and skills involves not only verification, but also self-control and self-assessment. The path for career development of young people, the acquisition of the required knowledge, skills, competencies and the essential norms of behaviour are set with the access to the information in the virtual environment. This model of learning and teaching creates favourable conditions for more flexible management of the education process for implementing the objectives of lifelong learning in various stages of development of the individual [6].

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