

Information Technology in Logistics: Teaching Experiences, Infrastructure and Technologies

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Abstract—Information Technology has always been a popular choice among high-school graduates when deciding on a field of study. Despite the comparatively high education levels among Latvian employees, there is still a lack of knowledge and practical skills crucial for competitiveness in a market based economy. In order to ensure relevance of the qualifications and adaptability in the fast changing environment, active learning and teaching have a special importance. Recent developments in information technology call for a serious reconsideration of the actual teaching methods and provide opportunities for developing a new educational methodology. This paper focuses on experiences of application of information technologies within the course of Logistics Information Technology for developing students' practical skills and abilities. Experience shows, that social emotional skills and abilities of nowadays students have better response on interactive collaboration, especially on active methods of teaching. Therefore, the necessity for an active teaching and learning e-environment is highlighted, and its possible realisation with application of Web 2.0 technologies is discussed within the course of Logistics Information Technology.

Keywords—active teaching and learning, information technology, logistics information technology, web 2.0

I. INTRODUCTION

Information Technology has always been a popular choice among high-school graduates during the last decades. Admissions statistics of Latvian higher schools shows that Computer Science and Information Technology are always on top among fields selected by enrollees as their future career. However, despite a comparatively high education level among Latvian employees, there is still a lack of knowledge and practical skills critical for competitiveness in a market based economy, and namely on logistics. The current paper focuses on application of IT within the course Logistics Information Technology (LIT) for developing student practical skills and abilities. In fact, information technologies within LIT are not only the subject of teaching, but rather part of didactical tool aimed at demonstrating the power of IT in every field of application, such as logistics, education, entertainment and others. The possibility of learning information technologies/systems by applying them in studies allows students (1) to understand the basic principles of IT in Logistics (which is the aim of the course), and (2) to evaluate the variety of its applications for different solutions (which is

the outcome of the course). This, according to Bloom's Taxonomy of Educational Objectives, can be explained as student growth through development of their intellectual skills and abilities.

Ten year experience of teaching LIT and researching students social emotional characteristics shows the necessity of reconstructing LIT teaching methods and learning platform in a way to support active teaching as much as it can be possible within the course. The dramatically fast growth of Information Technology, which is the main subject of the course, does not allow lecturer to stay passive without updating all teaching and didactical material monthly. Moreover, students' background in information technologies and their professional skills are always the challenge for the course lecturers. The lecturer has always to be able to give professional answers to questions which are out of studying programme and actually covers just up-to-date information technologies issues.

The objectives of the paper are formulated as follows. First the experience in teaching Logistics Information Technology is shared pointing out development milestones of the course. Then, the necessity for applying active training and teaching within the course is summarized. Finally, main specifications for learning management system within LIT are pointed out leading to a conclusion of necessity of applying Web 2.0 technology into the course. According to the objectives pointed, the rest of the paper is structured as follows. In the beginning, introduction to the subject of Logistics Information Technology is presented and the necessity of developing the course is highlighted. The syllabuses of the course, as well as some pedagogical notes are discussed.

II. INTRODUCTION TO THE COURSE LOGISTICS INFORMATION TECHNOLOGY

A. LIT milestones

The symptoms of necessity for the course Logistics Information Technology in the Master Curriculum on Information Technology were pointed out firstly during participation in the European project „INCO Copernicus AMCAI 0312 (1994 – 1997) “Application of Modern Concepts in the Automated Information Management in Harbours by Using Advanced IT – Solutions””. The project results showed a

great lack of logistics specialists having efficient knowledge in information technology [1].

The course of LIT was developed for the post graduate students of the Department of Modelling and Simulation in 1998. The course curriculum became an outcome of the project LOGIS LV-PP-138.003 “Long-distance tutorial network in “Logistics Information Systems” based on WEB technologies” (2000-2002). As well, the lectures and training book “Logistics Information Systems” book was published covering the main topics of the LIT course [2].

The enhancement of the course curriculum continued within participation in the next project LOGIS MOBILE LV/B/F/PP-172.001 (2004 – 2006) “Competence Framework for Mobile On-Site Training in Logistics Information Systems”. The novelty of it was the use of mobile telecommunications in learning and training in the area of LIT, combining them with m-training and e-learning methodologies [3].

In the LOGIS MOBILE project usual training methods are changed fundamentally, from e-learning to m-training, together with reducing the amount of study material. Instead of comprehensive lectures and a training book it was decided to prepare, as compact as possible, a concise training dictionary in LIT. The most frequently used terms in LIT are grouped in the dictionary. There is a control question at the end of each term explanation, which would let users to check their knowledge. Mobile phones could access this study service. Computers would no longer be necessary.

In 2005, the course materials were located on the Web at <http://www.logis-edu.com>. Since 2007 the description of the curriculum has been located on the ELA-LogNet website. The ELA-LogNet site is a logistics education network of universities and non-academic training organisations interested and involved in initial and further education and training in logistics to promote all types and levels of logistics learning by means of all new technologies in pan-European collaboration. In 2008, co-funded by the European Social Fund, a text book in Latvian on Logistics Information Systems was published covering basic topics of the course, as well as lab descriptions. In 2009, the course curriculum was re-viewed and some critical improvements were made. The current syllabus of the course is presented in the next section.

B. LIT syllabus

The LIT course is aimed at providing students with high level knowledge, skills and competencies in Logistics Information Technology through the integration of theory and practice. The course focuses on the application of information technologies to logistics management. It is divided into two parts: Logistics Information Technologies and Logistics Information Systems. Due to the high correlation between both of them, information technology applications in logistics management should be first explored before going deeply to the subject of Logistics Information Systems, which in turn are applications of appropriate information technologies to the realisation of logistics functions. However, the important point is to observe information technologies in the context of

logistics management. Fig. 1 explains the LIT course main components.

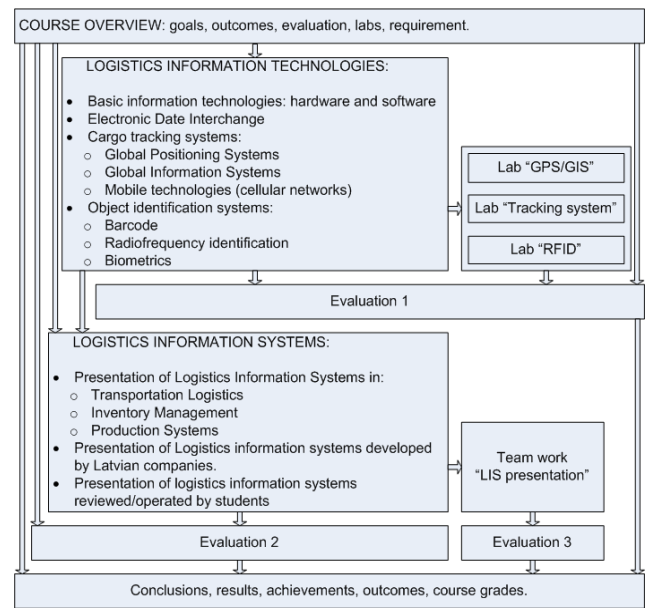


Figure 1. Main Components of LIT Course

As shown in Fig. 1, the course is structured into several blocks. It starts with a course overview block. According to the first principle of andragogy which states that, as the learners need to know why learning is important and how learning will be conducted, the course structure, goals, outcomes and requirements must be discussed first. Moreover, a response to IT professional standards should be provided underlining the role of the LIT curriculum for getting a professional diploma of Master in Information Technology. This is normally done in interactive discussion sessions, if the number of students is not too great. Finally, the lecturer outlines the course structure, its goals and outcomes.

The second block of the LIT course covers the main topics in Logistics Information Technologies, such as Cargo Tracking Systems, Global Positioning Systems (GPS), Geographical Information Systems (GIS), Methods of Automotive Identification (Bar codes, RFID, Biometrics), Industrial Networks, Electronic Data Interchange, Mobile Technologies in Logistics etc. Actually, they all are sub-blocks within the main Logistics Information Technologies block. The sequence of the sub-block through the course is not precisely defined, and is flexible to any lecturer/students requirements. Along with this theoretical block, students should improve their practical skills performing several tasks during three labs, descriptions for which will be provided in the next section. The evaluation test finalises the block of Logistics Information Technologies and allows students to summarise and analyse it during preparation for the evaluation.

The next block of the LIT course is aimed at both exploring and introducing the variety of information systems in the context of logistics management. Several solutions are discussed in the fields of transportation logistics, inventory management, warehouse logistics, production etc. In each case

the focus is on the functionality of the system for supporting related logistics functions. However, besides exploring the functionality, technical solutions are also discussed in order to underline the correlation between information technologies and information system. For example, when discussing every logistics information system, the following questions are debriefed: hardware (not only the common use like computer, fax, or whatever, but also GPS tracker, or RFID scanner), software, data transmission solutions (local network, Wi-Fi, mobile network, EDI etc.), and information technology (GPS, GIS, Biometrics, etc.). In parallel with lecturer's (and invited industrial partners' as well) presentations, students make their own presentations of different logistics information systems. This task is performed as team-work and is aimed at both enhancing students' professional competence and their group working skills. The block is finalised by evaluation tasks (see the section on evaluation for detailed explanation).

C. Labs

Although there are many different modern approaches to enhance learning by students through e-learning and m-training, the lab-based approach has gained popularity in recent years. It is recommended that labs should form an integral part of the undergraduate IT curricula. In the context of this, two lab assignments in LIT curriculum were developed and implemented in 2003, namely "The analysis of e-commerce systems" and "GPS and GIS application for object positioning monitoring". Lately, in 2007 "E-commerce" was replaced by the new one, namely "Cargo Tracking Systems Analysis", and in 2009 a new lab on "Radio Frequency Technology applications in Logistics" was added to the LIT curriculum. At the time of the preparation of this paper, the course consists of three lab assignments aimed to develop and enhance students' practical skills and competences in LIT. Table 1 provides a description of the lab exercises:

TABLE I. DESCRIPTION OF LIT LABS IN 2009

Lab	Lab description	Outcomes
"GPS and GIS systems"	Students learn the basics of GIS and GPS. They use GPS receivers to collect data (geographical coordinates) of the defined route and then analyse collected data using geographical information systems (learn how to calibrate maps, read GPS receiver data and analyse data).	Understanding the principles of GPS; Understanding GPS accuracy errors; Map calibrating skills; GPS data importing skills; GPS data analysis ability.
"Cargo Tracking Systems"	Students work with cargo tracking systems. A student team is separated into two groups. The first group makes a route outdoors while the second group follows their movements by means of the tracking system.	Enhancement of GPS principles by using mobile technologies; Tracking software operational skills.
"Radio Frequency Identification"	Students make experiments with RFID tags; write/read information; test influence of different factors (magnetic field, water, metal etc) on RFID operational capability.	Understanding RFID physics; Ability to write/read RFID tags.

D. Student Evaluation

The student evaluation process is a critical challenge for every academic course. It should be realised in a way which:

1. allows adequate evaluation of student knowledge;
2. is effective for learning and in fact is part of learning;
3. covers students personal character traits (for example, some of them perform better on tests, some benefit more in oral examinations, others do better writing essays).

Initially, the evaluation of students was conducted at the end of the course and was organised as an examination. In this, students choose a topic for discussion at random from a number of cards. After a brief preparation period, students present their topics and receive a grade. However, the shortcoming of this method is the limited number of questions students may answer in a limited time period. Due to that, since 2004 the examination processes has been supported by an on-line test which consists of more than 500 questions covering the main points in LIT. Students answered about 40-60 questions in a one hour time frame. This allowed the evaluation of a wider range of student knowledge and avoided any claims of unfair assessment. However, the main shortcoming of this is that examination at the end of the course usually leads students to postpone their studies to a few days before the exam.

To improve the evaluation by making it an assessment-for-learning, in 2009 a new evaluation system was implemented. The final grade for the course is derived from these three components: (1) a first evaluation after the "Logistics Information Technologies" block, (2) a second evaluation after the "Logistics Information Systems" block, and finally (3) a third evaluation for team-work at the presentation of the LIT system.

Each evaluation has its own weight and allows students to complete their final grade points during the semester. This can be called a portfolio assessment, in which students gather artefacts that illustrate their development over time. If a student is not satisfied with a final grade, it is always possible to improve the grade by taking a written examination which covers all course questions. The evaluation portfolio in the LIT course consists of:

- An on-line test with 60 questions which covers the block of Logistics Information Technologies (Evaluation 1 in Figure 1);
- Written essays on three questions in the context of block Logistics Information Systems (Evaluation 2 in Figure 1);
- Team-work and lecturer presentations of the Logistics Information Systems (Evaluation 3 in Figure 1).

While there are still some shortcomings in the current evaluation, the new way of assessing students provides the following benefits:

1. motivates students to study during the course;

2. minimises psychological stress during the assessment, by providing opportunity to improve the grade during next evaluations;
3. provides a variety of assessment methods way for students. This is an essential point for discussion in a pedagogical context, because there is no just one 'best' way of examining the students. Some of them being "slow-thinkers" would feel a lot of pressure due to time limitations during the test (in evaluation 1). Others might feel more comfortable going deeply into the subject (as is necessary in evaluation 2), and some like to give direct answers to precisely-defined questions;
4. supports both individual student work (and responsibility for the outcome) and team-work (where the responsibility for the evaluation is spread among all team workers).

The evaluation portfolio components may have differential weights which can be easily updated by the lecturer before the course is started.

III. PEDAGOGICAL NOTES IN LIT

There is little difference between the terms 'teaching' and 'learning' in the current paper. 'Teaching' is explained as part of educational process, where an active position (or role) is taken by a lecturer who presents (teaches) some material to students using different methods. Illustratively, a didactic lecture is a trivial method of teaching. In contrast 'learning' can be explained as part of an educational process, where students actively construct their own knowledge by absorbing, understanding and analysing information provided by the lecturer. We can assume that the student's role in teaching is more passive compared with the lecturer's, however learning is driven more by students (with some support and coordination from the lecturer's side).

In LIT, the main focus now is on supporting students in active learning and, if possible, in student-centered learning. By active learning we understand "instructional activities involving students doing things and thinking about what they are doing". Active learning is the idea that different people learn in different ways. Understanding how learning can be realised, which is the better method of learning for each student and to provide different learning styles for students is one of the pedagogical objectives of LIT. Teaching aids include text books, slide-show presentations and different video materials etc., see Fig. 2.

Every teaching process consists of three components: students, teacher, and an environment. In teaching, the role of the lecturer is dominant and usually performed by a trainer (instructor, lecturer). In learning, the main components are students and the learning environment. The lecturer's function here is to support students with a variety of methods, tools and environments. In this section, we consider the LIT course audience and discuss some teaching methods and tools specific for students doing studies in technical fields.

Despite plenty of traditional didactical teaching aids, the actual focus now is on improving the quality of educational process applying different IT solutions, especially at the Faculty of Computer Science and Information Technology of Riga Technical University. Academic personnel point out the great importance of using modern technologies in teaching. Illustratively [4, 5, 6, 7] describe the application of IT solutions in developing effective e-learning and evaluation methods.

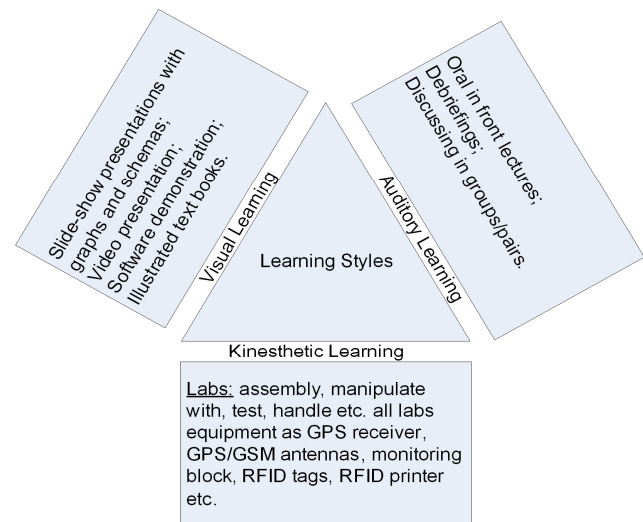


Figure 2. Supporting learning styles in LIT

A. Course audience

The understanding of the students taking the course is a quite essential point in any educational process. Prior experience of the learner undoubtedly impacts on the process of learning, partly because students get their experience not only at university. The LIT course is developed for postgraduate students doing full-time Masters Studies in the field of Information Technology, so prior knowledge in information technologies and computer science is preferable. This cannot be regarded as a challenge because (1) professional competence in information technologies is presumed, when one is a student in the Faculty of Computer Science and Information Technology, and (2) the course in Logistics Information Technology is a logical enhancement of the course of Logistics Information Systems Basics which is part of the Bachelor's Curriculum.

The LIT course consists basically of postgraduate students whose average age is 22-24. Almost 90% of LIT students are employed either in private companies or in government organisations, which makes them to be extremely high demanded for qualitative learning and teaching processes. Most of the students work in the IT field, which gives them deeper professional skills. For that reason, lecturers need to be able to adjust course material to suit students experience and prior knowledge. Some features of LIT students noticed during the teaching experience are:

- students ask for concise information;
- need more practical illustration;

- share their own experience about subject;
- prefer debriefing sessions to lessons;
- prefer labs to lessons.

B. Teaching methods

According to our experience, a lecturer must organise the course providing a balanced learning experience using different learning methods, i.e., lectures, labs, discussions etc., see Fig. 3. To illustrate, during typical classroom lectures, conceptual and theoretical information (intuitive learning) should be supplemented with concrete, practical information (sensory style) expressed through lecturers comments and explanations. Pictures and diagrams of slides presented to visual learners must also be explained orally for verbal learners who seek explanations having words. Active learners prefer to do physical experiments and to learn by expressing themselves working in groups. They appreciate conducting lab exercises which can promote the students cognitive activities. For reflective learners, however, we provide tasks, such as evaluating different options (i.e., different cargo tracking options in the second lab exercise) and making analysis (of the data acquired in Lab 1).

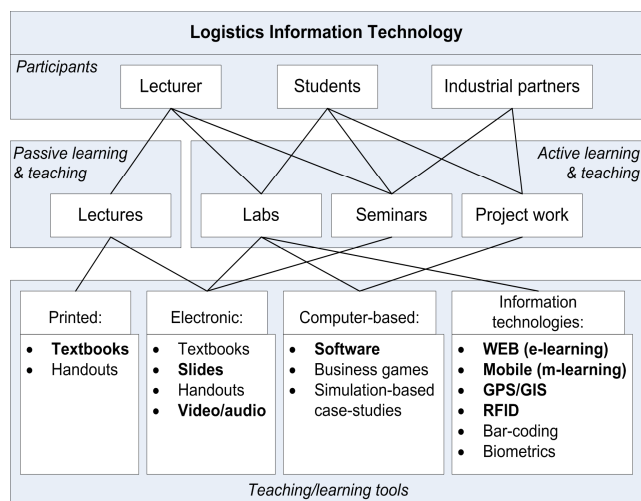


Figure 3. Teaching components in LIT

LIT employs lectures as the most used teaching method. This can be called a passive teaching method, where the lecturer has a major role. Lectures are mostly used in the Logistics and Information Technologies block; however it still has some active learning elements such as debriefing, discussions and 5-minute activities done in pairs. The Logistics Information Technologies block is organised using workshops, seminars and team-projects. Here, both lecturers and students have active roles, so this block can be characterised as an active learning support block.

Laboratory exercises are traditional method of active learning. Labs can be used to facilitate the exploration and illumination of difficult concepts. Most importantly, labs can enhance the cognitive learning process, which is often referred to as the integration of theory with practice.

In fact, information technologies within LIT are not only the subject of teaching, but rather part of didactical tool aimed at demonstrating the power of IT in every field of application, such as logistics, education, entertainment and others. The opportunity to learn information technologies/systems by applying them in studies allows students (1) to understand the basic principles of IT in Logistics (which is the aim of the course), and (2) to evaluate the variety of its applications for different solutions (which is the outcome of the course). This, according to Bloom's Taxonomy of Educational Objectives, can be explained as student growth through development of their intellectual skills and abilities.

IV. TEACHING / LEARNING ENVIRONMENT IN LIT

The application of information technologies for the purpose of education in LIT started almost directly after the course had finished (see table 2.)

TABLE II. IT IN LIT LEARNING

Year	IT Solutions	Pedagogical goals
Since 2004	On-line test	Student final evaluation, using on-line test
Since 2006	Mobile training	Student self-evaluation of main logistics information systems terminology, precise vocabulary
In 2007	Moodle	publishing announcements for students, providing lecture materials & handouts, giving assignments for practical work; communications
Since 2008	ORTUS education e-environment	publishing announcements for students, providing lectures materials and handouts, giving assignments for practical work; communications; evaluation desktop; course evaluation by students

Application of modern information technologies for teaching/learning purposes in LIT started firstly with using on-line test as evaluation. Lately, m-learning elements were included for student self-evaluation in main terms of LIT.

Application of Information Technology as an environment started in 2005, when all course materials were located at Learning Management System Moodle. Application of Moodle was aimed to facilitate educational process and make it more efficient and interactive, as well as for distance learning purposes. Moodle provided different means for educator and students that allow performing day-to-day operations in a much more efficient way, for instance publishing announcements for students, providing lectures materials and handouts, giving assignments for practical work and labs. In this case students were able to access all necessary materials and information from anywhere at any time when Internet is available. Also it is possible for students to stay in a permanent contact with their lecturers, which is important when personal communication is impossible (for instance, in the case of distance learning). The next step in enhancing a learning environment took place in 2008 in overall way for all RTU students. ORTUS is an environment created on the basis of LMS Moodle as a single electronic educational environment of RTU. It provides high-

quality support for an educational process. However, ORTUS does not allow the use of objects, to be placed inside the educational modules repeatedly; or the use of materials, created by lecturers and students, to remain in a study programme, so that in the course of time a student loses access to them. Also, using ORTUS it is not possible to organise a comfortable educational space for active co-operation between students working on team solutions to educational tasks.

Despite plenty of benefits being provided by above mentioned solutions (mostly related to the possibility of using them outside of class), there are still some shortcomings. The following can be mentioned as main issues:

- There is no single e- environment that co-ordinates both learning methods and tools in one single platform. The on-line testing system is physically located at another website, the ORTUS structure is formed by RTU IT department and, in fact, provides only limited functionality for active learning.
- None of the mentioned solutions provides an environment for active learning. Actually, all of them serve as storage for keeping such teaching material, as slides, video/audio, handouts etc. The only active processes are forums and on-line tests.

All the above mentioned leads to the final conclusion concerning the necessity of re-designing the e-learning environment in order to satisfy the following requirements for active learning:

1. to implement active learning tools and methods;
2. to maintain learning activities like communication, discussions, team-working;
3. to support both collaborative and co-operative learning;
4. to support the lecturer's role as an active participant and co-ordinator, rather than as promoter;
5. to allow students to create valuable cooperative, collaborative and individual products, (for example, project works), which can later be used by students in their professional carriers.

When analysing applications of IT for teaching purposes, it is possible to select a number of influencing factors. In our opinion, the most important of them are the increased amount of information related to the permanent development of technologies and entrepreneurial activity, and the mass introduction in teaching the technologies on the basis of the Internet, including Web 2.0 technologies. The first factor causes changes in knowledge of the specialisation, and determines the main requirements of the environment for teaching, the rapid transmission of knowledge and abilities of the students and researchers from different geographical regions. The second factor allows an increase in the creative potential of students, provides joint creation and use of information resources and collaboration and expansion of functional possibilities for teaching. Contemporary students want teaching in the form of an active dialogue and to be in a position to have an impact on the course of events, that is, they

want to be competent participants in a teaching process, the authors and reviewers, as the student-centered model foresees it.

Following the definition of Tim O'Reilly [8], Web 2.0 is the technology for designing systems which, through network co-operation continue to develop as more people use them. The main feature of Web 2.0 is to attract the users to create knowledge by introducing home page content and to use the principle of frequent verification. In the base variant of Web 2.0, every person could easily create and spread content in the World Wide Web. It could include records in weblogs, pass video information through YouTube, place pictures in Flickr, help in the creation of content in wiki, as it is actualised in Wikipedia, and also create social networks of the Myspace type. Thus, contrary to Web 1.0, which makes service to a vertical «Teacher-Student» relationship, the Web 2.0 technology is characterised by development of horizontal connections and works on the basis of social ties and relations.

The high popularity of Web 2.0 in social environment asked to its serious analysis as a tool which can be applied as teaching and learning platform. There are plenty of researches on Web 2.0 benefits as a pedagogical tool. Illustratively, [9] shows a significant reason for educators to turn to Web 2.0 as it seems fit with certain experiences emphasized in contemporary theories of learning and modern thinking. The research presents a response of Web 2.0 within the psychology of learning, namely four influential but overlapping frameworks as behaviourism, constructivism, cognitivism, and the socio-cultural perspective. It is concluded that Web 2.0 technology makes possible individual efforts of knowledge construction; it provides tools for more probing self-reflection; and, most significantly, Web 2.0 stimulates the experience of learning as interpersonal and communal in nature.

The key components of Web 2.0 are easy-to-use instruments and general or social relationship systems having the expected results. One of the most interesting results of the use of Web 2.0 is the phenomenon which is often named 'Collective Intelligence', describing the situation when the potential influence of information between the users of World Wide Web grows very quickly. It is very important, that this index increases with the increase in the number of persons actively contacting each other through World Wide Web that provides people with possibility of joint search, creation and the exchange of information. The research of McKinsey [9], Forrester [10] and other authors in the area of the application of Web 2.0 technologies, shows recently growing active interest in the phenomenon of Collective Intelligence. It has also resulted in an increase in the amount of investment in Web 2.0 technology. Researchers point out that for effective creation of new decisions and knowledge it is necessary to aggregate the possibilities for users of the input of information, methods of joint activity, and also modern technologies of collection and processing of information (wiki, weblogs, widgets, mashups etc.).

As a result of research on improving LIT teaching, the main conceptual requirements were formalised for the developed environment of e-learning with the use of modern approaches

and IT technologies. It is necessary to provide the e-environment having the following basic functionality:

- permanent development of educational materials, with the possibility of their modernisation by authors and teachers and by students. Traditional electronic courses serve only as base information sources;
- generalisation of existing knowledge and the creation of new knowledge – students create materials themselves and communicate with other students through technologies, enabling the distributed creation of materials and division of responsibility in the process of forming and the use of resources;
- use of large sections of the aggregated information sources in the process of teaching, which includes in itself all possible formats of files and methods of their transmission;
- the study of materials takes place at any time and at any place: all information sources can be used not only by computers but also by mobile telephones, MP3 players etc.

The development of these new possibilities for e-learning environment will be based upon the instruments of Web 2.0 technology, such, as weblogs, wiki, podcasts etc.

Articles written on weblog technology form an analogy of the classical concept of scientific theses and create electronic home pages of a persons or organisations on which the collection of information is made on a concrete topic or topics, including regular updates of this information. Information can be written down in a weblog by a proprietor. It can be re-written from other weblogs. The readers of a weblog can also supply information, make comments on themes and discuss different questions. Automatic creation of templates is thus possible for theses published in a weblog, using information from the pages of wiki and personal notes associated with them. A weblog can be integrated with other weblogs. The results of continued experiments, current results of work and newly synthesised ideas, can be written down in a weblog.

It is possible to select the different forms of weblogs for the teaching of LIT, firstly as a means of communication between students concerning organisation of the course, the performance of tests and home tasks, and the support of different student initiatives, secondly, for additional discussion of course themes, conducted by a teacher and the encouragement of students to make independent analyses of the information received. In such weblogs, teachers will formulate questions and tasks for students, and also give references on additional materials and resources for the topic. Thirdly, for the students, using weblog on a research theme can become the method for bringing in mates and teachers to make comments, and to criticise and correct the method of preparation.

The addition of the use of weblogs for teaching LIT can be a forum – a traditional asynchronous mechanism of communication. A forum can be related to any theme, document, person, or weblog. A forum provides bilateral

connections and enables both comments on the theme and the comments of other users.

For the personal base of knowledge modern technology of wiki is appropriate. Wiki is a home page which, in the asynchronous mode, is filled with information from a group of people and can be used as a mean of accumulating knowledge on a certain topic in the process of collective work. The basis of wiki is represented by a graph, where knots are noted by keywords (terms) and vocabulary entries associated with them. Personal wiki can be integrated with other wiki's, for example in Wikipedia and other dictionaries and encyclopaedias.

In teaching LIT, the use of wiki is assumed for the joint performance of laboratory exercises and course projects, and also for group discussions having a possibility of giving references on additional materials. Upon completion of every block of the course themes, students apply the acquired knowledge in practice and by wiki resources to collect new ideas, descriptions of interesting decisions etc. relating to this block of themes. In the future, they can be taken into account in a new modification of the course or to create independent educational content themselves.

To provide the course with a great number of aggregated information sources, it is possible to use podcasts. It will be used in the teaching of LIT for distribution among students by audio and videotape recordings including courses or comments on a study programme. Creation of podcasts is also planned by students themselves, summarising the results of their research in LIT course.

CONCLUSION

Recent developments in information technologies and telecommunications facilitate the development of new training and educational methods and tools, as described above. This provides possibilities for organising educational processes not only in the traditional way, but also by means of active learning, combining IT technologies with modern pedagogical approaches. This is of special importance for LIT teaching, where IT is the main subject of the course.

Current improving of LIT teaching relates to redeveloping course context, structure (using module-based structure), and appropriate student evaluation method. Special attention is paid to developing laboratories with modern IT equipment like GPS navigators, tracking software and Radio Frequency identification technology hardware and software. The interest among students grows up dramatically with inventing labs, moreover, they became more active not only in labs, but in lectures as well. This helped to make usual lectures to be more interactive and student-oriented with debriefing sessions at the end of every lesson. However, making those essential steps toward active learning, the importance and necessity of teaching platform became obvious. Four years experience of Moodle as learning management system showed both its benefits and shortcomings. The analysis of shortcomings leads to the conclusion of necessity researching Web 2.0 in the context of LIT.

By using Web 2.0-based LIT e-learning environment, both lecturers and students will be able to create individual centres

of teaching and researches on the different themes of LIT. Moreover, the designed e-environment will provide opportunities to form student personal portfolio achievements in studies and research, by submitting them in an electronic form for discussion and debriefing with co- students and lecturers.

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