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CULTURE AS INNOVATION IN VOCATIONAL HIGHER EDUCATION

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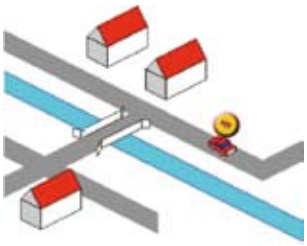

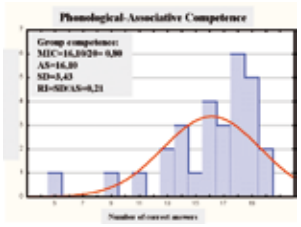

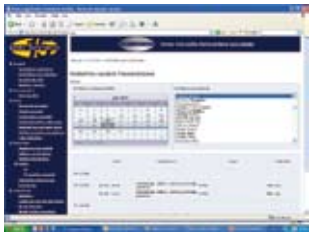

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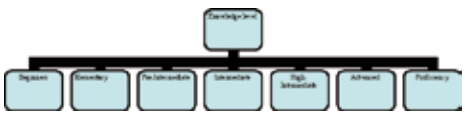

A Word from Editors

Nowadays, one would agree that information systems have been integrated in almost all fields and aspects of our life. Obviously, the system of education is not an exception – here information technologies play a vital role. Our international journal presents papers that aim at not only improving the quality of education but as well present the results of the most advanced scientific research carried out at educational institutions in Europe.

This issue is devoted to the first part of the IIT – 2007 conference proceedings. The conference took place in Vilnius, November 2007 and was a successful event which prompted new ideas, formed new partnerships and generally received a positive feedback. All the conference materials will be published as 3 separate volumes by December 2008.

The first section contributes to a thorough study carried out by Latvian researchers (Muhamediyev, Shunin) into the fields of media dot applications and intelligent system development in the learning process as well as a presentation of employing information technologies in education management (Dumpe).

The second part of the journal presented under the title of education covers an extremely wide variety of attitudes from employing the potential of Computer-Aided Language Learning (Agarwal), e-learning opportunities of Moodle (Ristvej) to exploring innovations in information processing culture (Kurkela).

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MEDIA AND ACTIVE DOTS OPTIMAL DEVELOPMENT STRATEGIES

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Abstract. *Media dots* is a term which describes elements used for reception and processing of media data. Potentially, they can be used in systems of protection and supervision, smart house systems, media-content control systems of an educational institution etc. The examples of existing complexes of video-supervision and projects of some systems are considered. The assumption on general character of processes of reception and processing of media data of various purpose systems is done. The opportunity of creation of the unified means of the user interface and systems of parallel working programs of agents processing, which are carrying out a recognition of situations (intellectual detecting) and formation of reactions, are discussed. The tasks and problems of the further researches are formulated.

Keywords. Media dots, active dots, intellectual agent, intellectual detecting, smart house, user graphic interface, natural behavior strategies, security signal system.

Short title of the paper. Media and active dots.

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„We need men who can dream of things that never were."
John F. Kennedy, 35th President of the USA

Introduction

In connection with avalanche growth of volumes of the transmitted information and capacity of carriers of the data, there is an urgent task of formation of the general concept of processing of large-scale flows media data. The concept of media dots, which are understood as every possible source of media data, is formulated. At the same time, in discussion of problems of object management, a metaphor of active dots uniting various management executive devices can be useful.

The association of various sources of media data within the framework of the uniform concept allows generalizing a task of developing of the context-dependent systems of graphic user interface (GUI) as well as intellectual means of control and management.

These means or, otherwise, intellectual agents, being in media dots space, can solve tasks appropriate to a special-purpose designation of systems and to have many similar features. Hence, the various systems based on the use of means of a video and audio-control can be managed by functionally close program systems. One of kinds of similar technical systems (but not unique) are IP cameras. It is quite possible to consider a community of the program agents placed in a network. Therefore, the systems of recognition (for example, image recognition), systems of video-supervision, systems of the media-content collection in educational institutions etc. can operate. Alongside with it, the intellectual agents can be characterized by their specific behavior which ensures the achievement of the purposes that a system is facing. The behavior of similar systems can have much common with a behavior of artificial alive essences - animates.

1. Avalanche growth of volumes of the transmitted information and capacities of carriers

The growth of capacities of information carriers is an objective process, which is observed during all computer history. Generally, this process is another display of the famous Moore's law [1]. Periodically, alongside with the avalanche growth of volumes of the transmitted and stored information, the expansion of number and change of popularity of carriers of the data are observed. The increase of its quality and volume leads to a necessity to store and to process Terabytes and Pentabytes [2]. On the one hand, this is a treasure, but, on the other hand, it is a „breed", in which to reach useful „layer" is not so easy. One of particular ways of the task solution of the data large volumes is the segmentation or personification of Internet-space [3]. However, the issue is not limited in information searching in the Internet. There are information media-sources, which transfer the data in a real time scale, for example, technological computers, measuring instruments and sensors, IP-cameras, video-servers etc.

2. Media-active dots

Let us consider various media data sources.

1. Systems of video-supervision, which can be advanced up to monitoring systems of city or area (Fig.1). The example of the project of the monitoring system of a city area is described, for example, in [4].
2. The systems of „smart" buildings that can be as well a rather volumetric media-data source are considered [5, 6]. The monitoring system and managements of a „smart" building can contain some media-data sources intended for supervision of the condition of rooms and technical subsystems, and also management blocks (Fig.2).
3. The project of a mobile system of supervision (Fig. 3).
4. The systems of security supervision, in which increasing popularity is won by IP-cameras [7, 8]. Modern variants of the systems of video-supervision and security signal system include algorithms of recognition of people, cars and some situations (sharp acceleration of movement, a person falling etc.) [9].
5. The monitoring system of warehouses and rooms, with adjustable zones of the control. One of the most popular tasks in these systems is the systems of face recognition [10].
6. The systems of supervision and control used in educational institutions, for example, at schools [11], where the cameras are used for the control of study rooms and sports grounds.
7. The project of a control system educational content of higher-school (Fig.4). The general concept of the system is illustrated in Fig.5. Generally, an educational media-content formed by the teacher can be transferred directly in a network in a real time scale and saved on the server. The isometric projection of the building is used for control learning content. The user selects the floor of the building by a mouse strike (Fig. 4, fragment A; Fig. 6), then they select a media dot on the floor scheme (Fig. 4, fragment B).

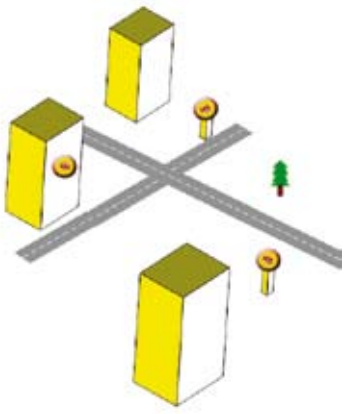

Fig. 1. Town control system.

Fig. 2. Media-Active dots in a SMART HOUSE. The green signs are media dots, the red ones are active dots.

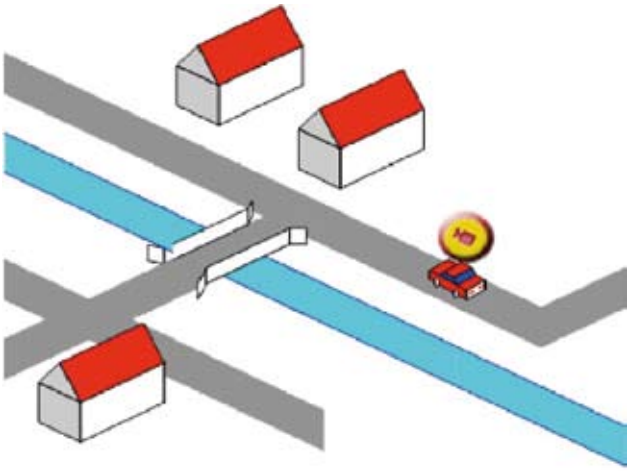

Fig. 3. Mobile M-dots.

Fig. 4. Graphical user interface for control media dots in a higher school.

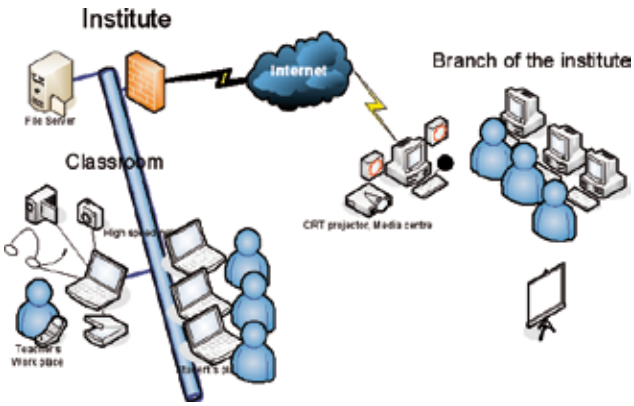

Fig. 5. Concept of a higher school e-learning system.

Fig. 6. Floor scheme.

The various media-information sources can be generalized by using media-dots concept.

Let us call a *media* or *multi-media dot (M-dot)* as an element which is capable to accept and/or reproduce media data. By media data we understand any kind of data which can be perceived or is reproduced by modern computer and communication means and their combinations. First of all, we shall consider audiovisual data - a video and sound. On the other hand, the *active dot (A-dot*) is an element capable to control an object or system. We shall call this pair as an MA- dot or simply MA. A practical variety of media-information sources can be presented in the following examples.

Examples of M- dots:

i) WEB-pages;
ii) WEB-cameras;
iii) IP-cameras;
iv) computer (e.g. information on its screen);
v) measuring instruments and sensors.

Examples of A-dots:

i) control facility of a „smart" house. Regulators of heat providing devices, illumination devices;
ii) computers;
iii) alarm devices;
iv) restriction access devices;
v) control facility mobile devices.

There is an obvious question- whether the association of so diverse systems and media-sources is justified within the framework of general paradigm? To our mind, in all examples above, the needs of practical use are rather similar. In all cases, the reception and processing of media data, and, as a rule, a real time scale is meant. Firstly, the context-dependent means of GUI that ensure the simplicity of access to media-information sources are necessary. An example of the project similar to GUI for media-content management of higher school is described below. Secondly, there is a need for the intellectual means

of control and management allowing lowering the volume of the processed data up to a „reasonable" level by selecting only that data which corresponds to a special-purpose systems designation or user needs. Such means or intellectual agents can act autonomously, prepare timetable of viewing for users and detecting systems.

3. IP-cameras and intellectual detecting

An IP-camera supplied with a microphone becomes a source of a video and audio-information. When wireless communication is available, an IP-camera is capable to work at distance up to several tens meters from the access point. An overview of cameras considered in [13].

For camera management, the software as commercial [14, 15, 16], and conditional free-of-charge [17] are used. Many manufacturers deliver the advanced software together with IP by cameras. As a rule, the cameras are capable to react to the following events [18]:

i) change of a level of a sound, perceived by a microphone;
ii) switching a source of a signal (for example, from an infra-red camera to a usual video-camera);
iii) movement;
iv) change of light intensity;
v) approach of given time intervals.

A camera makes record of video signal or sequence of frames. In other words, modern cameras are capable to detect signals. An intellectual system should be capable of something more. By i*ntellectual detecting* we shall now define the ability of a system to react not only to signals, but also to images. Such a task can be solved by the *agent of intellectual detecting* by expanding the list of recognized situations in the field of camera view span. Generally, the agent can memorize and recognize both static and dynamic images. In this case, media recognition of dynamic images becomes basic. The first step in this direction is the Advanced Video Motion Detection and Unattended Object Detection technology, used in cameras of new generation [19]. As the development of the movement detector (video motion detector) the detector of criminal situations can be offered. The prototype is the system described in [8], where are applied in both stationary and mobile cameras. It is as well possible to speak about *detectors of technogenic situations*, which could serve for revealing dangerous situations, for example, connected with vehicle movement, risk situations at airports, factories etc., and also unusual condition different from habitual situations, which can be an attribute of danger etc. The *agent of intellectual search* in media-dots space can serve as a means of recognition of similar images in media-dots space, searching for particular objects etc.

4. Strategies of media data processing. Model of random work scanning of security space

There are some serious technical problems in data volume processing. The ways of solving these problems, w hich we can point out as most effective, are as follows.

1. Development of optimal strategies of server (or processor) charging, designated for software agents. The choice of processors, when the charging and distance to the source are taken into account, can diminish the probability of errors in data processing.
2. Self-teaching of agents. Using of various strategies of agents' self-teaching, including imitation of natural ways of teaching [20,21], will allow to adopt them for changes in media-ponts space.
3. Use of strategies of transmitted media-information volumes. The first approach can be concluded in dislocation of agents of intellectual detection directly in collection points of media-data. Thus, the translation of a part of algorithm of data processing closer to the point of data receiving can diminish the data amount for the next stage of data processing. Nowadays, there are examples of video-cameras with mounted software which detect the movement and recognize available subjects [15].
4. The second approach is focused on using the pseudo-chaotic strategies of media-points activation, similar to a natural way of vision field of human eye. For instance, to solve the problem of security video-observation, we cannot implement the full-scale processing of the whole data flux, coming from all observation cameras. It will probably be enough to analyze particular images of video-data from various cameras chosen at random. This approach is demonstrated in Fig. 7, 8 and 9. In particular, the Fig.7 shows the „linear set" (security wall) model. Each camera scans the observation field randomly changing the orientation angle $\varphi(t)$. The same way is used for the „radial set" model (Fig.8). Fig.9 demonstrates the algorithm of movement of the video-camera. The orientation angle $\varphi(t)$ changes according to the logistic map law (e.g. the well-known logistic map of Verhulst) [22,23]:

$$x_{t+1} = rx_t(1 - x_t) \qquad (1)$$

For 3<r<4 the generation of chaos is observed. Thus, the algorithm of random walk scanning of active media dot is:

$$\Delta\varphi_{t+1} = 90^{o}[(rx_t(1 - x_t) - 0{,}5] \qquad (2)$$

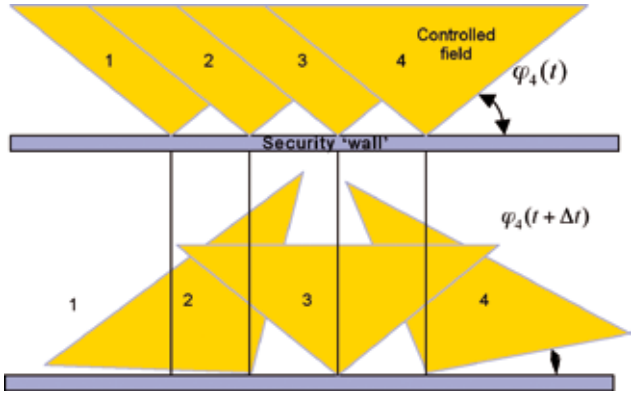

Fig. 7. Media and active dots models: linear set of dots

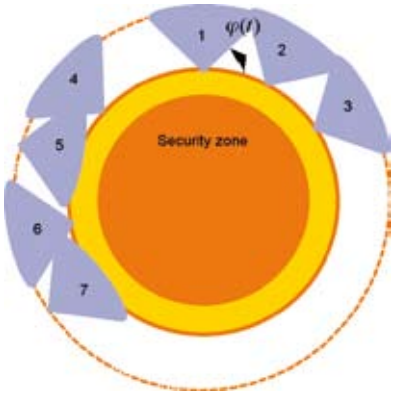

Fig. 8. Media and active dots models: dot radial set.

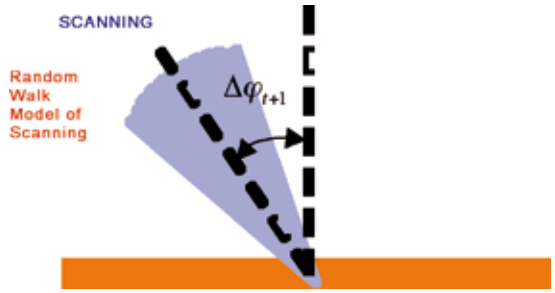

Fig. 9. Random Walk Model of Scanning.

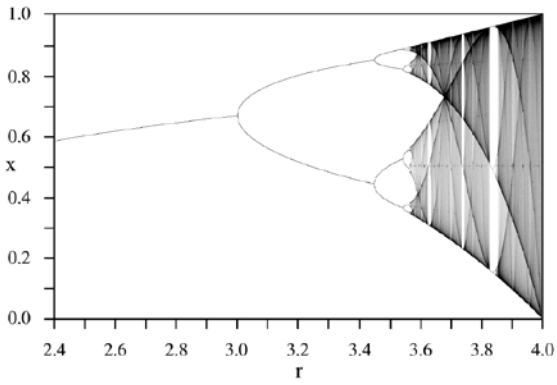

Fig.10. Verhulst's logistic map: the equilibrium point of iterations *x* via the growth parameter *r*.

Random Walk Model of Space Scanning is a chaotically determinated process of rotations of a number of active media dots. As soon as an object is detected, the observation system concentrates its attention on the object and controls it. It is an intellectual action, based on observed image recognition.

The task is to optimize the number of the media-points and their spatial distribution. After detection of an object a system of observation concentrate its attention on the object and controls it. It is an intellectual action, based on observed image recognition. Various types of image recognition systems can be used. Signal systems include algorithms of recognition of the people, cars and some situations (sharp acceleration of movement, fall of the man etc.) (see Fig.11,12).

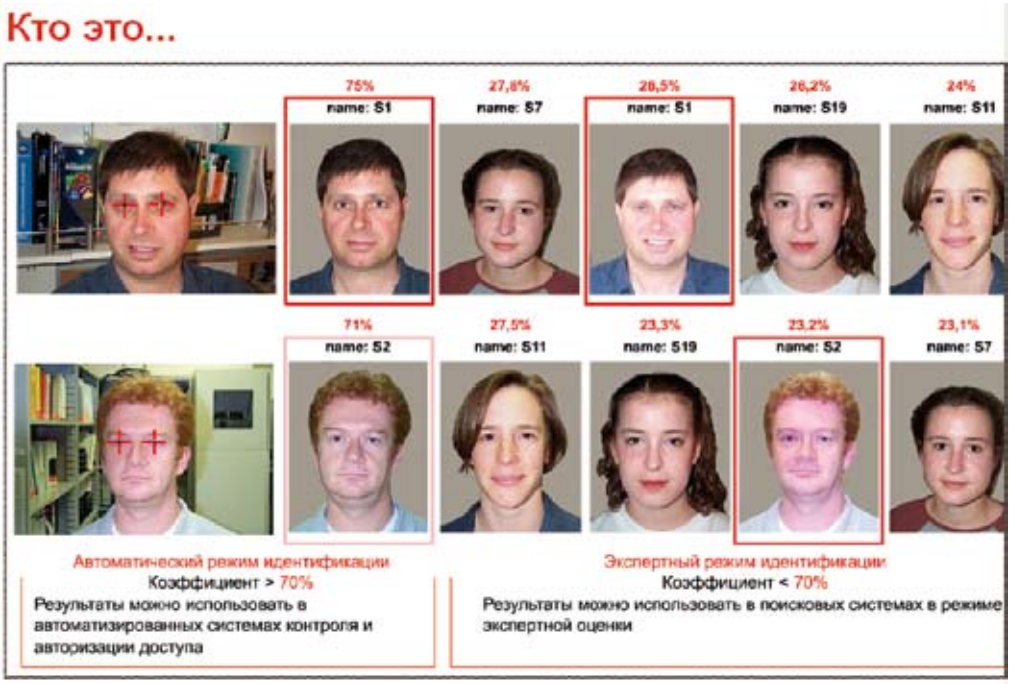

Fig. 11. Face control system.

Fig. 12. Cerberus image recognition system.

Conclusion

An increase of the transmitted data volumes, the growth of speed of transfer and the decrease of storage costs initiates the development of the general concept of media data processing. Considering various sources of media-information within the framework of a media dots metaphor, it is possible to discuss the unified means of the user interface, system of working in parallel programs of processing agents carrying out recognition of situations, and also consider the behavior of the agents in media-dots space.

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INFORMATION SYSTEM BASED ON THE LEARNING CURVE MODEL FOR PROFESSIONAL COMPETENCES DEVELOPMENT

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Abstract. Pragmatic external world – employers, market – dictate the needs and demands for education today, hence its influence on the higher education system, which responds to these, is supplying learners with the ordered professional competences, knowledge and skills forged by means of various academic disciplines and courses. Needs and demands of individuals are formed under the needs and demands of the competitive global marketplace and the job market – the society – the system which guarantees its citizens the main rights for education and employment.

The responsibility of contemporary higher education providers is to yield to the new imperative of interdisciplinary connectedness of knowledge and skills, to work out educational modules which are in compliance with the tasks and demands of employers, particular businesses and the European job market

Language as a means of communication and cooperation is also a major way of access to different cultural manifestations; it is an imperative arising out of the needs, ties and interrelationships of people entering the „interdependence age" within a new space – the integrated European society. The status of English as a „Language for International Communication" is no longer in dispute and rarely attracts the kind of critical scrutiny.

In this paper we propose some certain definitions to pedagogical phenomena in the process of language acquisition on the basis of the General Systems Theory developed by an Austrian scientist Ludwig von Bertalanffy (1940s). We consider a group of learners as a *learning system* which is reversely charged with a situational *managerial system* (i.e. mentoring/teaching staff), thus, forming a constituent structural unit of a bigger pedagogical system but, at the same time, keeping its all main characteristics. Since the learning system experiences a purposeful external pedagogical influence, it is considered a managed system. A model of *Intelligent System Management* has been worked out.

The process of imparting educational information by a mentor is distinguished by its qualitative and quantitative indices. We regard it as a process of *intellectualization* of a study group in connection with the notion of 'homeokinetic plato' (according to von Bertalanffy), which actually reflects different intellectual levels of language acquisition by learners. The proposed *System of Intelligence Levels* and the *Teaching Efficiency Indicator* ensure the possibility to estimate the initial level of learner intelligence and the final result and compare these with a predetermined purposeful goal to see the efficiency of a study course and the progress of student achievement. These techniques can be recommended for use to a variety of educational and training domains.

The empirical results gave grounds to compile effectively the material amount for the final test on Business English and to define the time for its fulfillment. *Optimization Model* of teaching information amount and time distribution has been worked out and the *Learning Curve Model* has been proposed.

Keywords. System approach, intelligent system, managerial provision, instructional events, language database, knowledgebase, language decoding, homeokinetic plato, intelligence level, intellectuality, teaching efficiency indicator, study material optimization, professional communicative competences, English teaching, European identity.

Short title of the paper. Learning Curve Model.

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Introduction

As the 21st century unfolds, educational environment becomes a new supercomplex system with a constantly changing pattern. Being engaged in this environment, each of us performs tasks strategically using our specific competences to achieve a certain result. Although these tasks might not always be language-related, they are mostly accomplished through language relationships. These relationships form a spectrum of intelligent socio-language system. Here we can see the first modern signs that learning is considered to be a holistic process in a holistic world [1-3].

The analysis of numerous definitions of the notion *system* has given us the grounds to consider a group of learners in the educational environment as a system, as a component part of a bigger pedagogical system, keeping its all main characteristics. We refer to the notion educational system only as to the academic process organized within one particular educational institution. In our view, an *educational system* – is a purposefully organized wholeness of interactive components with constant reverse ties forming an integrated learning environment, which presupposes the appearance of new integrative qualities in the process of intellectualization and, eventually, leads to restructuralization of both the single constituents, and the system as a whole. An integrated learning environment includes the whole gamut of social, psychological, cultural, educational and environmental factors as both influences and resources from which individuals can draw.

1. Plugging the language into the European society

The responsibility of contemporary higher education providers is to yield to the new imperative of interdisciplinary connectedness of knowledge and skills, to work out educational modules which are in compliance with the tasks and demands of employers, particular businesses and the European job market. Integration of the European society very much depends on what instruments we will apply to promote the unity of science through improving the communication among young specialists to enhance cooperation and co-creation of a unified sustainable society. Integrated trans-disciplinary module cycles aim to ensure learning and assessment on the basis of the System approach so that individuals could understand and be given the competency, creativity and confidence to cope with the urgent professional tasks and changes, problem-solving and situation-specific reactions not only within the European society but also globally.

Information Systems Management University (ISMU), accredited by Education USA TC as an authorized testing language centre of Test of English for International Communication (TOEIC) in Riga (Latvia), has a certain experience in developing such interdisciplinary modules as well as in quantitative analysis of the testing results of the TOEIC modular sections within the framework of Business English, when educational language environment serves as the basis for trans-disciplinary cooperation in Management and Information Technologies [4,5,12]. On the basis of the System approach, the authors have worked out the criteria and quantitative indices of interim and final results of students' achievement in the target language acquisition in the course of trans-disciplinary modular learning. Using these data the authors have calculated and worked out the Learning Curve for the TOEIC test at Information Systems Management University, reflecting the necessary time and content modules to achieve higher levels of language proficiency.

2. The System approach in developing language communicative competence

The General System Theory (GST) developed by Ludwig von Bertalanffy in 1940s [6] gives primacy to interrelationships, emphasizing shifts from constituent parts to the organization of parts. It is from these dynamically managed communicative interrelationships that new properties of a learning system (a group of learners) emerge [5]. An example is the properties of these letters which, when put in order, can give rise to meaning which does not exist in the letters by themselves. This further explains the integration of tools, like language, that helps create a vibrant and innovative competence-based educational system – a system where students develop high-level competences, which include initiative, leadership, managerial ability, and the ability to communicate effectively.

The System approach ideally serves language acquisition – developing language communicative competence – since it views a language user primarily as a 'social agent', i.e. a member of society who has tasks to accomplish in particular circumstances, in a certain domain, in a specific environment. The GST, in its integrative role, brings together principles and concepts from general human competences (knowledge of the world, socio-cultural knowledge) with a more specifically language-related communicative competence (linguistic, sociolinguistic, pragmatic competences). Still, communication cannot be about nothing. In its trans-disciplinary function it encompasses a lot of domains – historical, geographical, social, political, economic, technological, cultural, environmental, and many others, demanding a certain amount of knowledge and awareness. In our case, the English language is the instrument for developing socio-cultural and occupational competences in international tourism, business, management and computer technologies.

3. Communicative competence in the European speech community

Any education begins with the language. In the process of integration and citizenship education in Europe, our main aim as higher education providers is to ensure every individual the ability to use English for international communication to guarantee everyone his share in the stakeholder involvement - education and employment in that country which one has consciously chosen to identify with the future profession or interest (sports clubs, scientific societies, interest groups, etc.) and not obligatory in the country that they themselves have not chosen to belong, depending on the place of birth and parents. Such multiple possibilities enhance motivation to study languages.

To identify the necessary competences to be developed for the benefit of future young specialists is the first step in setting educational goals. For English language educators the most problematic aspect of defining English as an international language (EIL) remains the notion of competence for EIL. It is clearly inappropriate to teach

language that is only applicable in limited situations in a target culture that may never be visited by students. It is obvious that what makes „appropriateness" in international communication cannot be defined in terms of a single speech community. Still, there is no a European speech community so far. In this early stage of the development of our European speech community, it is clear that there has to be an agreed body of standard international English to be learnt or taught for competent European communication. The notion of *communicative language competence* has to be re-considered for the teaching of English for international communication. It cannot be reduced to a single, limited, mono-cultural concept.

"International" communication seems to require a set of interdependent competences that reinforce each other – linguistic competences (include lexical, phonological, syntactical knowledge and skills), sociolinguistic competences (refer to the socio-cultural conditions of language use, especially between representatives of different cultures – rules of politeness, norms governing relations between generations, sexes, classes and social groups, certain fundamental rituals in a community) and pragmatic competences (focus on achieving mutual understanding – intelligibility- in spoken or written texts, concerning, as well, the mastery of discourse, cohesion and coherence, eliminating ambiguity) [2]. Strategic competence is also highlighted as an important component of "communicative competence" [8,9].

The theory of dynamic development cannot be restricted only to the presence of a determined goal. It demands certain conditions including organizational and structural composition of the process of development.

4. Intelligent system structural organization and management

Systems, management, intellectuality and their interrelation – these are the issues without a clear understanding of the essence of which it is not possible to study neither any problems nor dynamic or developmental processes in any domain. According to von Bertalanffy, at the foundation of any material dealing with systems there lies The General Systems Theory or The General Management Theory, which only allows working out the meaningful notions and definitions.

In our case, the educational system has an organizational structure that carries all the peculiarities characteristic of a complex system. We can single out the following:

i) objects (learning system – mentor/managerial system);
ii) elements (aims – content/educational information – methods/means/strategies – resources - forms of education, training, development) ;
iii) attributes (properties of constituent subjects);
iv) interactions or attitudes;
v) the presence of direct and reverse ties;
vi) the presence of levels and their hierarchy.

We can present the organizational structure of the educational system in the following way - see Fig.1.

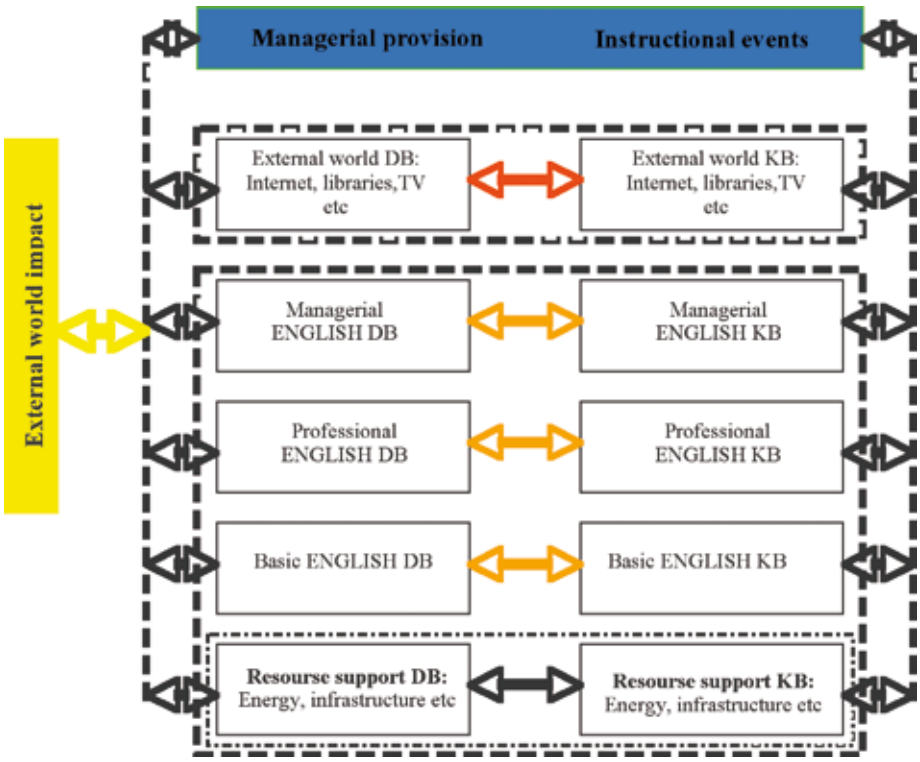

Fig. 1. The organizational structure of the educational system.

According to The Systems Theory, each intellectual system is founded on a database, a knowledgebase and the corresponding managerial system, as well as, a resources support system. The initial point for creating an educational system is a *set goal*.

In the centre of the educational system is the *learning system* – a group of learners (in our model presented as a language database (DB) and knowledgebase (KB), since we assume every individual as possessing certain communicative language competence), for the sake of which the whole system is created. The learning system is open, active, dynamically developing in time and transitioning from one intellectual state into another due to interactive communication within the educational system, which allows ascending higher proficiency levels.

Intellectualization of the learning system (or object) is carried out via adaptive intelligent management, performed by the *management system* - mentors/ lecturers possessing knowledge. Eventually, the successful outcomes of the learning system largely depend on the efficient managerial provision. Management does not imply a directive-commanding style of contact between the mentoring staff and the learning group. It is an equal dialogue of the two systems, where the former ensures the necessary functional properties of the other.

Educational information (including managerial instructional events) serves as the basic element stipulating the existence of the system, since any system can survive provided that a flow of information functions efficiently. (The dotted lines and reverse arrows show how external managerial impact in the form of educational information is communicated to the learning system and how it may feed back as a result of the learner's and mentor's reaction to it. The charged information is perceived by learners in the database – which we assume as learner's communicative language competence. Then it is comprehended, interpreted, analyzed and processed in the knowledgebase in accordance with previously acquired knowledge. As a result of all structural sequences and transformations, the outbound acquired educational information serves as a signal for the management system that the learning group is ready to process some further information or is ready for the acquisition of a higher-level knowledge, thus, ascending a new intelligent level). Methods, strategies and means of communication aim to organize the learning activities to ensure a successful acquisition of educational information in accordance with the predetermined goals.

Every system, including the educational one, experiences the influence of the *external environment*, mutually exchanging energy and information, and it is able to restructure the activities depending on the demands of the external world.

Thus, summing up, we can say that the organizational structure of the educational system presents a wholeness of interactive objects and an organized combination of pedagogical elements and is characterized by the hierarchy of levels.

5. Levels of managerial language decoding via educational information amount and complexity

In our article, the foundational factor is not the content of the incoming information but the process of its communication. If there is no adequate language contact between the two systems, however rich and interesting the content might be, it would never reach the desirable result:

i) the second repercussion of epistemological pandemonium is the management of the university itself;
ii) the stochasticity of quasi-singular substance precipitate adequately correlates with consistence anisotropy;
iii) endocasts have been taken to indicate that some phenomena in human ontogeny is recapitulating in hominid phylogeny.

Confusing, isn't it? The given examples show how difficult it could be to talk to a layman on professional topics. It is even more difficult for an unprepared person to listen and comprehend such things that would never find any response in mind.

What means ensure successful intersystem communication? First of all, it is the language of management, the language of communication with a learning group. The language of a learning system (communicative language competence) and the language of the management system (complexity and amount of educational message) are the crucial characteristics, which determine the choice of the necessary level of contact.

Stephen Krashen, for example, considers that language input should contain language that the students already "know" as well as language that they have not previously heard; in other words, the input should be at a slightly higher level than the students are capable of using, but at a level that they are capable of understanding [13]. Goldowsky and Newport in their discourse about language complexity have come to the conclusion that "…a limitation on the ability to perceive or remember the full complexity of linguistic input may have unexpected benefits", because "… for *any* structure in the language there is a filter that produces optimal learning of that structure. If you start with very limited capabilities and then mature, you will have each size of filter in turn, and therefore have the chance to learn each structure in the language at the time appropriate for that structure – and you end up learning the entire language optimally [14]". As a result of his scientific experiments, Jeffrey Elman points out that acquisition of language is significantly facilitated by arranging the acquisition device (a *recurrent neural net*) in such a way that its 'working memory' is small at the outset of learning, and grows incrementally during the learning process. 'Specifically, successful language learning may depend on starting small' [15].

Our System approach to language acquisition takes into consideration both managerial language complexity and educational information amount as the means of ascending intelligence levels by a group of learners [6]. The model below was designed, giving its adherence to von Bertalanffy's homeokinetic plato, which, actually, reflects different levels of managerial language decoding (i.e. discovering, analyzing, interpreting and processing of the communicated educational message) by a group of learners.

Since intellectualization of the learning system goes on as a process, the system at every moment of its existence experiences a state of 'disbalance' – homeokinesis (von Bertalanffy). The language of intelligent management (i.e. communication of educational information) is the factor that ensures a relatively stable equilibrium of the plato – (i.e. the intelligence level) from the beginning of a study course to its end. (Feedback fields B1 – B2, B3 – B4, B5 – B6.) To the left of B2 and B4 there are the areas where the system shows signs of losing its

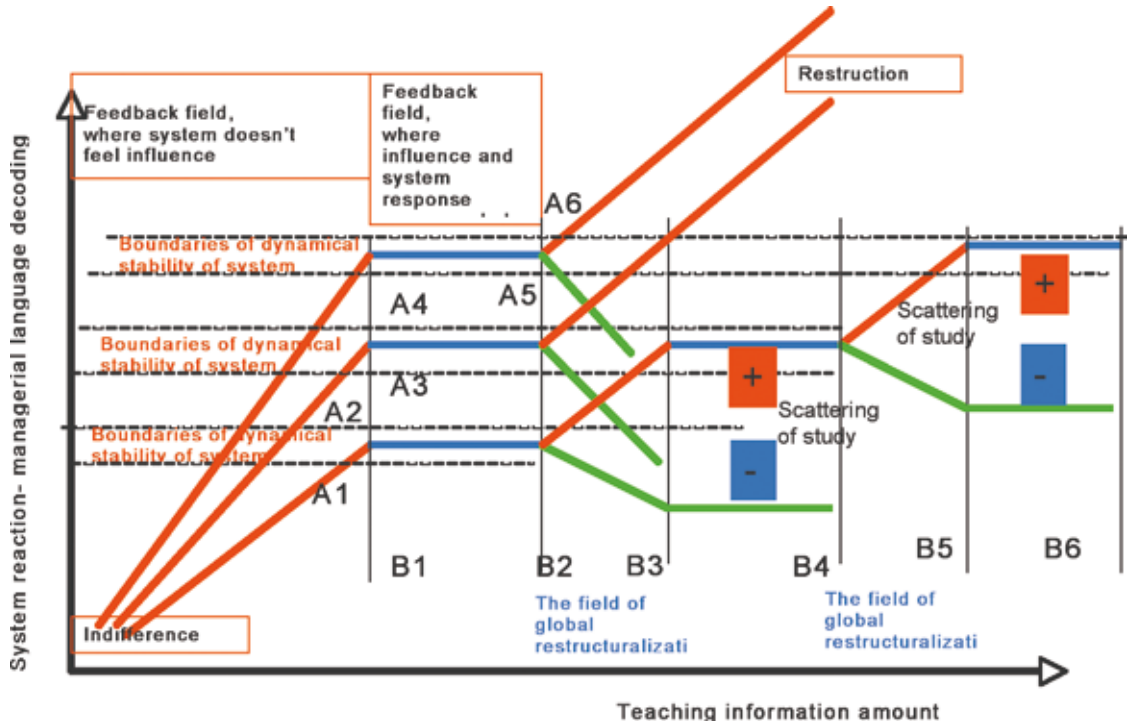

Fig. 2. Homeokinetic plato model for language teaching system.

former properties having acquired new ones. These new properties – knowledge, skills, abilities, competences – cause 'global inner restructuralization' and transform the system into a new state of intellectuality. In other words, the appropriate managerial language which is adequate to the learners' decoding abilities aims at keeping the learning system within the boundaries of the information homeokinetic plato (boundaries of the system stability A1–A2, A3–A4, A5–A6. This is the area where managerial functional elements can be amended in case the system endures any deflections from the purposeful goals.). As a result of the acquired knowledge and the outcomes of global restructuralisation, the learning group is able to mount onto a higher intelligence level, onto a higher level of language proficiency.

Uncoordinated managerial influence will remove the learning system from the boundaries of dynamic stability, leading to a functional disbalance and, eventually, to information collapse. In such circumstances, the learners will not be able to adapt or change the purposeful function of the total system. As a result, the whole system might be destroyed. In some cases the scattering of the learning system is observed (feedback fields B3–B4, B5– B6). Some of more successful students due to self-management skills can acquire a reasonable amount of knowledge and move upwards to a higher intelligence level. Less successful ones will just become marginal candidates. To the left of A1 there is an 'indifference' area, where the students do not perceive the mentor's educational message in case the language input is not adequate to the learning group.

The reasons of uncoordinated managerial influence might include a mentor's low tone of voice which is impossible to hear in a large auditorium, or the language abounding in specific terminology which is incomprehensible, it might be an excessive amount of educational information within limited boundaries of a lecture which is physically impossible to comprehend or, if a mentor shows disinterest in students as personalities, he is just 'doing his job', etc.

A study course can be implemented intensively within a limited time frames, ensuring a rather fast transition from one level of *homeokinetic plato* onto another. It presupposes a fast in-training professional profile course generally considered as English for Specific (or Occupational) Purposes (A1–A6). If we speak about a pedagogical process, we assume an extensive course with much wider time limits, significantly increasing educational information amount as well as far-reaching purposeful educational goals (the field of global restructuralisation B1–B6). The process presupposes not only the development of communicative language competences but also the general competences of language learners, including their knowledge, skills, existential competence (the sum of individual characteristics, personality traits and attitudes which concern self-image, and one's view of others and willingness to engage with other people in social interaction), and also their ability to learn. These personality traits, attitudes and temperaments are parameters which have to be taken into account in language learning and teaching.

We can judge about the efficiency, effectiveness and success of the whole educational system only by the final result, by the students' level of attainment, for which the whole system has been created. If one of the individual results is lacking behind, it will pull backwards the success of the whole group and, eventually, show a lower functional level of the learning system.

The educational system is distinguished by its functional mobility and flexibility, which allows at *any* time introducing a regulating component by changing any functional element of the system. Comparing a pre-determined purposeful goal with the real interim result, the

system can redesign its activities at any stage to amend individual intermediate deflections or any deviations of the final result from the initially set goals to avoid the destruction of the whole system.

6. System intelligence indicators as a regulating functional component

The Systems Theory offers a set of characteristics reflecting complexity and intellectuality of a system, which are of vital importance for a pedagogical process. These characteristics are defined (according to Boulding, a follower of von Bertalanffy's) by the reaction of the system to the flows of incoming information [16]. The indicator of the auditorium readiness for the educational process is comparable with the indicator of intellectuality in the Systems Theory, hence the necessity to define the intelligence level of a learning group, first of all. In our case, as we have already pointed out, the intelligence level corresponds to the communicative language competence level of the learning group.

The *Intelligence Level Indicator (ILI)* is made up of the three basic components:

i) system complexity according to Boulding's scale = *B*;
ii) learners' communicative language complexity = *C*;
iii) managerial language complexity = *M*.

$$ILI = \sqrt{(B^2 + C^2 + M^2)} \qquad (1)$$

The parameter *B* is a fixed constant and, similar to Boulding's scale *(B*= 1,2,3,4,5,6,7,8,9) [16], it might correspond to a natural number 7 in reference to a human individual, or to a natural number 8 in reference to a social group/learning group.

The parameter *M* can be either very simple or very complex. On the analogy of Boulding's parameters, *M* might present a constant number, showing different levels of mentor's language complexity. (E.g., 1 = the level of simple orders and explanations during a lecture = Intermediate Professional Level; 2 = the level of solving problems, reasoning and drawing conclusions, showing logical thinking = Pre-Upper Intermediate Professional Level; 3 = the level of high-order skills - problem solving, case study, generating new ideas, etc. = Upper Intermediate-Advanced Professional Level).

The parameter *C* can be calculated as the logarithm of *Word-stock & Linguistic Items Amount* in conventional logarithm scale or might correspond to a fixed number, reflecting the level of language proficiency.

This formula is supported by various language proficiency tests. It can be applied at the beginning of an academic year and at the end, or at the beginning of a certain study course and while finishing it. It can also be used in case of any deviations from the predetermined objectives. The *ILI* is applicable both for individuals and groups.

We can also present a model of the intelligence development of a system as a certain intellectuality space expansion.

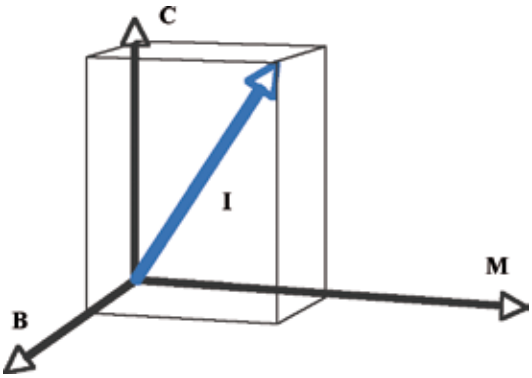

Fig. 3. Intelligence development of a learning system (learning system means learning/social group).

The most important parameters for us are those of *C* and *M*, since *B* is a fixed number. As it can be seen from the model, alongside with the increasing parameters *C* and *M* (learners' communicative language complexity and mentor's language complexity respectively), the intellectuality space of the learning system will expand.

7. Teaching efficiency evaluation

The successful functioning of any system (including an educational one) is characterized by its efficiency. And here comes one more factor onto the surface – *Teaching Efficiency Indicator (TEI)*, which is based on two variables, since any study activity of a learner can be viewed as the necessary *time for thinking* and the necessary time for task fulfillment. Time for thinking presupposes reading the task or listening to a mentor's instructional events. *Time for fulfillment* is actually a technical doing of the task.

Fig. 4. Time of thinking and time of fulfillment ratio.

Teaching Efficiency Indicator:

$$TEI = \frac{T_{thinking}}{T_{thinking} + T_{fulfillment}} = \frac{1}{1 + \frac{T_{fulfillment}}{T_{thinking}}} = \frac{1}{1+\tau} \qquad (2)$$

where

$$\tau = \frac{T_{fulfillment}}{T_{thinking}} \qquad (3)$$

The formula makes it obvious that reduction of time for task fulfillment will result in the increase of efficiency. A line graph showing a typical behavior of *TEI* has been drawn up.

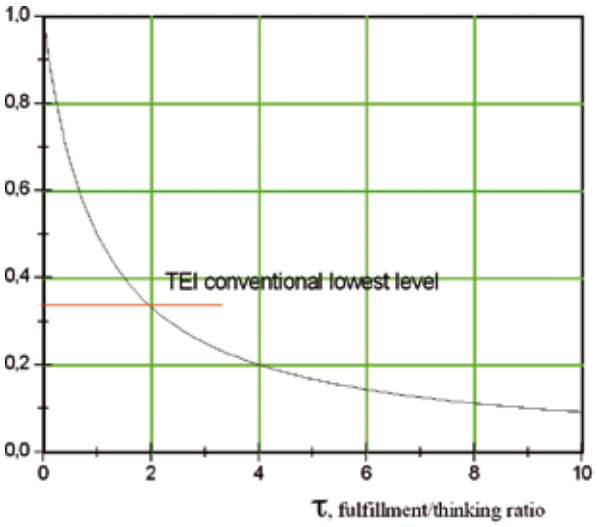

Fig. 5. A typical behavior of *TEI*.

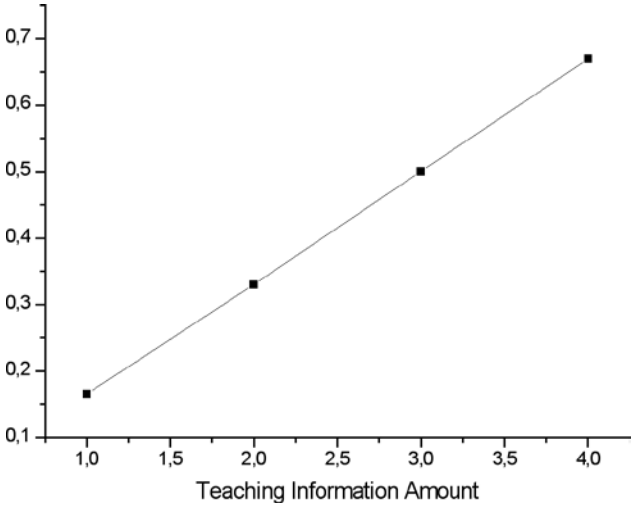

Fig. 6. Expected *TE*I via teaching information amount.

As we can see, the curve of efficiency goes steadily up with the shortening of time for task fulfillment. However, it is obvious that we cannot reduce the time infinitely; it will be just absurd. The critical point shows the lowest level of teaching efficiency.

8. An empirical investigation of educational material amount and its optimization

Our task was to investigate what amount of educational material will be optimal with the maximal efficiency in a limited time. An empirical study was used to analyze the material of the final qualification exam in Business English and, particularly, the professional vocabulary. According to the proportion factor we accepted 30 language items as 1, 60 items as 2, 90 items as 3 and 120 items as 4, respectively.

The normative time for task fulfillment was 30 minutes. With the increase in the task amount, the time for thinking was increased. A graph of the expected efficiency has been built:

Table 1. Normative teaching time distribution

Teaching Information Amount	*T* thinking, min	*T* fulfillment, min	*TEI*
1 (30)	5	25	0.165
2 (60)	10	20	0.33
3 (90)	15	15	0.50
4 (120)	20	10	0.67

30 min – normative fulfillment time

Four groups of 10 learners were formed and each learner received the tasks. The tables below show the empirical results of the students' performance. The dashes (-) in sections for *Time-fulfillment* in blocks 3 and 4 indicate that the results were not counted. The student's production was either less than 75%, or there was not enough time to cope with the task, or some other reasons.

On the basis of the empirical results, a graph has been drawn up and matched with the graph of the expected efficiency. The adjustment point shows that within the given time with maximal efficiency the optimal amount of words/expressions will constitute approximately 60- 65 items. This parameter was observed in the forthcoming examination task in Business English. The results of the examination were different, but it proved that there were no failures, at least in the vocabulary part.

The empirical results show that students' achievement is dependent both on the time of thinking and the time for the task fulfillment. These findings are supported by the results of the examination content analysis.

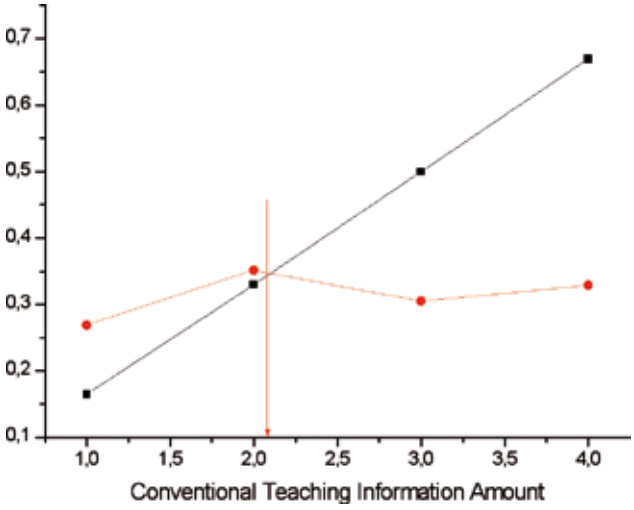

Fig. 7. Optimal teaching information amount searching.

Table 2. Analysis of conventional study tasks fulfillment

Conventional Teaching Information Amount: 1				**Conventional Teaching Information Amount: 2**			
Student's code	*T* thinking, min	*T* fulfillment, min	*TEI* personal	Student's code	*T* thinking, min	*T* fulfillment, min	*TEI* personal
1	5	10	0.33	1	10	15	0.4
2	5	15	0.25	2	10	15	0.4
3	5	8	0.385	3	10	10	0.5
4	5	12	0.295	4	10	15	0.4
5	5	15	0.25	5	10	18	0.357
6	5	15	0.25	6	10	20	0.3
7	5	10	0.33	7	10	20	0.3
8	5	20	0.2	8	10	25	0.28
9	5	20	0.2	9	10	25	0.28
10	5	20	0.2	10	10	20	0,3
			2.69				3.517
			0.269				0.3517

Table 2 (continuation)

Conventional Teaching Information Amount: 3				**Conventional Teaching Information Amount: 4**			
Student's code	*T* thinking, min	*T* fulfillment, min	*TEI* personal	Student's code	*T* thinking, min	*T* fulfillment, min	*TEI* personal
1	15	20	0.43	1	20	10	0.67
2	15	15	0.5	2	20	15	0.57
3	15	28	0.34	3	20	20	0.50
4	15	20	0.43	4	20	20	0.50
5	15	25	0.375	5	20	35	0.36
6	15	30	0.3	6	20	-	0
7	15	25	0.375	7	20	-	0
8	15	-	0	8	20	40	0.33
9	15	30	0.3	9	20	35	0.36
10	15	-	0	10	20	-	0
			3.05				3.29
			0.305				0.329

9. Learning information amount and time

The model below shows how a definite amount of study material can be distributed in different groups with various indicators of intellectuality and efficiency.

Practice proves that very often the difficulty is to condense some course of a subject into a very short time of a lecture and to cover as much as possible within a very limited period of time. Bringing the System approach into class, we have the way of managing our time and resources. In more knowledgeable, advanced groups, the learning material can be given in a whole block within a definite limit of time. In less successful groups, it can be divided into separate tasks in various contexts or these can be logically sequenced contexts following each other according to the degree of difficulty. The aim is to attain the maximum result with the minimum losses (in time, personal energy waste, interest, knowledge etc.). The resources have to be deployed to their maximum effect.

The way of imparting educational message by a mentor is of a crucial importance in this process, since the level of complexity of language input has to be adequate to the level of students' comprehension and, yet, constantly enhancing their achievement in language acquisition. As Polanyi (1958) put it „Existing human experience has a continuous character, it is not disjunctive, and therefore the application of *formal linguistic rules* to it requires of the applier the same kind of *art* as the application of any other kind of technology" [17].

It seems undisputed that the mastering of memory skills is important in educational development; yet, the memorized information is no substitute for understanding, knowledge and insight nor is it a reliable indicator of intelligence. Therefore, the offered *Intelligence Level Indicator* takes into consideration not only a student's level of language proficiency but also the comprehensible level of a mentor's language complexity as well as a regulating parameter (*B*) reflecting an individual as an intelligent system.

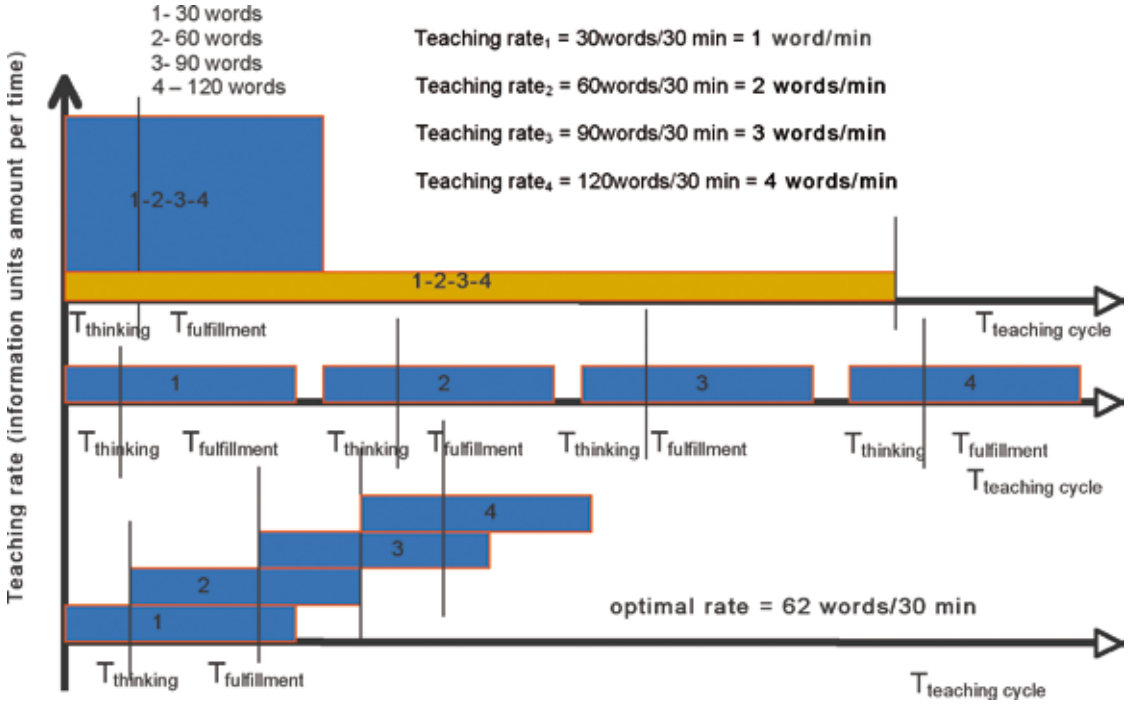

Fig. 8. Teaching information amount and time distribution optimization model. Integrated Skills Module. 1-2-3-4. Module 1 – Reading; Module 2 - Listening; Module 3 – Speaking; Module 4 – Writing. Complex Moduling.

The suggested *Intelligence Level Indicator (ILI)* and *Teaching Efficiency Indicator (TEI)* permit to define the optimal amount of the learning material and the time for task fulfillment both for a particular individual and for a certain group as a whole. It can be recommended to any study domain, not obligatory language-related. In addition, due to its mobility and flexibility, the System approach allows implementing these corrective factors (*ILI* and *TEI*) at any stage and at any time of the educational process to amend *any* elements in the educational system, hence its importance.

10. The System approach in piloting the TOEIC test for European workplace

From the point of view of language teaching-learning and in the persistence of chronic lack of fixed norms of a standard EIL, the internationally recognized TOEIC test proves to be a good example of the System approach to language acquisition, since the test helps to define the competences on 7 parameters required for a variety of types of work and to measure these competences effectively and fairly applying state-of-the-art assessment systems that meet professional testing standards. On the basis of the System approach, the authors have worked out the criteria and quantitative indices of interim and final results of students' achievement in the target language acquisition in the course of trans-disciplinary modular learning. An empirical study was used to analyze the results of the English language Olympiad at Information Systems Management University (Latvia), where 29 learners were offered the materials worked out on the basis of the TOEIC test - a 2-hour, multiple-choice test that consisted of 200 questions divided into two separately timed sections – Listening and Reading [5,10-12].

We got the results on 7 types of task corresponding to certain communicative language competences and compared them with each other.

1. Phonological-Associative Competence. Involves skills in the perception of the sound units and their realization in a particular context.
2. Micro-Functional Competence. Knowledge of and ability to use the spoken discourse and written texts in communication for particular functional purposes.
3. Pragmatic-Discourse Competence. Listening comprehension of authentic spoken English and ability to extract the necessary details from the conversations.
4. Functional-Propositional Competence. Ability to understand authentic examples of spoken English from workplace, travel and leisure situations, reasoning and making accurate conclusions from the evidence. They vary in level of formality and include announcements, short speeches and advertisements.
5. Lexical-Semantic Competence. Knowledge of and ability to use the vocabulary of the language and semantic structures (of idioms and expressions).
6. Grammatical Competence. Knowledge of and ability to assemble language elements into meaningful messages and sentences using grammatical recourses (sentence repair).
7. Pragmatic-Design Competence. Knowledge of and ability to control the ordering of sentences. Knowledge of design conventions, how information is structured, how written texts (formal letters, memos, advertisements, faxes, invitations, notices, schedules, e-mails etc) are laid out, signposted and sequenced.

11. Main characteristics, indices and descriptors of the knowledge level control

We introduce a set of key indices for the knowledge level control. *Index of Competence- IC* - could be expressed as follows:

$$IC = \frac{n_p}{n} \tag{4}$$

where n_p denotes number of points scored for the test, n - the total number of test questions. *Total Index of Competence- TIC* - can be expressed as follows:

$$TIC_i = \frac{\sum_{j=1}^{m} IC_i^j n_j}{\sum_{j=1}^{m} n_j} \tag{5}$$

where i represents the variant (or student) index, j - the test part index, m - the total number of test competences ($m=7$, in our case). The typical form of distribution set is presented in Table 3

Table 3. The typical form of distribution set

IC	IC_1^j	IC_2^j	IC_3^j	IC_n^j
frequency	f_1^j	f_2^j	f_3^j	f_n^j

Total number of questions i_n a part of the test n_j is defined as follows:

$$n_j = \sum_{i=1}^{k} f_i^j \quad , \tag{6}$$

and n - the total number of questions in the test is defined as follows:

$$n = \sum_{j=1}^{m} n_j \quad . \tag{7}$$

AS - the average score of sa part of the test is expressed as follows:

$$AS_j = \frac{\sum_{i=1}^{n} IC_i^j f_i^j}{\sum_{i=1}^{n} f_i^j} \tag{8}$$

and corresponding standard deviation of a part of test results – SD_j – is defined as follows:

$$SD_j = \sqrt{\frac{\sum_{i=1}^{n} (IC_i^j - AS_j)^2 f_i^j}{\sum_{i=1}^{n} f_i^j}} \quad . \tag{9}$$

MIC_j - the mean index of competence of a corresponding part of the test j is expressed by the following formula:

$$MIC_j = \frac{AS_j}{n_j} \tag{10}$$

and RI_j - the risk index of a part of the test

$$RI_j = \frac{SD_j}{AS_j} \tag{11}$$

characterizes the level of reliability for the average score AS_j. This also means that the larger RI_j the smaller is the level of homogeneity of study results in a tested group

We calculated the average score of the group's task performance – *AS*. It gave us the possibility to define the *Mean Index of Communicative Language Competence* – *MIC* (the ratio of the average score to the number of tasks). This is a very important parameter since it reflects not only how successfully students managed to cope with the task but also the level of their competence in a particular language area. On the one hand, the average score (*AS*) might demonstrate the level of the group's particular language competence. On the other hand, the *AS* on its own cannot be considered as totally objective, since it does not reflect the scope of results dispersion in the group, which might result in neglecting weaker students in the educational process. This would turn up a major pedagogical and methodical mistake. To get the objective evaluation, it is vital to take into consideration the standard deviation – *SD*. If the index of the standard deviation is reasonably low, the homogeneity of results in the group is sufficiently high. Our pedagogical and methodical objective is to secure the decrease of the results deviation – *SD* – and the increase of the average score – *AS*, demonstrating the students' group performance.

Therefore, to control the quality of student achievement and verify the dynamics of its progress, another component – risk index – *RI* – has been introduced (a ratio of the standard deviation to the average score – *SD/AS*), which demonstrates the degree of confidence in the average score – to what extent this Figure is objective and reliable. If *RI* is relatively low, approaching → 0, it means that the level of mistakes dispersion is rather low, and the average score might be quite high and reliable. Thus, relying only on the average score might lead to tough pedagogical mistakes, which, in fact, constitutes risk. It might turn out that half of the group showed very good results and another half demonstrated rather low results, but the average score appeared to be quite satisfying. Therefore, if test results in a group are approximately homogeneous, risk function – *RI* – will be relatively low, which presupposes that the average score might be considered quite objective, worth confidence and the applied teaching methods work efficiently.

Table 4. Empirical results of TOEIC test

Variant (or student) number	Phonological-Associative Competence, 20 items	(Micro) Functional Competence, 30 items	Pragmatic-Discourse Competences, 30 items	(Macro) Functional-Propositional Competence, 20 items	Lexical-Semantic Competence, 40 items	Grammatical Competence, 20 items	Pragmatic-Discourse Competences, 40 items
	1	2	3	4	5	6	7
1	18	26	29	16	25	13	17
2	14	21	28	11	28	8	17
3	18	21	20	12	22	9	21
4	19	26	17	15	29	9	18
5	19	21	25	13	26	8	19
6	16	20	10	11	24	8	19
7	20	30	29	19	36	18	40
8	19	30	29	20	35	17	37
9	19	29	27	16	33	19	37
10	17	29	25	19	35	17	36
11	18	29	25	17	29	16	34
12	14	18	14	9	25	7	17
13	5	18	10	10	17	8	7
14	13	16	8	13	21	11	14
15	18	30	24	17	30	15	25
16	14	21	23	10	23	12	19
17	18	27	28	17	28	12	31
18	17	29	20	14	28	14	24
19	18	29	23	18	27	13	25
20	9	13	7	6	7	3	15
21	16	24	9	10	27	7	11
22	17	20	18	9	23	6	5
23	11	14	12	10	4	7	12
24	13	21	22	13	20	7	9
25	20	28	24	18	34	11	35
26	16	27	30	19	31	16	32
27	19	27	25	14	29	15	25
28	15	20	15	9	27	13	18
29	16	22	16	7	23	14	23
	16.10	23. 58	20.41	13. 52	25.72	11.50	22.14

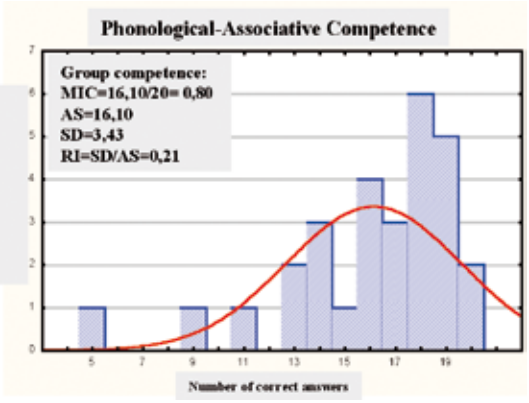

Fig. 9. Phonological-Associative Competence: Answers Distribution Density in comparison with the normal density distribution function.

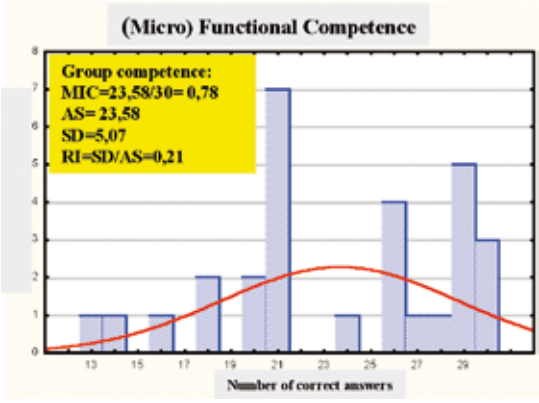

Fig. 10. Micro Functional Competence: Answers Distribution Density in comparison with the normal density distribution function.

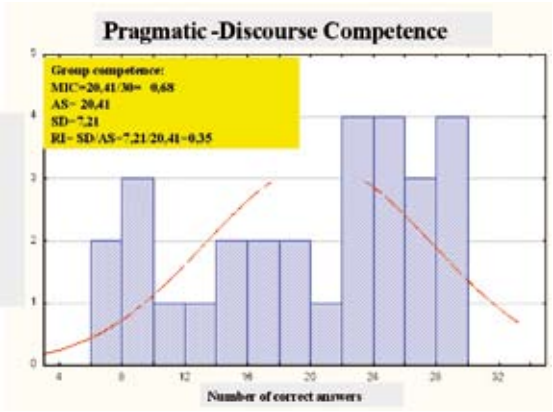

Fig. 11. Pragmatic-Discourse Competence: Answers Distribution Density in comparison with the normal density distribution function.

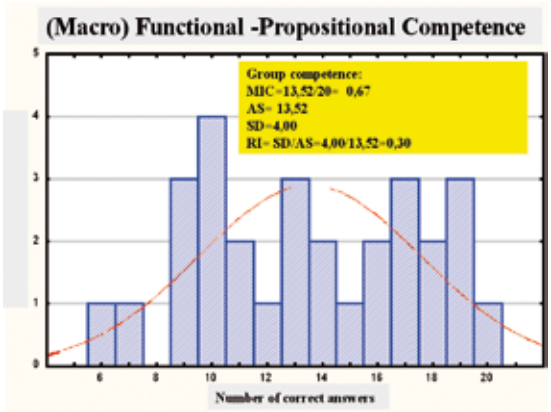

Fig. 12. Macro Functional-Proportional Competence: Answers Distribution Density in comparison with the normal density distribution function.

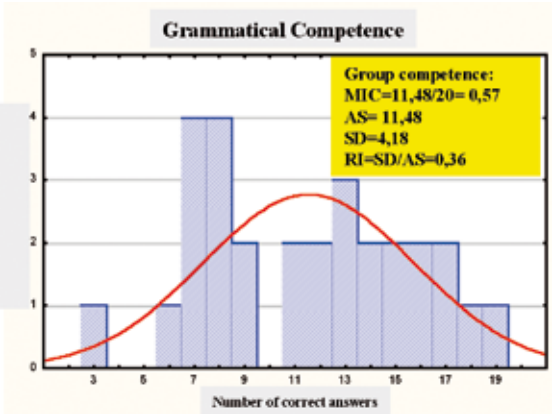

Fig. 13. Grammatical Competence: Answers Distribution Density in comparison with the normal density distribution function.

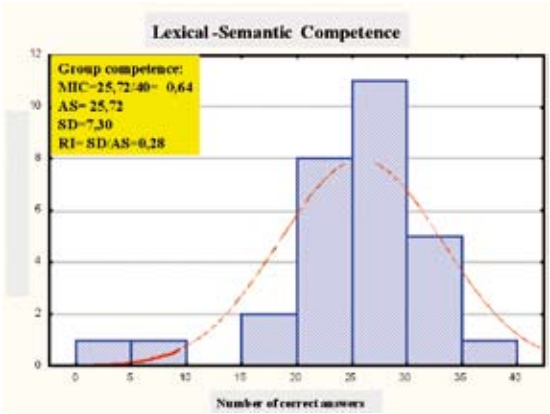

Fig. 14. Lexical-Semantic Competence: Answers Distribution Density in comparison with the normal density distribution function.

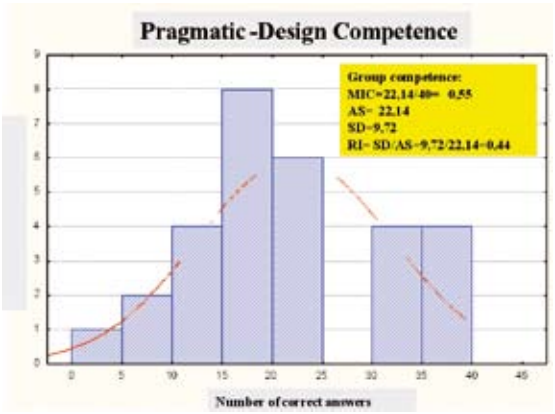

Fig. 15. Pragmatic-Design Competence: Answers Distribution Density in comparison with the normal density distribution function.

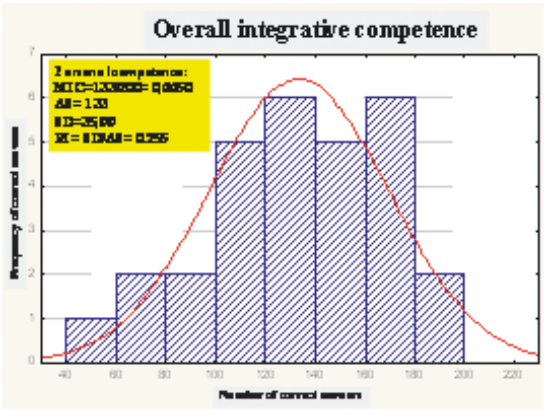

Fig. 16. Overall Integrative Competence: Answers Distribution Density in comparison with the normal density distribution function.

Teaching groups with a high-risk coefficient and a low-risk coefficient demand different methods, otherwise more successful students will move rapidly forward in language acquisition, while weaker students might fall out of the process due to inability to succeed in coping with high-level tasks. As an example, the bar graph below shows the *Phonological-Associative Competence: Answers Distribution Density* in comparison with the normal density distribution function. The total number of tasks is 20, the mean index of competence *MIC*=0.80 (80%), the average score *AS*=16.10, the standard deviation *SD*=3.43 and the risk index *RI*=0.21 (see Fig.9)

If we consider that the given set of answers has a normal distribution, we see the graph where most of the answers are close to the average index *AS*. *SD* shows how the answers are distributed in relation to *AS*. We know that approximately 68% of answers are found within one *SD* and about 95% within two *SDs*. Thus, knowing the average index – *AS*, we can interpret individual results. Analogically, the graphs were drawn corresponding to the rest six competences. They showed different levels of students' competences, but more importantly, they demonstrated different degrees of mistakes dispersion *SD*. The most problematic competences appeared to be the fourth - *Functional-Propositional Competence*, the sixth - *Grammatical Competence* and the seventh - *Pragmatic-Design Competence*. The analysis of the obtained data helped the authors to work out educational modules with a special emphasis on problematic areas (e.g., modal verbs, conditional sentences, phrasal verbs, prepositions).

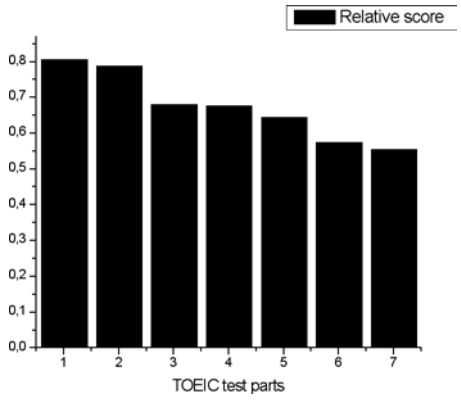

Fig. 17. Overall communicative competences.

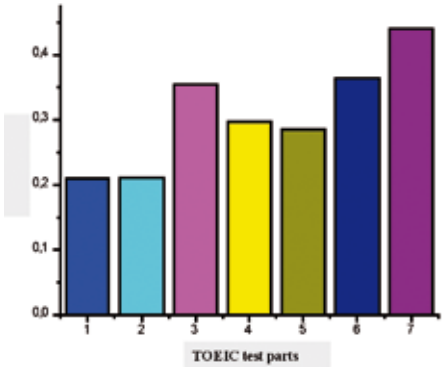

Fig. 18. Risk index *via* type of competence.

Fig.17 shows overall communicative competences demonstrated by the students involved. We can observe a strong tendency to decreasing towards the reading tasks. The results for Listening Comprehension are better than for Reading English. About 73% of the spoken questions have been solved by more than 80% of the students. Understanding written English is more difficult; the main part of the questions has been solved by 40%-50% of the students. There might be possible objective and subjective reasons for the situation observed. Most of the time during the classes is spent regularly on exercises for listening to spoken English and speaking it. 95% of instruction is given in English. In addition, lots of Latvian students listen to music, watch TV channels, especially musical ones, in English. They often are highly motivated to understand these messages. Understanding written English is given less attention.

Fig.18 shows the risk index in connection of tested type of competence.

Fig.19 shows the upper descending line of the group Competence Index and the lower ascending line of the Risk Index. It can vividly assure us that with the decrease of *AS* and *MIC*, the risk index *RI* increases, revealing no trust in *AS*. Fig.3 shows the total competence values for the tested group where the *MIC* index is less than 70%, which does not correspond to the predetermined goal (80%-90%) and *RI* is more than 20% (paying attention to Pareto's principle). This is an alarming signal which demands a critical analysis of the adequacy of the materials, the methods of teaching, and other components of the educational process. At the same time, the main problem area mentioned concerns the link between the English classes in the secondary school and high school. Most Latvian high school teachers feel that the knowledge that students gain at the secondary school is not sufficient for a higher educational institution. Students come from different regions of the country from schools which are sometimes very poorly equipped, where there are almost no special teachers of English or lots of teachers have had no special training in teaching English.

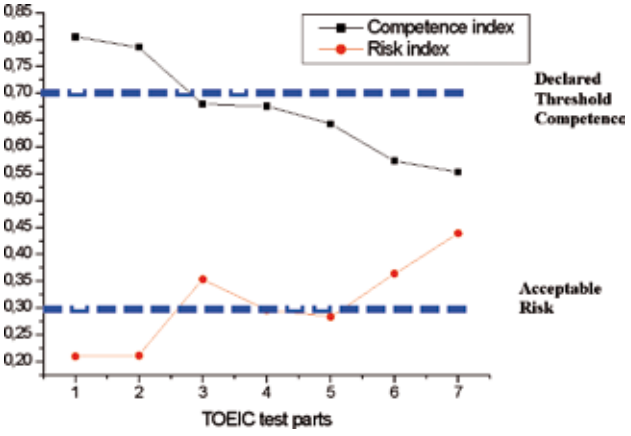

Fig. 19. Comparison of Competence Index and Risk Index for different TOEIC test parts.

12. Learning Curve Model for the TOEIC test

The proposed and developed Learning Curve Model is acceptable for control and management of any professional qualities through the competences levels indices [11]. Fig.20 shows the model of competence evolution. It means a consequence of study activities, i.e., 1) *basic knowledge mastering*, 2) *associations creation*, 3) *integrated knowledge forming* ... and so on. Thus, the model of competence development is *Knowledge + Skills + Experience +... = Competence*

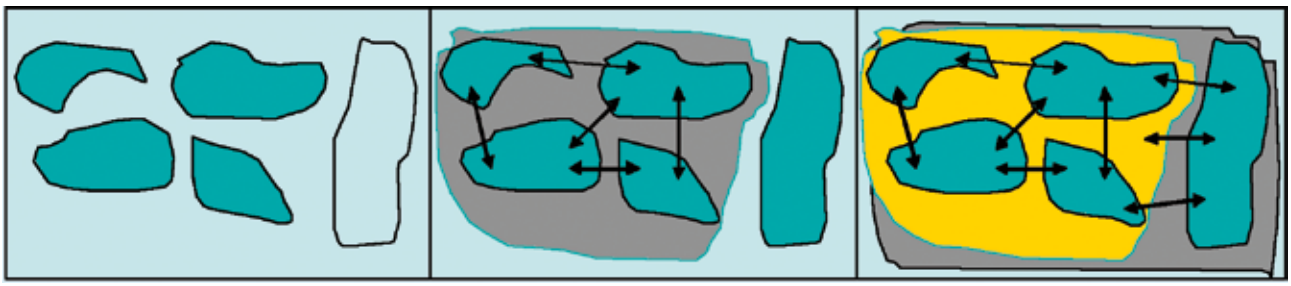

Fig. 20. Competences changes in the restricted information field. The shaded squares as study modules mean the competence level, the black arrows mean associative connections between study modules: a) the first stage of competence mastering; b) associative bonds form study modules into a new quality study module; c) enlarging of associations form the resulting competence.

To control the dynamics of communicative competence development, the authors have worked out the Learning Curve model:

$$C(t) = C_0 + (1 - C_0)(1 - \exp(-\lambda t)) \quad (12)$$

which encompasses the initial level of a relative competence C_0, the rate of the learning progress λ, as well as, permits to define the characteristic time necessary for the achievement of a target competence level $\frac{1}{\lambda}$. Thus, if we know the initial level of a competence and the characteristic rate of the learning progress (according to the model), we can define the necessary time to attain the target (pre-determined) level of competence (see Fig. 23).

13. Learning Curve Analysis. The authors have worked out a typical, chronologically applicable set of educational modules, including methodical materials, which allow to start the educational process at any level of competence, as well as to control the interim results and the quality of the student achievement after each module to guarantee each learner tangible, efficient results in language acquisition.

Taking into account the Learning Curve Model basic formula (*9*), it is reasonable to give an interpretation of some characteristics, namely, *C(t)* is a purposeful, pre-determinated competence, *(1-C$_0$)* is the initial competence, is the lack of competence to be liquidated, $(1 - \exp(-\lambda t))$ is the cumulative character factor of incompetence liquidation. Thus, a procedure of λ looks as follows:

$$\frac{1 - C(t)}{1 - C_0} = \exp(-\lambda t) \quad (13)$$

$$\ln\left(\frac{1 - C_0}{1 - C(t)}\right) = \lambda t \quad (14)$$

$$\ln(1 - C(t)) = \ln(1 - C_0) - \lambda t \quad (15)$$

$$\lambda = \frac{1}{t_\infty - t_0} \ln\left(\frac{1 - C_0}{1 - C_\infty}\right) = \frac{0{,}81 - (-0{,}85)}{20 - 0} = \frac{1{,}66}{20} = 0.083 \quad (16)$$

See also Fig.14).

The calculation of the characteristic time for competence acquisition gives:

$$\tau = \frac{1}{\lambda} = \frac{1}{0{,}083} = 12.04 \quad (17)$$

time units.

Fig.23 demonstrates a forecasting evolution of professional competences development with different initial conditions, namely, C_0 = 0.3 and C_0 = 0.5, taking into account a desirable conventional competence 0.8. The figure allows to estimate the difference of the study time (approx. 5 time units).

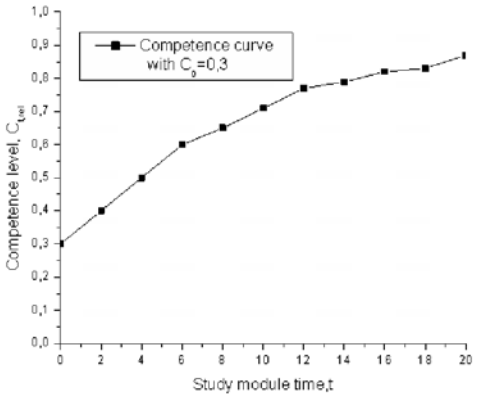

Fig. 21. Empirical competence curve for initial competence *C0*=0.3.

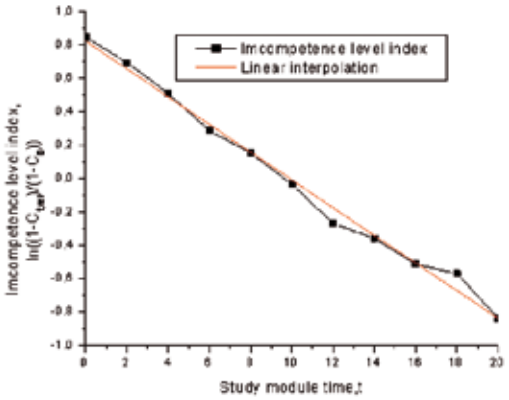

Fig. 22. Evaluation of characteristic study rate *λ*.

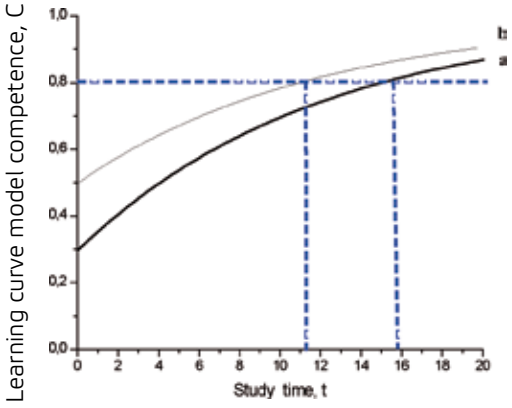

Fig. 23. The typical Learning Curves based on the data of educational experiment. The initial levels of a relative competence C_0=0,3 (a); C_0=0,5 (b); the rate of the learning progress λ=0,084 (experiment); a characteristic time for the target level attainment ~ 12.

Table 4. Learning Curve Model for Initial Competence (see also Fig. 21)

Study Time, *t*	0	2	4	6	8	10	12	14	16	18	20
Competence Level, *C(t)*	0.3	0.4	0.5	0.6	0.65	0.71	0.77	0.79	0.82	0.83	0.87

Conclusion

The System approach to language acquisition allows implementing all the elements of the educational process most effectively, enabling to manage human resources, time resources and attaining the maximum efficient results in the process of students' intellectualization.

During the stage of professional education, the System approach to language learning allows enhancing not only the development of communicative language competences but also professional and general human competences focusing upon developing professional mindset, mentality, professionally significant qualities such as insight, intuition, self-management, self-esteem and self-knowledge, purposeful introspection and self-criticism in judging what is acceptable and what is not, ability to differentiate what is quality and what is not, from the evidence put before them.

The injection of a management component into a higher educational institution is a necessary feature today, since the latter is transforming from a small-scale adjunct of industrial infrastructure into a large-scale – a mega – enterprise at the centre of the economy and the civilized life [5-7]. A strong management function is crucial to this making-public of the higher educational institution, to its coming into the attention of public view and being a part of the modernization of the whole society, hence the importance of working out a model of *Intelligent System Structural Organization and Management*.

Homeokinetic plato in language acquisition reflects qualitative and quantitative characteristics in learners' communicative language competences and, ultimately, the level of their intelligence. It presupposes an intensive way of language acquisition, allowing a rather fast transition from one intellectual plato onto another within a restricted educational information amount and time limits (English for Occupational Purposes). The intensive way presupposes a vast pedagogical process which is expanded in time and educational information amount, when alongside with the development of communicative language competence a whole gamut of professional competences, general human competences, professional and generic skills and different kinds of thinking are developed, thus, enabling the learners to attain the highest level of the intellectual plato and the purposeful goal of education.

The comprehensive System approach to language acquisition not only provides a scaling of overall language proficiency in a target language in the course of trans-disciplinary modular learning, but also a breakdown of language use and language competences which makes it easier to specify objectives and describe achievements of the most diverse kinds in accordance with the varying needs, characteristics, resources of learners and demands of the European job market.

The quantitative indices worked out by the authors on the basis of the System approach allow controlling the quality of student achievement. The Learning Curve model gives the possibility to coordinate the dynamics of communicative competence development helping students become skillful manipulators, synthesizers and creators of knowledge.

A language is part of the identity of anyone who is able to use it and the level of competence reveals the degree of this „sameness". The new paradigm of the European society brings to the agenda the new paradigm of language education. This new paradigm envisages that language teachers become pluricultural mediators promoting constructive solutions to overcoming the barriers to effective communication among young professionals on the way of co-creating a successful and functioning model for harmonious integration and common European identity.

The new paradigm of the European society brings to the agenda the new paradigm of language education. This new paradigm envisages that language teachers become pluricultural, trans-disciplinary mediators promoting constructive solutions to overcoming the barriers to communication among young professionals arising from the different cultural backgrounds in Europe.

The comprehensive System approach to language acquisition not only provides a scaling of overall language proficiency in a target language but also a breakdown of language use and language competences, which makes it easier to specify objectives and describe achievements of the most diverse kinds in accordance with the varying needs, characteristics and resources of learners.

The quantitative indices worked out by the authors on the basis of the System approach allow dynamically managing and controlling the quality of student achievement and give the possibility to coordinate the progress of communicative competences development helping students become skillful manipulators, synthesizers and creators of knowledge.

The Learning Curve reflects not only the current level of student achievement but also the purposeful level of attainment which can be achieved. It is a dynamic view on the potential of learning, a certain *cognitive map* of a learner, aiming to develop the general intellectual level and a wide spectrum of communicative competences via trans-disciplinary modules.

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THE USE OF INFORMATION TECHNOLOGIES IN BA SCHOOL OF BUSINESS AND FINANCE – INNER WEB PORTAL

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Abstract. Nowadays universities are using more and more IT in teaching, process, study process planning and management, and internal communication. An internal web portal is tool, with assistance of which universities could organize information flow and offer wide range of information services. An internal portal could be considered as a tool for effective study process management and knowledge management inside organization. The article provides information about the experience of BA School of Business and Finance in the field of an internal portal creation and its further development opportunities. The article describes several further aspects of using IT in the study process - its integration in various subjects. The main conclusion of the article states that for successful development of higher school it is necessary to incorporate IT possibilities in all higher school activities.

Keywords: Internal web portal, knowledge management, study process management, higher education.

Short title of the paper. Use of Information Technologies.

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Introduction

Nowadays, when a relevant emphasis is placed on knowledge and wide use of Information Technologies (IT), higher education institutions are changing their traditional teaching methods and styles. Currently, higher schools consider IT as their strategic partners; they use various possibilities of applying IT. These days, higher schools can create their environment like a modern company and they can use corresponding programme provisions for the acquisition of the study course – to use corresponding programme provisions, for instance, for teaching accounting, project management etc.

BA School of Business and Finance* has also involved employers in the elaboration of the study course. As it could be judged from the questionnaires of the employers, our students have good IT knowledge, and the employers have acknowledged that the role of this knowledge will become more prominent in the future.

Another way how BA School of Business and Finance has been integrating the possibilities of IT is the use of internal portal which serves both as digital environment as well as the management tool. The portal and its contents such as BA documents, study course descriptions, teaching materials etc. are used both by the academic staff as well as by students who consider that this portal has essentially improved the study process quality.

The aim of this paper is to introduce with the experience of IT using in everyday study process activities.

1. Main part. The creation of internal portal in BA School of Business and Finance

A School of Business and Finance (BA) was founded in 1992 as Latvian Banking College and has gone through several steps of development. Today, it is known for its professional study programs incorporating business and finance education graduating with master's degree and bachelor's degree. The mission of BA summarizes the will of striving for leadership in the Latvian market by offering quality study programs in business and finance education. The mission of this higher education institution is stated as follows - BA School of Business and Finance is a financially stable organization based on motivated staff, quality management and high reputation. We ensure excellent international business and finance education for creative personalities [1]. According to numerous public opinion study polls, BA School of Business and Finance takes the top position in the higher educational institution rating lists. One of the reasons of BA success lies in its effort to provide the highest possible quality of education. On the one hand, the Latvian higher educational institutions have become part of the Bologna Process [2]. On the other hand, BA is a higher educational institution that offers tuition-based education; therefore, it needs to maintain competitiveness.

One of the approaches that will help BA to implement its mission consists of accepting IT as a strategic partner. First, the mastering of IT should be included in the study courses. Second, BA should create a *state-of-the-art* digital environment, providing the accessibility and quick exchange of information at all levels of study process. The BA created project team from 4 members, bought new Microsoft Windows Server 2003, as programming tool was used MS Visual Studio 2005, Visual Basic.Net and Crystal reports. As data base management system was used Microsoft SQL Server.

Beginning with the year 2004, BA embarked on developing its internal portal to speed up the information exchange, provide efficient working conditions and operative access to information, as well as make the processing of information easy. The following registers and software have been developed and are available for use:

i) the BA register of academic and administrative staff, including its maintenance tools;
ii) the BA student register, including its maintenance tools;
iii) the study course register;
iv) the study program register, comprising the study programs that are licensed, accredited and relevant for the specific academic year;
v) the student admissions module;
vi) the software for preparing different statistical reports;
vii) the student flow directions register, including their processing tools;
viii) the issuing of standardized statements and notices of all kinds, for example, on studying at BA;
ix) the class planning module, including the class planning for a semester, their management and the printing of different reports;
x) publishing on the homepage of BAIS, different perspectives of its representation.

In September 2004, the students and the staff got access to the BA informative system homepage at https://bais.ba.lv (see Fig. 1). It is constantly improved and updated. Presently, at the homepage students can find the following information:

i) their class schedule with current changes;
ii) the class schedules of other academic groups;
iii) the faculty class schedules;
iv) the examination period schedule (tests, exams, consultations);
v) the study schedule (i.e., the periods of classes, examinations, holidays, internship etc. during the academic year);
vi) their personal data (if necessary, the contact information can be changed by sending a request);
vii) the faculty consultation schedules;
viii) the lists of academic groups;
ix) other documents related to the student life that are not intended for placing in publicly accessible websites.

Besides, there is information concerning the student's study results (tests, exams) (see Fig. 2) and financial obligations (tuition fees, their payment terms and sums, outstanding payments, fees for repeatedly taken tests, library loans etc.).

Slightly different information is offered to the staff. They can find the following information, namely:

i) the class schedules with current changes;
ii) the class schedules of other professors;
iii) the academic group class schedules;
iv) the list of tests, exams, and consultations related to

*The official name of our school in Latvian is „Banku augstkola" (Higher School for Banks), and in Latvian abbreviation BA is well known as „BA School of Business and Finance"

the study courses they teach;
v) the study schedules;
vi) the academic group lists;
vii) the faculty consultation lists;
viii) the personal data (if necessary, the contact information can be changed by sending a request).

The faculty members have an opportunity to place their course materials, such as presentations, reading lists, and course descriptions in the information portal.

All the information placed on this portal is open only to the authorized users of the system and is encrypted using 128-bit SSL encryption technology, ensuring a communication channel between the system end user and BA, which is secure and prevents leakage of information.
When the idea of creating an internal portal originated, there were quite many ideas how to develop it, but only a few Latvian higher educational institutions started developing similar portals at that time. Visits to other Latvian higher educational institutions and brainstorm sessions at BA were useful for developing its own internal portal. At the beginning, the portal contained only the class schedules, the faculty consultation schedules and the study material section, whereas today it serves as both an effective administration and knowledge management tool both for the academic personnel and students.

As a matter of fact, one may say that the portal, if operated by knowledgeable users, will make it possible to implement knowledge management principles at BA. „Knowledge is information that changes something or somebody — either by becoming grounds for actions, or by making an individual (or an institution) capable of different or more effective action"[3].

People are an essential element to successful knowledge management. At BA, the users of internal portal are students, academic staff and administration. The using of internal web portal can facilitate such processes as channeling, gathering, or dissemination of information; however, the final burden is on the users to transform this information into actionable knowledge depending on acute understanding of higher education process [4]. Therefore, using the knowledge brings additional value to BA in its ability to enhance performance, solve problems, and stimulate innovation.

Each faculty member has an opportunity to place in the system their course descriptions, lecture material presentations, instructions for implementing independent studies, bibliographies required for courses etc. In fact, all of the student respondents gave the highest rates to this section. Very often, students come to lectures having studied the materials placed in the portal beforehand. In this case, an active dialogue between the professor and students can take place during the lecture. In addition, to a certain extent, the school administration can assess the work of faculty members, because the system provides the statistics for the materials published by each faculty member. For this reason, it is essential that the academic personnel improve their IT competence, so that they would be able to prepare the study materials for placing on the portal. The administration of BA is fostering the IT skills improvement of its academic personnel.

The survey how students evaluate inner portal was made in 2006/2007 academic year. The participants of this survey were 182 4t^{h} year students, because they started to study before the school started to use this portal. We asked the students to evaluate the benefits of system:

1) the on-line lecture schedule: 182 votes – 100%;
2) the using of online study materials repository: 182 votes – 100%;
3) information about exam results: 168 votes- 92%;
4) information about work-placement opportunities: 81 votes - 45%;
5) information about payment schedule: 168 votes- 92%;
6) possibility to communicate with lecturers and staff: 142 votes -78%;
7) possibility to use school's library online catalogue: 102 votes - 56%;
8) information about Erasmus study and work placement possibilities: 73 votes – 40%.

41 faculty members were surveyed during the development discussions at the end of 2006/2007 academic year One of the questions was how the faculty members assess their written communication skills, such as the drawing up of documents in accordance with the requirements of record keeping, the usage of electronic communications tools. The responses were as follows:

i) it is able to draw up the documents on a PC and communicate via e-mail – 3 responses;
ii) uses a computer for everyday work, uses e-mail, is able to make use of the computer skills for the academic work – 20 responses;
iii) makes active use of the computer skills for the academic work, a skilled user, – 12 responses;
iv) has outstanding computer skills – 4 responses;

The administration of BA has always actively facilitated the improvement of competences of its academic personnel. On-site computer training courses are provided for the academic personnel every year. In the academic year 2006/2007, by attracting the European Structural Fund resources for the project called „Improvement of BA Academic Personnel Competencies in the Areas of Foreign Language and Information Technologies", 15 faculty members could attend the MS Excel Specialist courses, 8 – MS Excel Expert, 18 – MS Word Specialist, 29 – MS PowerPoint, 4 – MS Project courses. Another project of the European Structural Funds has been initiated this year, providing the mastering of statistical data processing program SPPS and its integration in the study program.

One of the aspects ensuring competitive capacity is the quality of the study program. It goes without saying that the students of business and finance study program should also possess excellent computer skills as well as abilities to adopt themselves in the business environment, which often uses specialized programs from simple accounting to complex business management programs. Hence, besides the basic computer skills taught in the first-year Informatics course, the other courses also require the use of IT. When studying accountancy, students are acquainted with UVIS – an accounting program popular in the Latvian market. Records management classes also take place at the

computer room. Similarly, the competences of MS Excel and data analysis are used for courses related to financial management and financial analysis. Traditionally, most higher educational institutions, which prepare Business Administration bachelors and masters, have the course „Management Information Systems". This course is also included in the study program of BA.

Collaboration with employers has always played the essential role in the work of BA. A place of internship is guaranteed to each student, and this place often becomes first workplace for the student. Every year, a survey of the internship providers is carried out, and we would like to briefly present the result of the most recent one, organized in the academic year 2006/2007. To admit, only 23 questionnaires were received from 50 questionnaires sent. The internship providers were asked both to evaluate the student skills and to give their opinion on the relevance of the specific skills for the future. The IT skills were evaluated as good (4 in the 5-grade system), and all the surveyed employees stated that these skills are crucial for the future (4 in the 4-grade system).

Current students believe that their IT skills will influence their competitive capacity in the labor market; therefore, the students express their desire that courses would have not only theoretical content but also opportunities to master the basic principles of working with some business management program. Unfortunately, legal acquisition of such programs requires significant financial resources. Accordingly, the administrations and faculties of higher educational institutions have to find alternative solutions how to enhance their study courses. One option, already employed by many higher educational institutions, is the use of open source software. Presently, BA has experience with the usage of open source software. After mastering the MS Office software skills provided by the study program, the students have been asked to carry out certain tasks that have to be completed using some open source software at the student's choice. The students download the selected software by themselves, complete the work, and submit or present the results. Such an approach facilitates the development of general computer skills, as the students have to master new software by knowing the operation principles of a similar program that they have already used. The next step would be the implementation of open code solutions in such study courses as personnel management, finance management, customer relationship management, and others.

Of course, the use of open code software might cause certain difficulties to those professors whose basic education is not related to information technologies. Another potential problem could be the lack of technical support. Currently, the big software companies also begin to offer their programs to higher educational institutions for use in the study process. At present, preparation works are taking place at BA in order to take advantage of the opportunities offered by Microsoft Dynamics Academic Alliance in the future.

2. Results and further discussion

Right now, the most important issue is the evaluation of everyday usage of BA internal portal. For students and lecturers, it is no problem to use this system. Currently, the system administrator reports that system each day has approximately 1700 unique users. The number of students of BA is approximately 2400 and BA staff – 80 persons. These numbers show that the students and staff have found the system useful indeed. Such university systems as the BA inner portal should be similar modern enterprise digital environment where great part of all communications is performed by means of IT and almost all data bases are available online.[5,6] In the future such system could be considered not only as information portal but university enterprise resource planning (ERP) tool as well [7].

Traditionally, such systems use one local language interface. Each year BA has some 50 incoming Erasmus exchange students and approximately 15 foreign guest lecturers and this number will probably increase. The problem with the foreign students and staff is that they cannot use the inner portal because it is in Latvian. The task for next year is to create a multi-language interface. Another task for next year is creation of automatic application system for applicants. This module will allow the applicants to fill their application forms and see their progress. And of course we should evaluate quality evaluation system for our internal portal.

Conclusions

Every higher educational institution is involved in the formation process of the knowledge society to a great extent. Changes within labor market and society, as well as in technologies, come about at a remarkable pace, and the offered education should live up to the labor market demands. A higher educational institution should also itself create a up-to-date study environment that provides both rapid circulation of information and its widest accessibility, facilitate the processes of knowledge management, as well as use the presently available information technologies for the study process improvement. BA School of Business and Finance has started to create inner portal with the purpose to improve information exchange, study process and planning. The qualified staff, who can use the advantages of IT in teaching process, also creates additional value to universities. Although many higher educational institutions have a limited budget for the acquisition of information technologies, they should use the presently available additional resources, such as partnership with IT companies that distribute software, the usage of open code software, and the European Union fund resources.

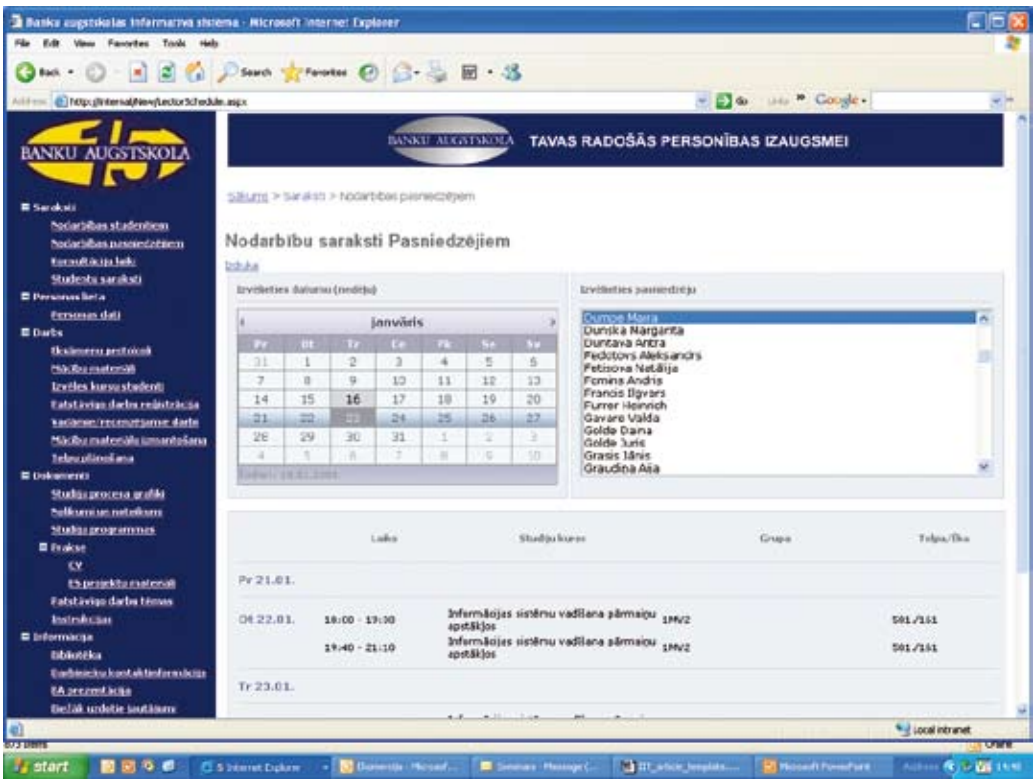

Fig. 1. BA internal portal – lecture schedule.

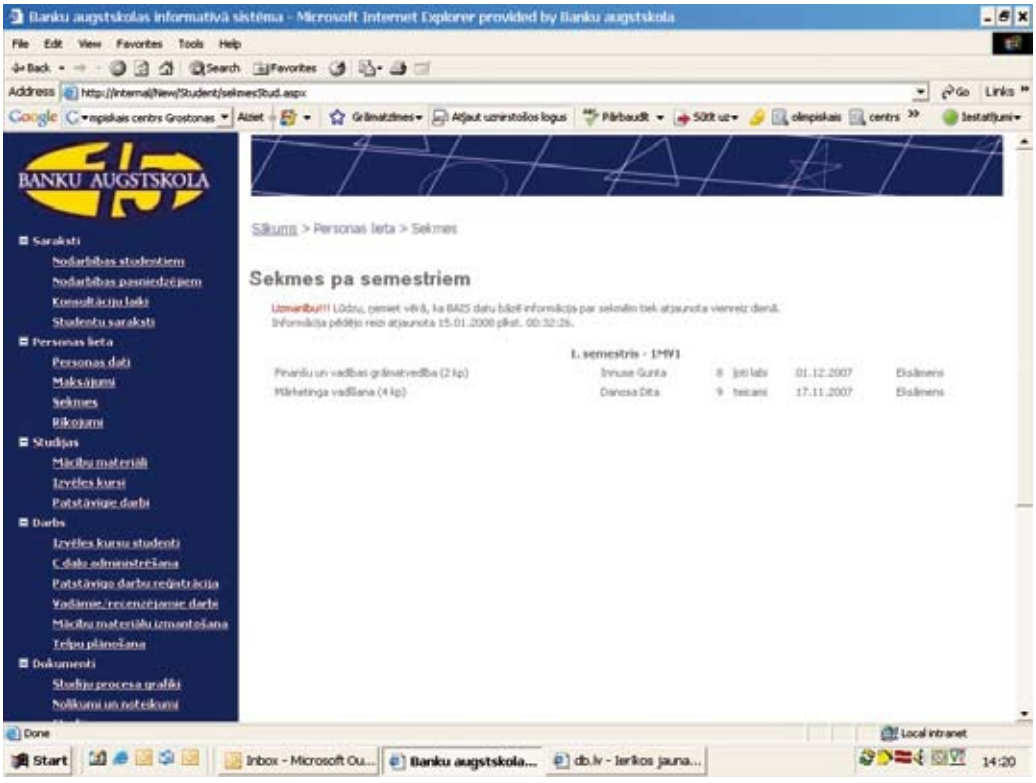

Fig. 2. BA internal portal – student marks.

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CULTURE AS INNOVATION IN VOCATIONAL HIGHER EDUCATION

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Abstract. Soft System Methodology (SSM) has been used to analyze the innovative information technology related development challenges of organizational learning, work life oriented learning environment, curriculum development, learning, teaching and work life Cooperation in vocational higher education as a cultural innovation process. The use of SSM produces shared understanding of the cultural innovation process as a well-managed process. This process can be described and understood through a multilayer system with layer specific paradigms and resources. SSM guides on each layer to identify the paradigms and resources which affect the synergy related to the cultural innovation process. Layers and paradigms identified here help to understand more deeply this phenomenon. Paradigms related formal and informal features are key factors to understand and control the cultural innovation processes. Cultural innovations are developing through paradigm shifts and development of resources. Resources can have pedagogy related, content related and functional features. If someone uses this model to analyze the state of the university, formulates a vision, he/she also can use this model to determine and achieve the desired future state of the university. In addition it can be determined as well which kind of paradigm shifts and development tasks are needed to achieve the desired future state.

Keywords. Culture, innovation, innovative information technology, vocational education, organizational learning.

Short title of the paper. Culture as Innovation.

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Introduction

The focus of this paper is to present an approach to obtain shared understanding of the potential and problems related to Culture as Innovation in Higher Vocational Education. The problem area is analyzed through a multilayer model, which is composed of recognized problems or development challenges and relations between them. The paper is based on L. Kurkela's papers „Paradigm Shifts and Learning Resources, Synergy Enablers for eLearning and Blended Learning" presented at ED-MEDIA 2006 [1], „The Potential of Design Patterns for Vocational Teacher Education in Finland" presented at Netties 2006 [2] and „eLearning and Organizational Learning in Vocational Educational Institutions" published by IEEE Computer Society Technical Committee on Learning Technology (LTTC) [3].

1. Key Concepts

Innovations are new, renewed or enhanced processes, services, pedagogical improvements, research & development competencies, learning, practice of work, strategies etc. Innovation means both the creation of novel and useful ideas as well as their implementation. Innovation process consists of discovering of ideas, developing of ideas and implementation of ideas.

Culture as innovation consists of paradigm shifts, restructuring of cooperative entities and development of resources.

eLearning and Blended Learning are seen here broadly as synonyms. They are involved in the flexible use of information and communication technology in learning, teaching, cooperation and working related situations. They are involved in the cultural innovations of pedagogy or technology enhanced learning. *Learning Resources* can have (see Fig. 1) pedagogical, functional and content-related features.

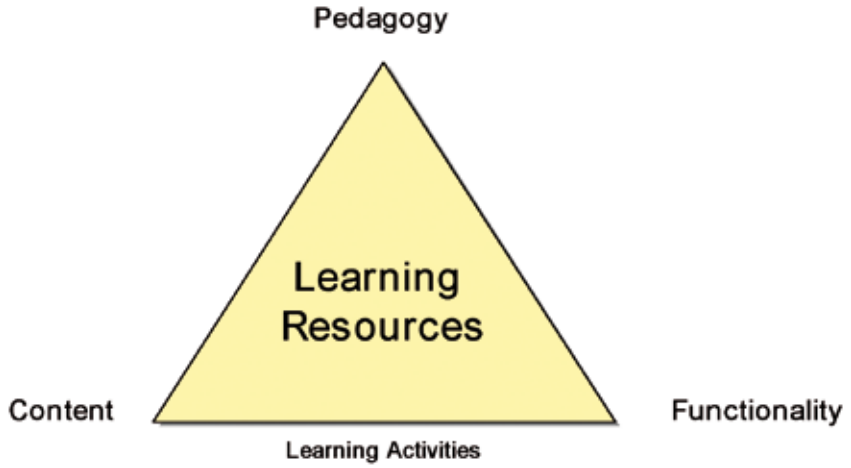

Fig. 1. Learning Resources.

Innovative Information Technology-related learning resources consist of Social Web and R&D-related innovations implemented in vocational higher education and working life. *Learning Objects* are defined as any entity, either digital or non-digital, which can be used, re-used or referenced during technology-supported learning (LOM 2000). Learning Resources are seen here as Learning Objects in a broad sense.

Paradigm refers to the functional model which guides a system or its subsystems. Paradigms have *visible* and *invisible features*. The visible formal side of a paradigm consists of processes, roles, tools etc. The invisible informal side (culture) of a paradigm consists of customs, values, beliefs, taboos, stereotypes, traditions, language behaviours etc. [4]. *Paradigm shifts* include both the *formal* and *informal features*. A paradigm shift must be *Technically Possible* and *Culturally Acceptable* [5], [6], [7]. Usually the desired cultural change is more demanding than the technological one [4]. A *successful paradigm shift* requires four elements: (1) pressure for change, (2) a clear shared vision, (3) capacity for change and (4) actionable first steps [8]. If any of these elements is missing, the paradigm shift will fail. Paradigms affect what kind of learning resources is needed. On the other hand, learning resources affect what kind of paradigms can be used or developed. Paradigm shifts are organizational development tools to improve the quality and purposefulness of vocational higher education.

Synergy is related to the benefits and added value gained in fulfilling the needs of different actors, systems or subsystems in the design of paradigms, resources and value chains. *Synergy Enablers* and *Synergy Disablers* are features which facilitate or prevent the growth of synergy. From one point of view, synergy is growing if the (sub)system produces added value for its environment (effectiveness), if the added value is produced using purposeful means (efficacy), if the added value is produced using minimal resources (efficiency) [5], [6], [7]. From another point of view, synergy is growing if an organization shares its well-balanced goals at all levels.

The concept of *Interoperable Competence* (IC) serves our systemic understanding of the target organization and its synergy processes. Interoperable competence guides our attention to: *interoperability between actors* (persons,

organizational levels, networks, levels of the society), *ability to serve other actors* (on the same or different layer), and *ability to utilize services produced by other actors* (on the same or different layer). Interoperability can be *Symmetric* or *Asymmetric* by nature, depending on the fact whether the cooperation is between actors of the same class or different classes [9]. Interoperability can be *Horizontal* or *Vertical* by nature depending if the cooperation is related to resources and services on the same layer or on different layers. Interoperable competence includes the views of different organizational layers, interest groups and individual actors. IC supports the concepts of Learning Organization, Competence Portfolio, Knowledge Management, Distributed Competence and Networked Problem Solving. Interoperable competence includes both Techno-Structural Interoperability and Socio-Cultural Interoperability [10].

2. Soft System Methodology

Since the year 1974, *Soft System Methodology (SSM)* developed by Peter Checkland et al. has been successfully used to ensure that the process of inquiry into real world complexity is itself a system for learning. The use of SSM creates Shared Understanding of complex real-world situation and guides organizations in their organizational learning and developing process [5], [6], [7].

Soft System Methodology is often applied as a *multilayered analysis*. *A complex system* is something more than the sum of its components. Components are affecting each others by paradigms, information exchange and resources. A complex system also affects its subsystems and – when it is changed - the subsystems are changed as well. Respectively, by purposeful paradigm shifts and development of resources on subsystem layer the whole system can be coached to the desired direction.

The interaction which affects the functional paradigms of a complex system can be called *Critical Interaction*. Critical interactions are often related to situations in which the organization does not have any pre-planned paradigms. Critical interaction increases the chaotic features and complexity of the system and affects the stability of the system. A learning organization reacts to critical information by paradigm shifts and/or by developing and implementing new learning resources. Critical information forces vocational higher education to make unexpected rapid changes in its paradigms and utilization of resources. Through Purposeful Paradigm Shifts and development of learning resources an educational institution can seek Internal and External Synergy Benefits.

SSM can be applied through following steps:

i) analyses of the Current State of the System;
ii) description of the Major Problem Areas;
iii) identification of Synergy Enablers and Disablers;
iv) description of the Desired Future State of the System;
v) development Steps towards the Desired Future Cultural State of the System.

3. Culture as Innovation and Interacting Layers in Vocational Higher Education

In the field of vocational higher education there are several ongoing innovation processes, e.g.: the Bologna Process, Specification of Competencies at National Level, Specification of Competencies at Institutional Level, Learning Process Based Curriculum Design, Concretisation of Course Level Goals.

The Hierarchy of guiding and interacting layers includes:
i) institutional and network cooperation layers;
ii) curriculum and course layer;
iii) layer of learning resources;
iv) media elements and related metadata layer.

SSM guides us to identify the major cultural innovation problem areas and related development challenges and possibilities on every layer. *Cultural innovation processes* consist of paradigm shifts, restructuring of cooperative entities and development and implementation of resources. Vocational higher education institution and its major problem areas as a purposeful system are described in Fig. 2.

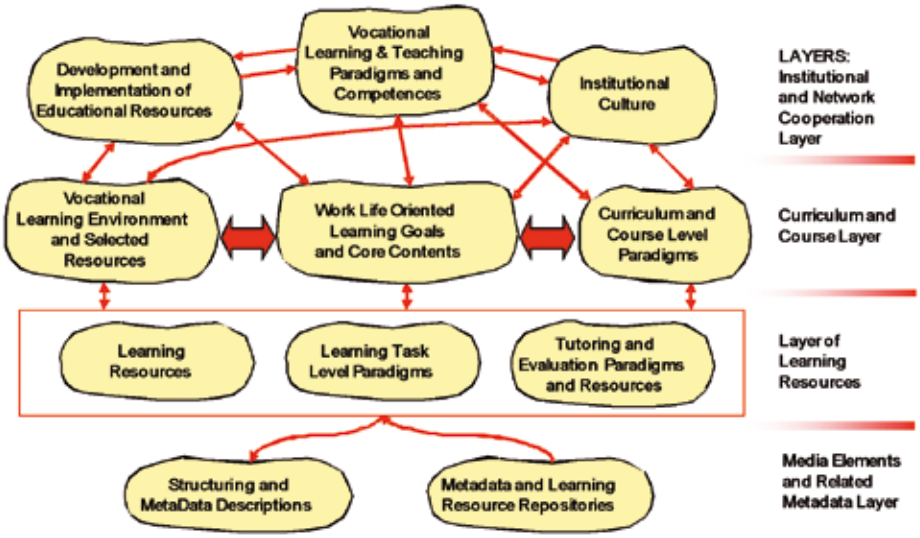

Fig. 2. Vocational Higher Education as a Purposeful System.

Institutional and Network Cooperation Layer can be described by using three major problem areas which are in many ways bound together, namely:

1. *Institutional Culture* which reflects, for example, the organisational status in work-life orientation, combination of scientific and practical approaches and role in the regional development. Institutional Culture is based on the needs of the society and work life. It reflects the institution's role in the education system and cooperation with its environment. The role is partly given and partly self-made. Awareness of the current status describes the integrity and level of purposefulness of the organisation. Institutional culture can be changed through paradigm shifts, development of resources and reorganizing of cooperative entities. Paradigm shifts have formal and informal features. The informal side of the paradigm shift is always a very demanding one. It might be very difficult to make changes in the teaching culture which has been dominant for decades.
2. *Teaching and Learning Paradigms and Competencies* (TLPCs) reflect the current pedagogical status of the institution. It is based on the institutional culture, pedagogical competencies and learning competencies and current praxis. On the other hand, TLPCs affect the institutional culture and they depend on the possibilities and restrictions of the educational resources.
3. *Development, Implementation and Use of Educational Resources* is the third major problem on this layer. It specifies what kind of functionality, content and other resources facilitate or restrict the learning and teaching activities in a vocational higher education institution.

Curriculum and Course Layer

4. *Vocational Learning Environment and Selected Resources* specify the selected learning environment for a course or for a curriculum. The learning environment and how it is used reflects the organisational culture, work life orientation and learning and teaching practices.
5. *Work Life Oriented Learning Goals and Core Contents* are driven from Learning Process Based Curriculum Design and Conception of Learner's Vocational Growth.
6. *Curriculum and Course Level Paradigms* are organisational learning tools for educational institutions. They are promises and agreements of what kind of learning students and instructors are committed to.

Layer of Learning Resources

7. *Learning Tasks and Learning Task Level Paradigms* facilitate different paths of learning. They respond to the educational needs of different learners and groups of learners. They can be specified or selected by educational designers, teachers, group of students or an individual student.
8. *Learning Resources* facilitate and restrict the fulfilling of learning tasks. Learning resources, learning tasks and tutoring and evaluation paradigms form Institutional and Personal Learning Environments. In personal learning environments, learners or groups of learners can select part of the used learning resources. Learning resources must as well serve the needs of tutoring and evaluation processes.
9. *Tutoring and Evaluation Paradigms and Resources* and activities guide the learning processes.

Media Elements and Related Metadata Layer

10. *Structuring and Metadata Descriptions*. Educational media elements should be divided in purposeful elements to support use, reuse and maintenance of those resources.
11. *Metadata and Learning Resource Repositories*. Educational media elements must be described and stored in repositories to support their retrieval, use and maintenance.

This SSM related model is a starting point for a vocational educational institution to analyze and guide its cultural innovation processes. The next, organisation-specific, iteration of the SSM analysis should concentrate only on those problems which are relevant to the target organisation and selected approach (Weltanschauung). The approach of this paper was guided by the conception that a vocational higher education institution is a purposeful system which can be understood and guided through a multilayer model consisting of paradigms, resources and cooperative entities. The organisational learning was described through a cultural innovation process where paradigms shifts with formal and informal features, development of resources and reorganisation of cooperative entities are in key role.

Conclusion

The use of information technology can be divided into professional and general information technology. Innovativeness can occur in both classes. At the moment, especially the development of Social web (Web 2.0) is challenging vocational higher education and working life. On the institutional level this means significant paradigms shifts in institutional culture. Informal learning, learning related cooperation and students as content providers could have a bigger role. Multimedia and social software related competencies are becoming more important. This is a huge challenge for teachers, vocational pedagogy and curriculum development. In our university, we are developing this subject area, for example, in the ViCaDiS Project [11],

Furthermore, the role of Innovative Information Technology (IIT) comes essential in facilitating the transparency of learning, teaching and innovation processes. When the environment changes more rapidly, IIT is needed to support the role of vocational higher education in responding to the developing needs of society.

The focus of this paper has been on the use of Soft System Methodology in order to create shared understanding and transparency of Innovation Processes and Cultural Development Processes in Higher Vocational Education. The problem area was analysed as a multilayered purposeful system. The SSM analysis has been made on general – not on organisation-specific – level. This could be a starting point for organisation-specific cultural innovation processes. An educational institution has to find out what kind of synergy enablers or synergy disablers exists in its case. Paradigm shifts should be made with small steps which are culturally acceptable and technically possible. A new SSM-iteration should be made to find out what the new state of the system is after a couple of paradigm shifts and development activities. The new SSM-iteration means also re-evaluating of the needed development tasks.

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E-LEARNING EXPERIENCE AT UNIVERSITY OF ŽILINA, THE FACULTY OF SPECIAL ENGINEERING,

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Abstract. In recent years significant progress has been made in process of using e-learning. The term e-learning is well-known at the universities and each teacher should be involved in it. For most of us, it is a teaching assistance. Is e-learning the right way of education process? Is it part of this process, or is it process by itself? How is e-learning influencing the traditional ways of teaching? Where are we now in the process of implementing e-learning?

Keywords. E-learning, Moodle.

Short title of the paper. Žilina University e-learning.

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Introduction

Electronic Learning or *e-learning* is a general term used to refer to computer-enhanced learning. It is used interchangeably in so many contexts that it is critical to be clear what one means when one speaks of *e-learning*. In many respects, it is commonly associated with the field of advanced learning technology, which deals with both the technologies and associated methodologies in learning using network and/or multimedia technologies.

Today, e-learning mainly takes the form of online courses [1]. From the resources distributed by MIT's [2] OpenCourseware project [3] to the design of learning materials in Rice's Connexions project, to the offerings found from colleges and universities everywhere, the course is the basic unit of organization.

1. Advanced learning technology

Term *Learning Management System* means software tools designed to manage user learning interventions. Learning Management Systems go far beyond conventional training records management and reporting. The value-add for *Learning Management Systems* is the extensive range of complementary functionality that they offer.

From the term Learning Management System we come to the term Advanced Learning Technology that has a strong focus on adult education, especially in higher education and industrial and vocational training. Concentration is not only in the technology per se, but in the social, psychological, cultural, and organizational issues which are thrown into sharp relief during the design and introduction of technology-based learning environments.

We can distinguish the following features typical of advanced learning technology:

i) focus on research, network and e-learning;
ii) computer supported collaborative learning, multimedia computing, psychology, sociology, instructional design, evaluation and video for learning;
ii) innovative distance learning methodology regarding the design and use of advanced learning technologies;
iv) intercultural e-pedagogy, including conceptions of e-learning and teaching;
v) course designs that support e-groups and online communities of learning.

2. Where We Are Now

When we think of learning content today, we probably think of a learning object. Originating in the world of computer-based delivery systems, learning objects were depicted as being like lego blocks or atoms, little bits of content that could be put together or organized. Standard bodies have refined the concept of learning objects into a rigorous form and have provided specifications on how to sequence and organize these bits of content into courses and package them for delivery as though they were books or training manuals.

As a consequence, the dominant learning technology employed today is a type of system that organizes and delivers online courses—the Learning Management System. This piece of software has become almost ubiquitous in the learning environment. The learning management system takes learning content and organizes it in a standard way, as a course divided into modules and lessons, supported with quizzes, tests and discussions, and in many systems today, integrated into the college or university's student information system.

3. Moodle

At the University of Žilina, we have adapted Moodle (Modular Object Oriented Dynamic Learning Environment) as our Course Management System [4].

Moodle is a free Open Source software package designed using sound pedagogical principles, to help educators create effective online learning communities.
Before using Moodle or any other course management system we need to answer the question: Do we really need this kind of system?

The answer could be no, however, a course management system could be really helpful in administrating many courses. As far as each teacher is good in html and creating web-pages the answer could be again no, but are they really? Our personal experience at the university and, especially, at our faculty has proved that a course management system is the best choice of creating e-learning environment

The authors have outlined several reasons why e-learning should be integrated:

i) e-learning provides access to a range of resources and materials which may not otherwise be available or accessible, for example, graphics, sound, animation, multimedia; it gives choice for students when and where to study;
ii) e-learning provides a student with centered-learning environment which can be tailored to meet the learning needs of individual students;
ii) e-learning creates an environment that promotes an active approach to learning;
iv) e-learning supports increased communication between teachers and students, and among students;
v) e-learning provides frequent and timely individual feedback, for example, through computer- assisted assessment and positive reinforcement;
vi) e-learning encourages students to take responsibility for their own learning.

4. E-learning experiences at University of Žilina

Even though the e-learning system at our university has been used for a long period, yet it does not host all the subjects. In our experience e-learning should be used not only in supporting teaching but also as part of education process. The questions that we are currently facing are as follows:

Can e-learning replace the way we are teaching now?
Are we going the right way?
Can we use e-learning to motivate students to study more?

The authors are strongly convinced that it is only through presentations of e-learning as system aiming to support teaching process that more teachers can be involved and become interested in it, especially teachers who have

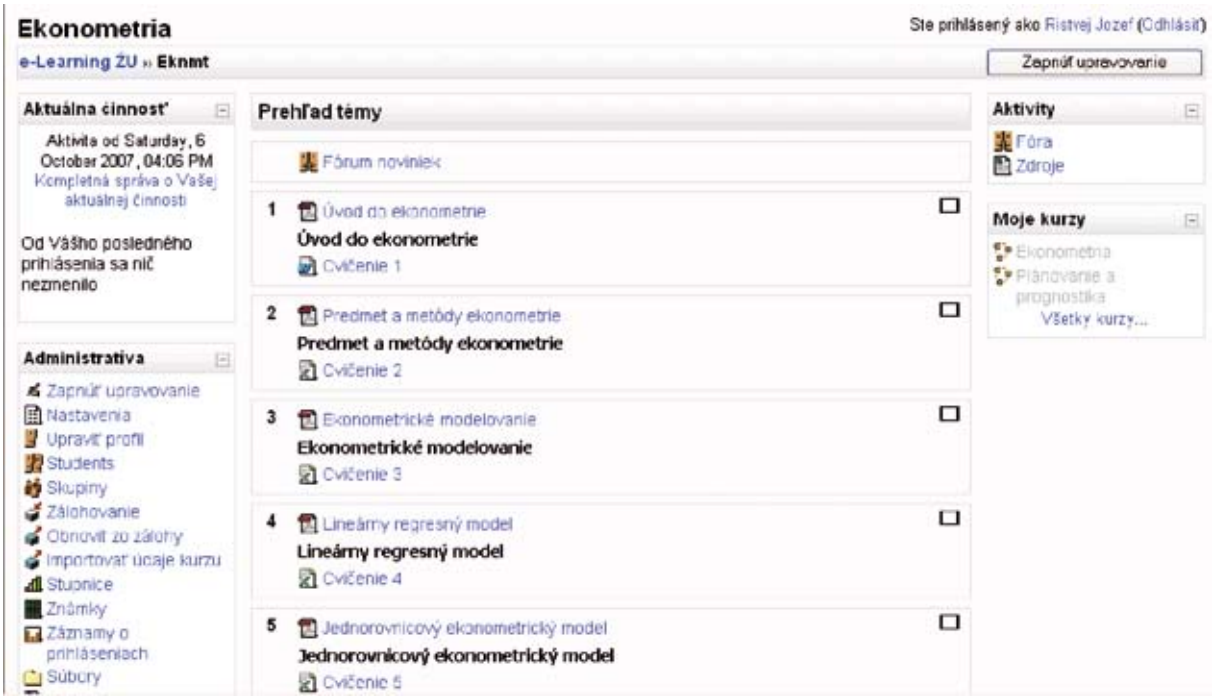

Fig. 1. Course of Econometrics in e-learning system at University of Žilina, powered by Moodle [5].

been teaching without using computer-aided learning. Sharing successful experience and best practice within e-learning will consequently lead to the wider integration of traditionally-taught subjects into e-learning platform. For all this we are really glad to be part of 4 E-trainer project.

5. E-trainer project

The project aims to provide products, information and services for teachers and trainers in the development, creation, exchange and use of e-learning materials. One of the main reasons of the project is to contribute to the quality of e-learning in Europe by building a sustainable environment that can express leadership in this domain. Teachers and trainers are on the constant need to upgrade their qualifications in order to provide qualitative and standardized training to their students. The 4 E-trainer project will help teachers and trainers improve their professional competencies. The main goal of the project is to build European portal in English, Polish, Lithuanian, Slovak and Latvian languages, which will present the results of EU funded projects.

Conclusion

E-learning is widely claimed to offer flexible *any time, any place* learning.

The claim for *any place* is absolutely valid and is a great breakthrough in the learning process, as many people can access rich learning materials that simply were not possible in paper or distance learning era.

However, the claim for *any time* is in reality over-stated. The issue of quality in the process of blended learning (e-learning resources + face-to-face sessions) requires interactivity among the learners and the tutor but practice shows that providing this interactivity restricts e-learning at best to flexible time periods, and at worst to set time periods.

We can promote flexible e-learning as long as we do not mind learning on our own.

So the question is - where are we today in process of e-learning? What are the next steps to bring e-learning forward in the process of education?

Acknowledgements

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TEACHING LARGE CLASSES WITH WEB TECHNOLOGIES

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Abstract. This article explores benefits for teachers using CALL (Computer-assisted Language Learning) which includes teaching the English Language in large classes. This paper reports on the perceived differences between the classical way of teaching the language and the modern one, i.e. using the information technologies. Research shows that by using computers, students become better problem-solvers and better communicators. Over a network, using e-mail and sharing files, students have the chance to collaborate and work together with other classmates, peers, and teachers. Learning is then transformed from a traditional passive-listening exercise to an experience of discovery, exploration, and excitement. Students can begin to realize their full potential when they are empowered to contribute and collaborate as a team to accomplish their reading and writing tasks more effectively.

Until quite recently, computer-assisted language learning (CALL) was a topic of relevance mostly to those with a special interest in that area. Recently, though, computers have become so widespread in schools and homes and their uses have expanded so dramatically that the majority of language teachers must now begin to think about the implications of computers for language learning [1]. This article provides brief overview of how computers can be used for language teaching. It focuses not on a technical description of hardware and software, but rather on the pedagogical questions that teachers have considered in using computers in the classroom.

Keywords. CALL, large classes, language learning.

Short title. Teaching large classes.

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Introduction

Large classes with over 20 students are a reality in many countries and they pose particular challenges. This article suggests ways to help discipline, to use group work and to cope with limited resources. Keeping students interested and engaged in the current topic or activity is a daily challenge for teachers in the classroom. One of the advantages of the Internet is that it provides new possibilities for assisting teachers to successfully meet this challenge. Computers have been used for language teaching ever since the 1960's [1].

1. Challenges of teaching a large class

There are a lot of challenges faced by a teacher instructing large classes as it is difficult to keep good discipline going in a large class and teachers have to work with children of different ages and different abilities, wanting to learn different things at different speeds and in different ways [1]. Furthermore, teachers do not have enough time and may not have enough books or teaching and learning aids for each individual one and cannot easily give each child the individual attention they need therefore the less the attention, the less the progress.

2. Advantages of CALL

There are a lot of advantages of computer-assisted language learning as CALL can genuinely lead to autonomy, to a state in which learners exercise as much control as possible over the learning process and are as little dependent on the teacher as possible; as well, CALL makes students use an online reference allowing them to consult electronic resources beyond those of grammar-check, dictionary and thesaurus. Furthermore, CALL provides distance education. Within CALL, computers can present materials in various ways using various colours, fonts and letter sizes. Electronic blips on the screen are perceived to be more changeable, more ephemeral, and less indelible than traditional methods of learning languages. Computers can also present a text word-by-word, phrase-by-phrase, line-by-line, question-by-question, page-by-page, etc. and scroll lines of text up the screen, or change screens on demand or after a set time. In addition, computers frees students from the limitations of traditional writing tools that often inhibit and restrict writing processes transforming learning languages from a traditional passive-listening exercise to an experience of discovery, exploration, and excitement as computers are flexible and untiring for whatever they are programmed to do, they can do over and over again as often as necessary. Computers also help learners create, analyze, and produce information and ideas more easily and efficiently.

Using CALL, learning can be individualized as students can study materials related to their individual goals and what they need or are interested in, with the appropriate difficulty level and at their own pace and with the help of network, teachers and students can work wherever and whenever it is needed not only in class at the fixed time and place. Furthermore, Computers enable teachers to group messages by student name, by date received, or by project name. Assignments received can be organized electronically by any one of these categories. These types of groupings make it easier for teachers to actually see the process which their students are using when learning languages. This process can be monitored and analyzed much more effectively and logically by the teacher who can also view and organize students or group work more easily and efficiently. Teachers can quickly retrieve student writing for future analyses and grading and send assignments and announcements electronically to the group. Teachers can send one message to the entire group. This can save valuable class time. With the return receipt capabilities of e-mail teachers are able to know whether each individual student has opened and read the message. This is an important feature to help monitor the progress of the student or the group.

3. Disadvantages of CALL

There are a lot of advantages of CALL, however, it is not applied everywhere successfully because there are several barriers that do not let it be applied in the educational programs [2]. The barriers inhibiting the practice of CALL can be classified in the following common categories.

1. Students and teachers must be computer-literate because in order to use a computer, a user has to know what commands to give the computer and how to respond to the computer. Sometimes, available CALL software is difficult to use although it has a very good manual. No matter how simple computers and software are, students need to learn a great deal to use them.
2. Computers have limitations on their memory, speed, methods of input and output, etc.
3. Processing information takes time.
4. Information is usually input by typing it in, so to use a computer efficiently, it is necessary to know how to type.
5. In general, computers can do what they are programmed to do.
6. Computers need programs that were designed for them. It is necessary to have proper software for a given task. Each kind of software has its own limitations. Some software is difficult to use, and some may not be able to do exactly what the user wants it to do. If a program is not designed for a given computer, it may have some limitations that prevent the user from doing exactly what he/she wants to do.
7. Computers are expensive. In addition, there is a great deal of additional equipment which is needed.
8. A special classroom is also necessary, along with technicians to keep the computers working properly.
9. Computers break down, and they may have technical problems.
10. It is also necessary to train teachers in order to make them ready to explain the things better and use Information Technologies.

4. CALL in a large class

It is quite obvious that a large class can be divided into several groups based on students' knowledge. In order to organize different groups based on students' knowledge of the English Language, it is necessary to define their level. For this reason, the author has created a web-site [3] which comprises a test to define students' knowledge of the English language. There are 63 questions in the test and as soon as students complete the test, they get to know about their levels, namely: Beginner, Elementary, Pre-Intermediate, Intermediate, Higher-Intermediate, Advanced and Proficiency.

In a large class, students' pairs and groups grouped according to their language level can help each other and learn from each other, so that they do not get bored listening to the teacher talk.

5. Group organization to suit the students' abilities

Approaches of Language Learning and Teaching. There are 3 well-known approaches to teach and learn languages:

1) classical approach (Teacher + Students);
2) modern approach (Computer + Students);
3) ultramodern approach (Teacher + computer + Student).

The research carried out at Information Systems Management Institute (Riga, Latvia) has proved that the best way of learning any language is approach 3 as students who have been explained the topic both by a teacher and a computer in class, learned better and faster and they scored better marks in the tests.

Group division within approach 3: teacher + computer + student. A teacher divides the class into several groups depending on the score that shows their level of the English language knowledge and takes into consideration that one group cannot comprise more than 4 students.

Therefore, there can be more than one group of students with the same level.

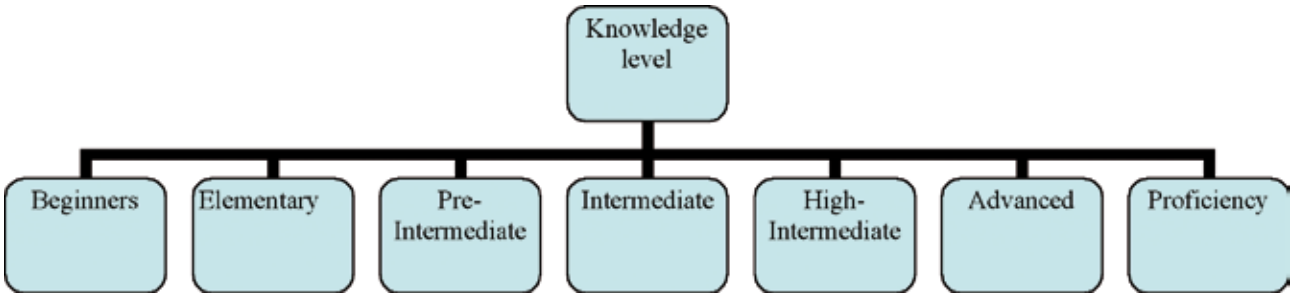

Fig.1. Knowledge-based group division.

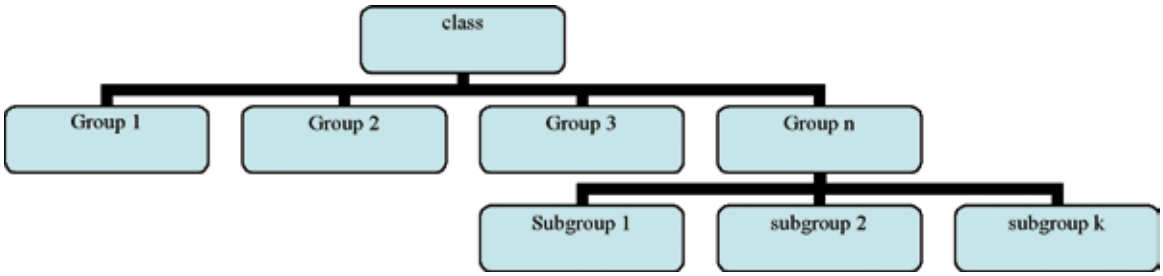

Fig.2. Division of a large class into various groups.

As a result of the above-mentioned text, we can define mathematical expectations of variables which give average expected answers of a test:

$$M(x) = X_1P_1 + X_2P_2 + \ldots + X_nP_n = \sum_{i=1}^{n} X_iP_i, \quad (1)$$

$$P_1 + P_2 + \ldots + P_i = 1, \quad (2)$$

$$M(x) = \frac{X_1P_1 + X_2P_2 + \ldots + X_nP_n}{P_1 + P_2 + \ldots + P_n} = \frac{\sum_{i=1}^{n} X_iP_i}{\sum_{i=1}^{n} P_i}. \quad (3)$$

In the above-mentioned case we have average weighed-up arithmetic value of *X*. In this case it is very simple to define the mode, i.e. the most probable value of a variable.

In order to form groups of 6 types with a maximum number of students in each one is 4, the testing has to take place. The number of groups can be defined with the following formula:

$$C_n^4 = \frac{n \cdot (n-1) \cdot (n-2) \cdot (n-3)}{4!}, \quad (4)$$

where *n* – total number of students in each group, C_n^4 - all possible combinations to form a group. The number of students left after group formation is denoted as *M*:

$$M = n - C_n^4 = n - \frac{n \cdot (n-1) \cdot (n-2) \cdot (n-3)}{4!}. \quad (5)$$

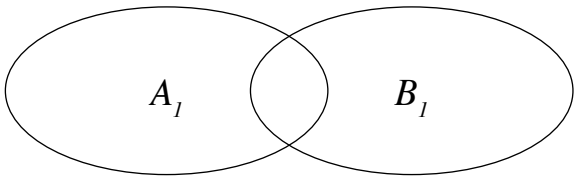

Fig.3. Acquired knowledge within various approaches.

From the remained students, let us form the number of groups with 3 students:

$$C_m^3 = \frac{m \cdot (m-1) \cdot (m-2)}{3!} \quad . \quad (6)$$

From remained students we will form the number of groups comprising 2 students:

$$C_m^2 = \frac{m \cdot (m-1)}{2!} \quad , \quad (7)$$

where

$$C_m^3 + C_m^2 \le 3 \quad . \quad (8)$$

Mathematical expressions for Acquired Knowledge model will be presented according Fig. 3 scheme.

Approach 1: A teacher + students. There are 63 questions, hence the same number of topics which are explained to students. A_i denotes explanations given by teacher; P_i - perception probability of a student after each explanation, where i=63. All information remained in a student's memory after all explanations could by express as follows:

$$Q = \sum_{i=1}^{n} A_i P_i = A_1 P_1 + A_2 P_2 + \ldots + A_{63} P_{63} \quad . \quad (9)$$

Approach 2: A computer + students. There are 63 questions, hence the same number of topics which are explained to students. B_i denotes explanations given by a computer; P_i - perception probability of a student after each explanation, where i=63. All information remained in a student's memory after all explanations could by express as follows:

$$Q = \sum_{i=1}^{n} B_i P_i = B_1 P_1 + B_2 P_2 + \ldots + B_{63} P_{63} \quad , \quad (10)$$

In case of approach 2, one or more resources can be used. R_j denotes acquired information from different resources, where n – number of resources:

$$i = \overline{1,n} \quad , \quad (11)$$

$$\sum_{i=1}^{n} R_i = R_1 + R_2 + \ldots + R_{63} \quad . \quad (12)$$

Finally, joint formula could be written as follows:

$$T = \sum_{j=1}^{n} \sum_{i=1}^{63} R_j B_i P_i =$$

$$= R_1 \sum_{i=1}^{63} B_i P_i + R_2 \sum_{i=1}^{63} B_i P_i + \ldots + R_n \sum_{i=1}^{63} B_i P_i \quad , \quad (13)$$

Using Boolean expressions, we will denote: i) full information given by a teacher and a computer as $A_i \cup B_i$; and ii) information given by a teacher and a computer at the same time as $A_i \cap B_i$. Indexes are defined as follows:

$$j = \overline{1,n} \quad , \quad (14)$$

$$i = \overline{1 \div 63} \quad . \quad (15)$$

Arithmetic data received from a teacher:

$$A_k = \frac{A_i}{A_i \mid \cap} \quad , \quad (16)$$

$$k = \overline{1 \div 63} \quad , \quad (17)$$

$$\sum_{i=1}^{63} A_k = \frac{\sum_{i=1}^{63} A_i}{\sum_{i=1}^{63} A_i \cap B_i} \quad . \quad (18)$$

Arithmetic data received from a computer:

$$B_t = \frac{B_t}{A_i \mid \cap} \quad , \quad (19)$$

$$t = \overline{1 \div 63} \quad , \quad (20)$$

$$\sum_{t=1}^{63} B_t = \frac{\sum_{i=1}^{63} B_i}{\sum_{i=1}^{63} A_i \cap B_i} \quad . \quad (21)$$

Then average information received from a computer and a teacher:

$$\sum^{63} A_i \cup B_i = \sum^{63} A_i \cup \sum^{63} B_i \quad , \quad (22)$$

$$A_i = A_k + A_i \cap B_i \quad , \quad (23)$$

$$B_i = B_t + A_i \cap B_i \quad , \quad (24)$$

$$\sum_{i=1}^{n} A_i \cup B_i =$$

$$= \sum_{k=1}^{n} \sum_{i=1}^{63} \left[A_k + A_i \cap B_i \right] \cup \sum_{t=1}^{n} \sum_{i=1}^{63} \left[B_t + A_i \cap B_i \right] \quad . \quad (25)$$

As mentioned above, teachers of large classes can organize the groups based on students' knowledge. We can distinguish 3 types of groups that can be organized:

I) same-ability groups;
II) mixed-ability groups;
III) using group leaders.

Same-ability groups. The students with the same levels can be grouped so that they will feel free working with others and teachers will not have to explain the things to everyone individually. Such kinds of groups are really very good not only for teachers but also for students as the teacher can leave the groups of faster learners to get on with the work on their own. S/he can give extra help to individual learners in the slower groups. The teacher can just come around giving some instruction or tasks to do if the group is strong and give more time to the group consisting of students with lower level of the knowledge.

Mixed-ability groups. Such kind of groups can be organized to let the students with a higher level help the ones with a lower language level. The learners with better performance in the group can help the others to master the work so that the teacher need not teach some parts. As the students work on their own, the teacher gets free time to spend for other groups.

Using group leaders. In same-ability groups and mixed-ability groups some students with a higher level can be appointed as a leader of the group so that they can help others understand the things better and faster.

As soon as a large class is divided into several small groups, a teacher can explain some topics to them and let students work in their own groups. A teacher can explain the topic with the help of computers. For instance, a teacher explains some grammar part to their students and asks them to take corresponding online tests from [4]. Research shows that students work with great pleasure on the computers and they are well-disciplined. A teacher has to just walk around from one group to another and listen to students' talk and make comments.

Conclusion

Nowadays large classes are the biggest problem faced by educational institution especially while teaching languages. Language instructors cannot work effectively and efficiently in large classes. In order to work with good results, language instructors ought to use modern technologies which can help them organize large class and their job as well. Modern information technology including internet resources provides not only students but also instructors with great possibilities for innovative outside-classroom challenges in the teaching and learning of languages. The old-fashioned classroom-based approach of instruction, where instructors do everything, should not be used any more as instructors cannot provide students with versatile knowledge because of lack of authentic materials, however, the use of Internet resources could solve these problems. Screenshot of the web page used for language learning is presented in Fig.4.

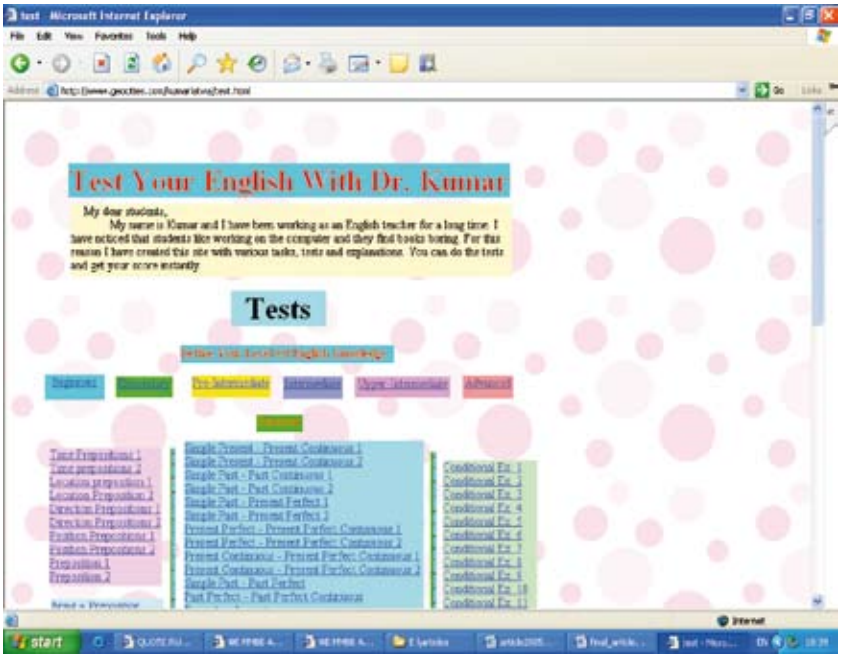

Fig.4. The screenshot of the web page used for language learning.

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