

# E-LEARNING DEVELOPING MODEL IN PERSPECTIVE OF NEW TECHNOLOGIES AND VIRTUAL REALITY

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## KEYWORDS

E-learning, technologies, modelling

## ABSTRACT

One of the most important prerequisites in base plan for long-term development of Latvia is high education level in society what includes qualitative e-learning studies. Teachers have been forced to search for possibilities to make e-learning more interesting and effective. Unfortunately lack of information about possible use and effectiveness of different technologies and methods is slowing the advancement of e-learning. The goal of the paper is to evaluate perspectives of different technologies in e-learning and to create technological model for e-course methods developing. This paper represents theoretical background and practically created model of developing e-learning course methods using different technologies for different type of classroom, which can be used in professor's decision making process to choose the most effective e-learning methods. The research base are secondary school pupils, students of Information Technology bachelor program in Vidzeme University of Applied Sciences and e-course developing of Valmiera professional schools teachers have been used.

## INTRUDUCTION

Latvija strategic document (year 2007.-2013.) main important task is develop education adequacy to changing labour market and prepare people accordingly future perspectives. In this content lifelong learning part in education start growing. It means for people frequent returning in education system in life time in difference of one education stage how it was before. It means also that using of education is changing. E-learning as one of educational form develops in the world several years already. One of the e-learning definitions is the delivery of a learning, training or education program by electronic means. E-learning involves the use of a computer or electronic device (e.g. a mobile phone) in some way to provide training, educational or learning material (Stockley 2003). Author defines e-learning as using internet to get learning

materials, to interact with the content, tutor and students for getting knowledge and support in the time of learning and making his own outlook based on this new knowledge. In 2001.already in Annual Report of the European Foundation for the Improvement of Living and Working Conditions European sector social dialogue committee, a survey is being conducted on education, training and lifelong learning where 40% of workers have not time to make their work precise and in time, therefore they have not time to develop their qualification. Therefore traditional form of learning is very embarrassing.

Most popular and accessible technological solution for e-learning is based on web technologies and using computer. Data of Central Statistical Bureau Latvia in 2010 statistical data report shows that internet accessibility is 59,8% and computer – 62,8% of Latvia households (CSP, 2010), but there are accessible also other technologies like mobile phone and others what could be used for sustain e-learning more effective and accessible for all.

There is result in the research of TNS Latvia about mobile phones distribution in age 15-49 that about 95% of Latvia inhabitants have mobile phone (TNS Latvia, 2008). The tendency to use virtual and augment technologies in education also is growing but there are only few virtual products and technologies in the world for study aims. Unfortunately there are not information systems what could organize all these technologies in unique system for learning aims. The same time e-course developers have not information about using different technologies and effectiveness of that in e-learning.

The goal of the paper is to evaluate perspectives of different technologies in e-learning and to create technological model for e-course methods developing. In the research experience of Information Technology bachelor program realization in e-learning form in Vidzeme University of Applied Sciences and e-course developing of Valmiera professional schools teachers have been used. In the research also traditional teaching methods are used focusing on using different technology devices. The following sentences briefly outlines the main points of the paper proposed to reach the defined goal. Section 2

describes theoretical background of the research. Section 3 contains brief description of methodology, Section 4 reflects on methods modelling for e-course development. Section 4 analyses the basic results of modelling. Section 5 describes the conclusions.

## THEORETICAL BACKGROUND

With the change of the life style paradigm in the process of education and teaching the student develops a skill to gather information in a negative way. A study process where the main role of the teacher is to present finished knowledge while the students task is to perceive, understand, remember, reproduce the knowledge facilitates formation of a reproductive cognition, not effectively enough facilitating development of creative thinking. Study process of modern sustainable development education include the use of information and communication technologies (ICT) in different forms of study.

Learning can be divided in two main categories: formal learning and informal learning. This article is focused on formal learning. Formal learning can be broadly divided into three categories based on the context of occurrence – regular classroom learning, distance learning and online learning (Seibu, 2008). Distance learning can be within a classroom environment, or with online access or it can be a combination of both. Online learning can include E-learning what can include also of M-learning (mobile learning) or T-learning (TV learning). Darek Stockley defines e-learning as delivery of a learning, training or education program by electronic means. E-learning involves the use of a computer or electronic device (e.g. a mobile phone) in some way to provide training, educational or learning material Distance education provided the base for e-learning's development. E-learning can be "on demand". It overcomes timing, attendance and travel difficulties. Blended learning can be delivered in a variety of ways.

A common model is delivery of "theory" content by e-learning prior to actual attendance at a training course or program to put the "theory" into practice. This can be a very efficient and effective method of delivery, particularly if travel and accommodation costs are involved. This mixture of methods reflects the hybrid nature of the training (Stockley 2003). Summarizing all reviewed definitions author define e-learning as use of Internet to access learning materials, to interact with that content, teaching staff and other students, to get support and knowledge in study process and on the base of acquired knowledge make their own opinion. There are four types of learning if detach full time studies:

- correspondence education;
- distance education;
- e-learning;

- blended learning.

There are many definitions of blended learning, but the most common is that which recognises some combination of virtual and physical environments. Littlejohn and Pegler recommend a different approach that they term 'blended e-learning' what changes the focus in learning design by shifting the emphasis from simply considering the face-to-face and online environments to that of considering the design issues of introducing e-learning and the process of blending [ the online and face-to-face environments] (Littlejohn at al, 2006). Graham describes the convergence of face-to-face settings, which are characterised by synchronous and human interaction, and Information and communication technology (ICT) based settings, which are asynchronous, and text-based and where humans operate independently (Graham 2006), who. Mason and Rennie extend this definition to including "other combinations of technologies, locations or pedagogical approaches" (Mason at al., 2006) and Garrison & Vaughan define blended learning as "the thoughtful fusion of face-to-face and online learning experiences" emphasising the need for reflection on traditional approaches and for redesigning learning and teaching in this new terrain (Garrison et al., 2008).

Blended Learning refers to a mixing of different learning environments. Blended learning gives learners and teachers a potential environment to learn and teach more effectively. A blended learning approach can combine face-to-face instruction with computer-mediated instruction. It also applies science or IT activities with the assistance of educational technologies using computer, cellular or Smartphones, Satellite television channels, videoconferencing and other emerging electronic media. It means that blended learning can use also part of M-learning and TV-learning. Learners and teachers work together to improve the quality of learning and teaching, the ultimate aim of blended learning being to provide realistic practical opportunities for learners and teachers to make learning independent, useful, sustainable and ever growing. One of the best ways for realizing e-learning in praxes is using blended learning.

Successful e-learning class needs to solve a number of new problems that have not been seen before. One of them is how to effectively use e-learning environment to improve the quality of e-learning through networked learning interactivity and new format of instructional tools.. The argument of Koper and his colleagues behind the development of Educational Modeling Language is modelling or designing of technology which makes explicit use of pedagogical models (Callum et al., 2008, Koper 2001). The productivity of studying process depends of student's approach to study and their awareness of study aim. It is possible to involve students in the learning process more productively by using collaboration, the new information technologies and the

problem solving. E-learning environment should be organized to stimulate all these processes. According to the approach of this article, the first step in the design process is reflection of technology in relation to different activities. An important objective of instructional design is often to design learning objects and virtual learning environment that are pedagogically neutral which would mean that they can be used in connection with different courses. This focus on pedagogical neutrality means that instructional design has prevented from explicitly designing technology in support of certain activities of learning environment.

One of the most important aspects in e-learning is large part of learning process without assistance. It means that it actual to create adequate concept, knowledge and skills in different questions where have necessity of special laboratories and devices.

One of solutions gives possibility to use object in virtual reality or combine real and virtual objects. For many processes there are necessity to use only computer, adequate software and small adjunct advice what is easy accessible and using for students. There are courses in the world with using virtual environment in this direction. Very important it is in professional learning where study programs are oriented to practical applications. The research contains different program products, technical solutions and software using for study aims.

In the e-training technology provided each trainee has various perceptions and nature, therefore the human model respects the personality each of the trainee giving the facilities for the managing of time of the training session and determining suitable set of the training scenarios (Ginters et al, 2007). Also time planning and managing, different learning scenario is very important for each individual student. One of the solutions could be as monitoring the learning process using simulation model TemPerMod (Ginters et al, 2007). In case when working place could be create using figures generating by computer is optimal to use augment reality (AR) technologies when student has impression that he see real world. For virtual environment it is very important optimally combine all these things.

According to the educational technologies in e-learning process there are some differences between:

- Support of synchronous and/or asynchronous education
- Support of e-learning standards
- Availability of permanent internet connection between mobile learning system and user
- Location of users
- Access to learning materials.

E-learning materials should follow e-learning standards but SCORM, and also LOM standard focuses strictly on content and data format without considering the

consequences and restrictions on activities of a learning environment. There is no pedagogical consideration about what will be very important in study process. Theoretically grounded model of technology in e-learning concepts in figure 1 could be termed as a pedagogical approach which is characterized by learning theories, learning methods, learning environment and activities using different type of technologies and technological devices.

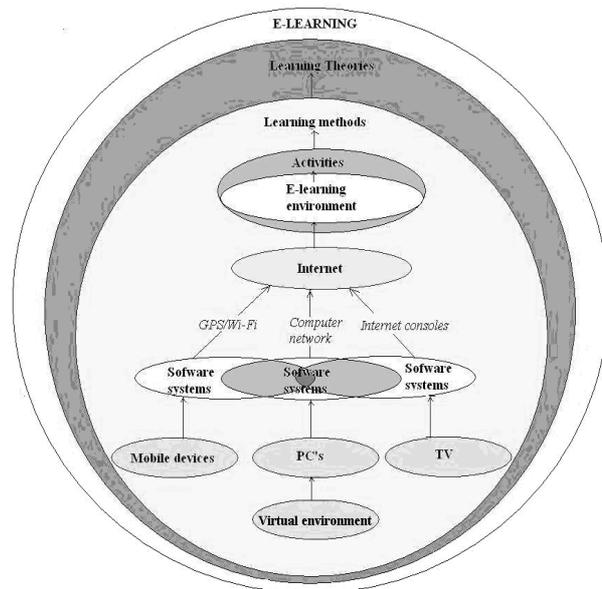


Figure 1. Theoretically grounded model of technology in E-Learning.

Based on learning theories the next step for developing e-course is to choose more effective methods for course content delivering to student and organization. There are some web-based e-learning course models scientifically worked out by different scientists. One of the most popular and effective model of web-based e-learning course is developed by Kaschek (Kaschek et al. 2003, 2004). He develops the framework for the design of e-learning system. This framework is based on an Abstract Layer Model. Model is worked out like a cycle what goes through several pyramid layer.

Since the aim of this research is to work out a qualitative e-learning methods development model focused on type of technology development. In this case technology is very important, but this model in default is developed to describe e-learning systems which are based on world-wide-web and are utilized using Personal Computers (PC), different mobile phones and other possibly useful technological devices. But there are also other technologies which is possible to use in e-learning process. Therefore model has been developed with join another layer – technology layer (Sedleniece et al. 2008).

## METHODOLOGY

There are several computer software for modelling different social processes like: STELLA, Extend, QPR Process Guide Xpress and others. As most useful for modelling e-learning course development is dynamic computer modelling tool Stella 9.0.3. There have easy user interface and possibility to import/export data what is important for modelling e-learning methods. As positive aspects for using this simulation environment is possibility to construct model using four basic elements and configure necessity parameters for simulation and also high speed computing for large scale of input data where model works quick and precise. As negative aspect they are some functional incompleteness and deficit of correct information about using this tool.

Main features of STELLA are:

Describing and modelling:

- Intuitive, icons based graphical user interface
- storage and stream diagrams ensure unique “system thinking” language and shows how system works and what influence of each element
- different storage types gives possibility to model also discreet and continuous processes, using sequence, technics and conveyers
- equation of the model has been generated automatically
- built-in functions facilitate mathematical, statistical and logical operations
- using massifs facilitate recursive structure of model
- support of multilevel, hierarchic model structures.

Imitation and analyse:

- simulation goes in real time
- careful analyses can discover key points for optimal result
- results are graphics, tables, animations, *QuickTime* films and files
- dynamic data export/import to Ms Excel (Isee systems, 2008)

Research base are 45 students of Vidzeme University of Applied Sciences and 4 experts. For data analyses have been used statistical methods like statistical tests, frequency tables, central tendency analyses, correlation and others.

## TECHNOLOGICAL MODEL

To ensure that the model of e-learning methods development using different technologies for different type of classroom is as closely as possible to real life situation, authors chose to create it using a system dynamics simulation environment STELLA.

The model of e-learning method development, realize simulation of these processes:

- Modelling of availability of technology;
- Modelling of perceptions distribution;
- Modelling of learning methods technological practicability;
- Modelling of students stored knowledge using each learning method;
- Modelling of enjoyment using each learning method;

Most important part of this model is students’ stored knowledge. The other processes of modelling supply the necessary data, or improve it.

Input data was tested with different statistical methods. Input data comes from basically four sources: student’s questionaries about technology and perceptions styles, course program standards, expert interviews and administrative documents. As output data model gives accumulated information units and satisfaction with course methods.

The conceptual model of technological e-learning course methods developing described in Figure 2.

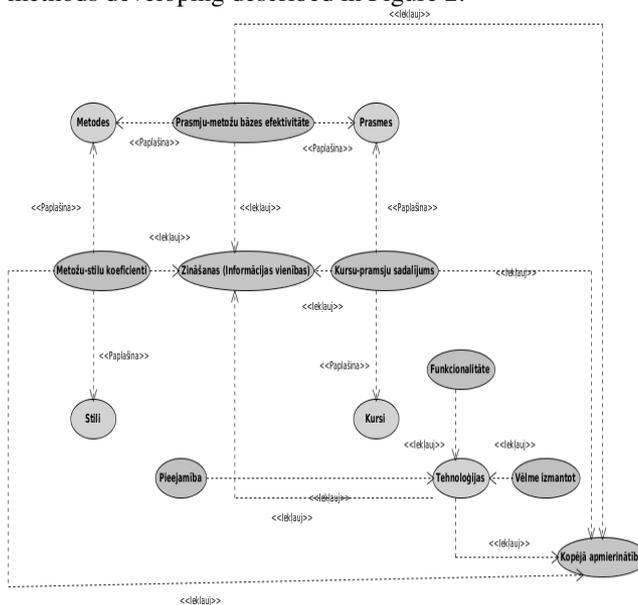


Figure 2. The conceptual model of technological e-learning.

The model contains several blocks, modules and data bases what cooperating each other. From input data directly information comes to modules methods-style coefficients, skills-methods effectiveness base, distribution of skills in the course, accessibility of technology, wish to use defined technologies and functionality of technology. There are modules stored information units and enjoyment using each learning method directly connected with output data. Inner data streaming goes through modules styles, methods, skills, course, and technologies. Technological part realized in

Stella cooperating with MS Excel and connected with MS Access data bases.

## BASIC RESULTS

There are 3 courses were tested using created imitation model. At the course beginning students take VARK test where they as a result get perception type level in kinesthetic, audial, visual or reading/writing perception. In average for this group was kinesthetic perception or modality where mean is 4,7 in diapason 1-7. The lower level was reading/writing perception with mean 3,55. Visual and audial perception was about the same a little lower than kinesthetic. Analysing most dominant type for individual student the visual perception was for 18,6% of students, audial 37,2%, reading/writing 13,9% and kinesthetic 30,2%. From this aspect most important information for this group comes using hearing and tested in action. Not so important are visual materials and possibility to read/write. The next step was questionnaire about more enjoyable technologies what they want to use for learning and for technologies what they have. All of them have computer and mobile phone. Also they checked which methods they do not want to use. As the result of computer modelling for business statistics course there are accumulated information units and methods attraction for students in the table 1.

**Table 1:** Result of computer modelling for business statistics course

	Accumulated units	Attraction of method
chats	20496	68
Computer games	27648	66
Internet competitions	22464	56
Internet tests	12096	63
reading	11592	44
mikro	8640	8
mp3	9960	52
PC based md	14544	43
ppt	20904	53
papers	9540	14
sms tests	8568	8
Tekstual home works	7632	34
vidconf	15576	61
video mat	16992	44
virt lab	18432	68
wiki	19320	54

As shown in the table more effective methods for business statistics course are computer games, the next are internet competitions, presentations and chats. After that are wiki and virtual laboratory. Analysing teacher experience for teaching business statistics for this group of students computer games and internet competitions in practice increase understanding comparatively complicated theory of statistics and use it in praxes. The

model helps to find the most effective methods for individual group and course content.

## CONCLUSIONS

There is necessity to perfect competences for life and work without interruption. Unfortunately lack of motivation for studying is one of the main reasons for unfinished study courses. There are some different ways to motivate students for studying process and one of them is to create more interesting courses using modern technologies and supporting student's types of perception. Student motivation to finish started course will growing using technological model of e-learning course methods developing. Developing of qualitative e-learning could be growing trust of society to this learnig way what is comparatively new. People will be ready to start learn and supplement their knowledge using e-learning only then when can see that the education quality is adequate. As a result of this paper has been created a dynamic model of e-learning methods development has been created in Vidzeme University College Faculty of Engineering which realizes Professional Bachelor Studies in Information Technology using e-learning environment.

A theoretical e-learning course evolution model has been developed, factors of qualitative e-learning method development have been researched, experts have been interviewed and student polls have been made to achieve this result. Theoretical model has been translated into STELLA 9.0.3 modeling environment. An Access database has been created to store all input data.

The model allows simulating the effectiveness and students' satisfaction of different learning methods based on many parameters. Created model and analysis of results using statistical data processing methods allow to arrive at important conclusions, which marketed in life, can give significant e-learning quality enhancement:

- Choosing learning methods within framework of one course is very important to ascertain whether there any other methods with the same average efficiency. This is necessary to known because if one of the method requires a large financial or time investment it is possible to use another method and do not lose learning quality.
- If there is situation where two methods get the same average efficiency, then professor choosing learning method needs to concentrate on methods which:
  - are more interesting for students and better can motivate students finish ongoing course;
  - are possible to realize using modern technologies;
  - support more of perception types.
- The largest amount of accumulated information units are collected in the online synchronous methods: chat, computer games, Internet competition and wiki.

- There are some methods which in totally different courses achieve equally effective results, but there are also methods which effectiveness in various courses is different. In order to clarify this is necessary to make statistical tests which compare the effectiveness of two methods for one course.

Model, data base and recommendations developed in paper could be used for teacher weekday work by choosing more effective methods for e-learning course development. Surveys about student group perception and technological possibilities have been recommended before choosing e-learning methods. Special questionnaires had been developed for such aim. Only by developing qualitative e-learning courses is possible to get confidence of society to this relevant new form of learning.

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## BIOGRAPHY

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