ON THE TRAINING OF CONSOLIDATED INFORMATION ANALYSTS

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Abstract: The current development of society requires the use of modern information technologies of business administration, regardless the field of activity. For automation and informatization an enterprise requires the introduction of innovative technologies, including technologies for knowledge management. To ensure the integration of modern information technology corresponding to the noospheric stage of scientific development organizations require highly qualified analysts for consolidated information (business intelligence analysts, information analysts, knowledge managers). The Social Informatics Department of the Kharkiv National University of Radio Electronics is engaged in the training of such specialists, its workers developed a standard for the preparation of consolidated information analysts in Ukraine. This standard is largely in line with the preparation of Competitive Intelligence Professionals (Competitive Intelligence)[1, 2].

Special difficulties in the training of consolidated information analysts in a lack of teaching hours are related to the need of development of a special kind of systematic analytical and creative thinking, as well as the ability to perceive and implement modern world standards of information and organizational culture. The training program is formed in a manner to develop thinking and understanding of the relevance, necessity and features of work with knowledge at the graduates from various universities and bachelor systems. An important role in this process belongs to the integration of educational and scientific process at the department that allows us to prepare highly qualified specialists in a short time, but the main feature is the use of training in the preparation of a noospheric system methodology - systemology and modern systemological method – the systemological classification analysis [3].

The article deals with the relevance of the training and development of the specialty through the use of modern tools of knowledge management, some aspects of the training of consolidated information analysts, methods and tools to improve the quality of their education in terms of reducing academic load and reduce the direct interaction between teachers and students.

Keywords: Knowledge management, consolidated information analyst, systemological classification analysis, information technology, classification, social network on the Internet, model, e-learning, UML diagrams, learning organization, software testing, business process analysis and modeling requirements.

Introduction

Enhancing of the role of information technology in society is a natural process that has accelerated within recent years. The emergence of new methods, techniques and approaches to work in various subject areas requires the use of modern information tools, which will significantly improve the efficiency of employees.

A distinctive feature of the modern higher education in business analysts' training is growing volume of variable information, skills, the mastery of which is necessary for graduates to prove their competence and create a competitive advantage in the labour market.

To improve the quality of information analysts' training systemology and the modern method corresponding to the noospheric stage of scientific development should be used – the systemological classification analysis which will effectively organize and consolidate knowledge and information improving the quality of information processing and the development of effective managerial decisions that will ensure the sustainable development of the organization.

Another area of improvement of the educational process in terms of reducing teaching hours and academic load due to the introduction of the credit-modular system is the development of e-learning (e-learning systems) used by students for self-development material or for enhancing of their skills. Information and computer technologies are an integral part of the higher education development in Ukraine, which is currently under the influence of the European integration process. The learning process of business analysts in the modern university requires the use of e-learning tools within the organization of independent work of masters, and the creation of computer systems, allowing partially to master skills without the direct involvement of the teacher is the main direction of development and improvement of learning while using information technology [5].

It should be pointed out that while working with the knowledge and information semantics the direct communication between a master and a teacher in the dialogue is vital. Therefore, despite the active implementation of distance education in the educational process, training of highly skilled analysts is not possible without a direct interaction between teachers and students in learning and knowledge transfer. To partially solve the tasks the authors suggest the use of knowledge management in information systems – particularly the knowledge-oriented social networks.

The Purpose of the Work

The purpose of the work is to present the research to improve the quality of training in the field of information analysts – namely consolidated information analysts. The proposed methods and approaches are aimed at improving the quality and level of intellectual capital of the organization through the use of systemological approach.

The goals of this research are:

-the study of relevance of knowledge systematization in the training of the analysts using the method of systemological classification analysis at the example of developing of the testing methods classification useful for learning;

- the study of the methods for optimization of analysts' training through the use of e-learning technology;

- the study of the methods to develop knowledge-oriented social networking in the training of highly qualified analysts.

The Method of the Research

As the method of the research and solving the set tasks the method of systemological classification analysis which refers to the noospheric stage of scientific development and helps to solve complex ill-structured problems effectively in non-formalized qualitative semi-structured domains [3, 4, 5 etc.] was employed.

On the Relevance of Knowledge Management Competencies in Consolidated Information Analysts' Work

In today's economy, the engine of which is information and knowledge, the organization sees more value in its intellectual assets than tangible ones [6]. Firms applying knowledge management are increasingly winning in the market, as the use of knowledge management helps to increase the competitiveness of an organization.

Knowledge management helps to organizations: it creates a competitive advantage, increases productivity, stimulates innovation, promotes cooperation, encourages and harnesses the power of education to increase social capital, attracts and retains human capital to create and use structural capital, shares best practices and processes, and provides leadership and effective decision-making, increases the level of customers' satisfaction [6].

Knowledge management is a means for performing multiple tasks meaningful information processing, including: management, acquisition, storage, presentation and knowledge transfer. To solve these problems it is necessary to form the analysts' organization knowledge management competence. These competencies are important knowledge and skills in the modern consolidated information analysts; they reflect the ability to work with the knowledge, to manage knowledge and information flows, processes, and contribute to training and the development of organization.

For an analyst of consolidated information to have full knowledge management competencies, he of she must possess the knowledge, skills and abilities, with which it is possible to solve the problems of knowledge management. The most important one is the application of systemological classification analysis as the noospheric method of systematization, classification, presentation, acquisition, extraction and production of new deep knowledge. Using this method will allow to visualize and formalize knowledge of almost every industry, including ill-structured ones.

It is necessary to define the requirements for skills and knowledge for consolidated information analysts obtaining knowledge management competencies. To solve this problem it is advisable to carry out a study of these competences and formalize their requirements, for example, in the form of using case diagrams, UML language and Rational Rose tools. Figure 1 shows a fragment of the diagram for requirements for knowledge and skills of the consolidated information analysts who possess the competencies of knowledge management.

Diagram requirements for skills and knowledge of analysts who have competencies in knowledge management identifies and visualizes the basic requirements for skills and knowledge of consolidated information analysts who have knowledge management competencies and some links arising between these knowledge and skills.

The studies in this field allow to identify the skills which should be developed and the knowledge required for efficient work of the consolidated information analysts.

On the Development of a Classification Model for Testing Types to Improve the Quality of Information Analysts

Software testing is a young and developing science. At present there is no single source of information, which would clearly describe the process of software testing or systematize experience of people working in this field.

As a rule, young professional testers get their knowledge from many different sources – and often it's inaccurate and contradictory. As a result of the lack of models describing the actual testing area is not completely clear what

the software testing process is, according to what uniform rules and how it is carried out. In each case, their own unique system is being produced, and this system may be unsuitable for any other situation.

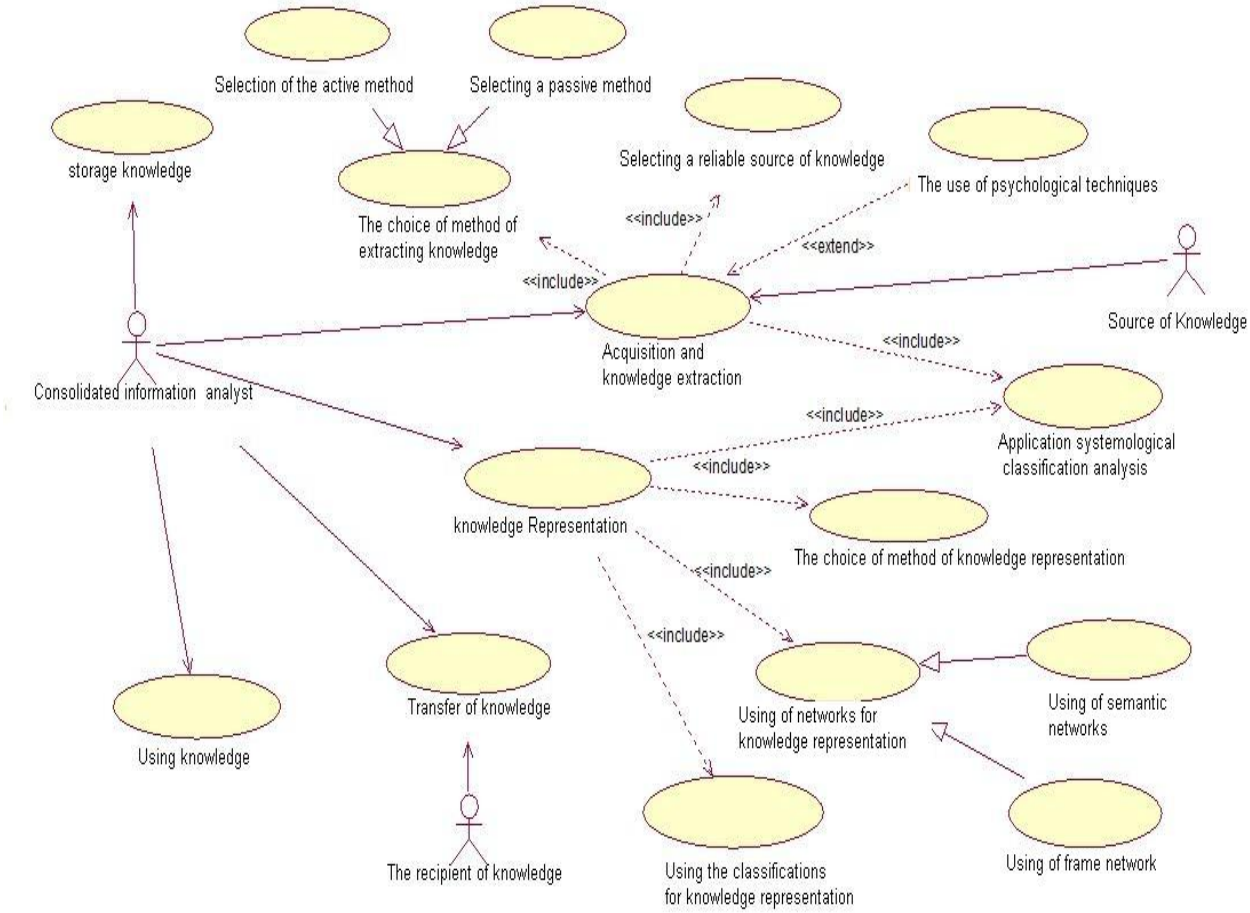

Figure 1. Diagram of the Requirements for Knowledge and Skills of Consolidated Information Analysts Having Knowledge Management Competencies

Nowadays there are many different classifications of software testing on different grounds (not only by testing types). A distinctive feature of all these classifications is their being contradictory and incomplete. This situation regularly baffles even the experts with experience.

The most common types of classification models of software testing is divided into functional, non-functional and regression testing types. This model includes a main field of testing, but does not take into consideration the time factor and the degree of being prepared for the software testing process. Functional and non-functional test types are "independent" and used in clearly defined within the scope of application, depending on their purpose. Regression testing is applicable to all areas, it covers is any type of testing, as is, in fact, screening. Regression testing, as opposed to a functional or non-functional ones, can only be applied after the first cycle of testing has been carried out when a portion of errors and defects have been already found, recorded and eliminated.

Functional and non-functional testing forms may be performed independently at any stage of the software development. Regression testing depends on the functional and non-functional ones, as it's being carried out on their basis, and often uses their tests results repeating the test cycles.

Based on the discrepancy identified above (as for the time and procedures), it is logical to assume that a certain distinction is necessary because the regression testing has properties that cannot be on the same level as the functional and non-functional test types have.

Functional and non-functional types of testing can be attributed to basic testing, as the test cases related to these two types, are the basis for software testing process.

Regression types of testing should be attributed to screening test types, which are not always independent, often repeat functional and nonfunctional tests which have been already carried out, being in some cases aimed only at test bug fixes.

Besides, the least explored area of software testing is the test of the product's documentation, which is not mentioned in most of the existing classifications of today.

Documentation testing is hardly paid with attention, because in the process of development of this type of testing they always lack time for it. However, the time spent on checking and testing of technical documents could save for a development team more than one working day in the future. Testing of the documents as well as the regression testing cannot be placed in one line with non-functional and functional types as there is a difference in time and area of application again.

Testing of documentation is a preparatory kind of testing that is supposed to identify errors, inaccuracies and contradictions in the documents according to which the project is being developed. It is necessary as well as the regression, as many mistakes are repeated more than once and lead to even a greater number of deviations from the requirements in the development and implementation process.

Thus, if we consider the classification of software documents testing not in terms of functional, non-functional and regression tests, but in terms of the time scale and purpose and include them into a system of preparatory, primary and verification kinds, the controversy related to the different start time of the tests and different test facilities are eliminated. Such a classification model of the software testing types can be especially useful both for those who are now just trying to learn how to become a professional tester and are involved into the collection of information about the subject domain, as well as for experienced professionals who have been working for many years and have decided to be engaged into scientific activities and organize their accumulated experience.

The Research and Modeling of E-Learning Systems as a Tool to Support the Educational Process In Terms of Academic Load Reduction

Peculiarities of consolidated information analysts' training related to meaningful description of the processes being studied and the analysis of qualitative information restrict the use of e-learning aimed mainly at the formation of the solution search skills requiring the implementation of the unambiguous algorithm. However, some aspects of analysts training in the field of decision-making theory, social processes modeling with the use of formal methods for their description, etc. allow partial application of computer training programs due to the parametric representation of problems in these knowledge areas. E-learning systems are considered as auxiliary means offering only additional ways of learning to the basic functions of a teacher related to the training of specialists in this field.

E-learning should not only perform functions related to the provision of theoretical material, but also to control the functions of training, testing, problem solving skills development and assessment of students with the search for "white" spots in their responses, and providing recommendations to return to the part of the theoretical material

which caused difficulties, or for additional training in the practical development of the material. Besides, the guidelines should contain information about the errors, the ways of their elimination and the level of student's knowledge that forms the distinctive feature of intelligent e-learning is the presence of feedback to the student, supported by special interactive modules that are responsible for the assessment of the student responses and errors place and type diagnosis which is an ill-structured area.

The analysis of existing e-learning systems shows that they are presented in the form of testing or information systems without feedback in the learning process. One of the major disadvantages of such systems is that they cannot be used during the learning cycle and restricted to a certain set of primitive functions (electronic books, databases and learning, etc.). The analysis of the existing development of computer training programs in the preparation of analysts revealed that it is the formation of feedback is most difficult in these developments, as it includes quite a number of formalized criteria for assessment and diagnosis of the errors causes. The proposed criteria do not always fully reflect the nature and function of the feedback realized by the teacher as the studied developments did not take into account features and specificity of analysts' training. This determines the urgency of the problem and the need to develop e-learning systems with feedback for the consolidated information analysts' training that will make the process of learning more effective and aimed at the students' self-development.

In the study of feedback nature of the educational process its main components implemented be a teacher have been revealed: assessment function, the function of the search of the location where an error occurred in the case of an incorrect answer and recommendatory functions of re-examination of the material according to the results determined by the location of the error. The last two functions are combined in a block of errors intellectual analysis that performs error detection in case of the presence of solution results mismatching to set values. Next the location of the error is detected at any stage of problem solving process and the status of the error is referred to a particular lecture topic or type of tasks. Then the problem (the gap) in the student's knowledge is diagnosed and the recommendations to improve the result are formed, for example a student can be offered to explore the theoretical material with the topics or chapters, to learn an algorithm for solving the proposed problems, to try the tasks of a simpler level, etc.

The problem of intelligent e-learning systems development is considered as the creation of complex computer projects and is closely linked with the development of requirements for their structure, functions and software content. Requirements describe the behavior of the system, the properties of the system, its classes and attributes and limit the computer system development process [7].

Analysis and modeling requirements require special formalized approaches that can accommodate the interests of all those involved in the process of e-learning: students with various psycho-types, basic knowledge levels, information processing perception and speed and teachers with their experience of "how to do", "how to teach "," how to assess "and" how to identify the true causes of the error". Moreover, other external constraints such as training programs standards, curricula, etc., should also be taken into account.

The study of this ill-structured domain proves that the development of a complex computer system is not possible without the development of information support requirements. Information support for the requirements development for an intelligent e-learning system must contain a formal description of its functions, conditions and transitions, logical aspects of the sequence of actions and interactions between its members in the form of adequate visual models of functional and user's requirements.

User requirements describe the goals and objectives that e-learning can solve and indicate what students can do with the system. The ways of presenting these options are to use the scripting requirements and an “answer-set” approach. Functional requirements define the functionality of the software which developers must generate and users should be able to perform. To cover all the requirements it is necessary to develop models that represent them at a certain level of abstraction and can detect incorrect, inconsistent, missing or redundant requirements. Data flow diagrams, state-transition diagrams, cooperation and sequence diagrams relate to such a conceptual representation of an intellectual computer system. Each model describes a particular aspect of the system, uses a set of diagrams or formal description as well as reflects the point of view and is the subject of a variety of people with specific interests, roles or tasks. These models provide a useful tool for the analysis of software development problems and information exchange between the developed modules. Modeling extends the coverage and treatment of functional and user requirements, and improves the quality of the system [8].

The most effective way to create visual models is a special standard object-oriented modeling language - Unified Modeling Language (UML). At the level of abstraction of separation, which is suitable for the requirements analysis, UML-notation is used for all types of diagrams for intelligent e-learning systems. Analysis modeling techniques are supported by various business automation software tools known as computer-aided software (CASE-tools). This choice is due to a number of advantages if compared with conventional methods: 1) they are easy to improve the diagrams accuracy in case of requirements’ repetition, since it is impossible to create a model with a high degree of adequacy of the actual processes immediately due to external and internal changes during the simulation; 2) CASE- tools support rules for each method of modeling and can identify syntax errors, inconsistencies and detect semantic errors in the scheme , and that is not always possible without the use of such tools.

Figure 2 and Figure 3 show the sequence diagram and the cooperation diagram which reflect transactions between the separate modules of the intelligent e-learning system.

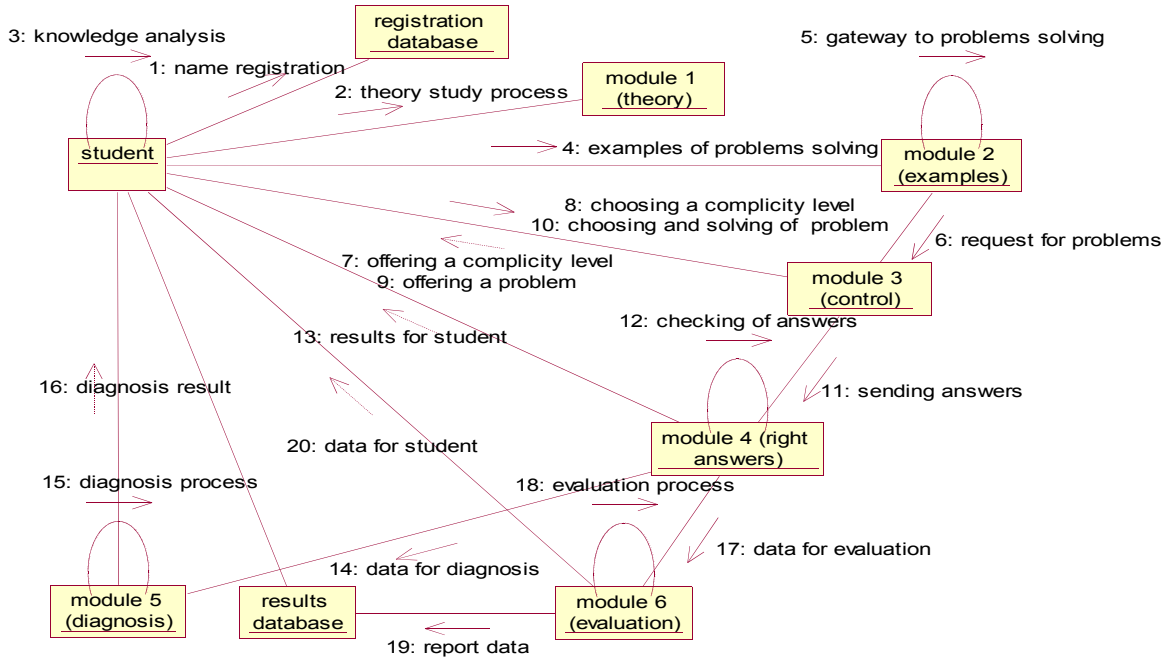

Figure 2. Cooperation Diagram of an E-Learning System

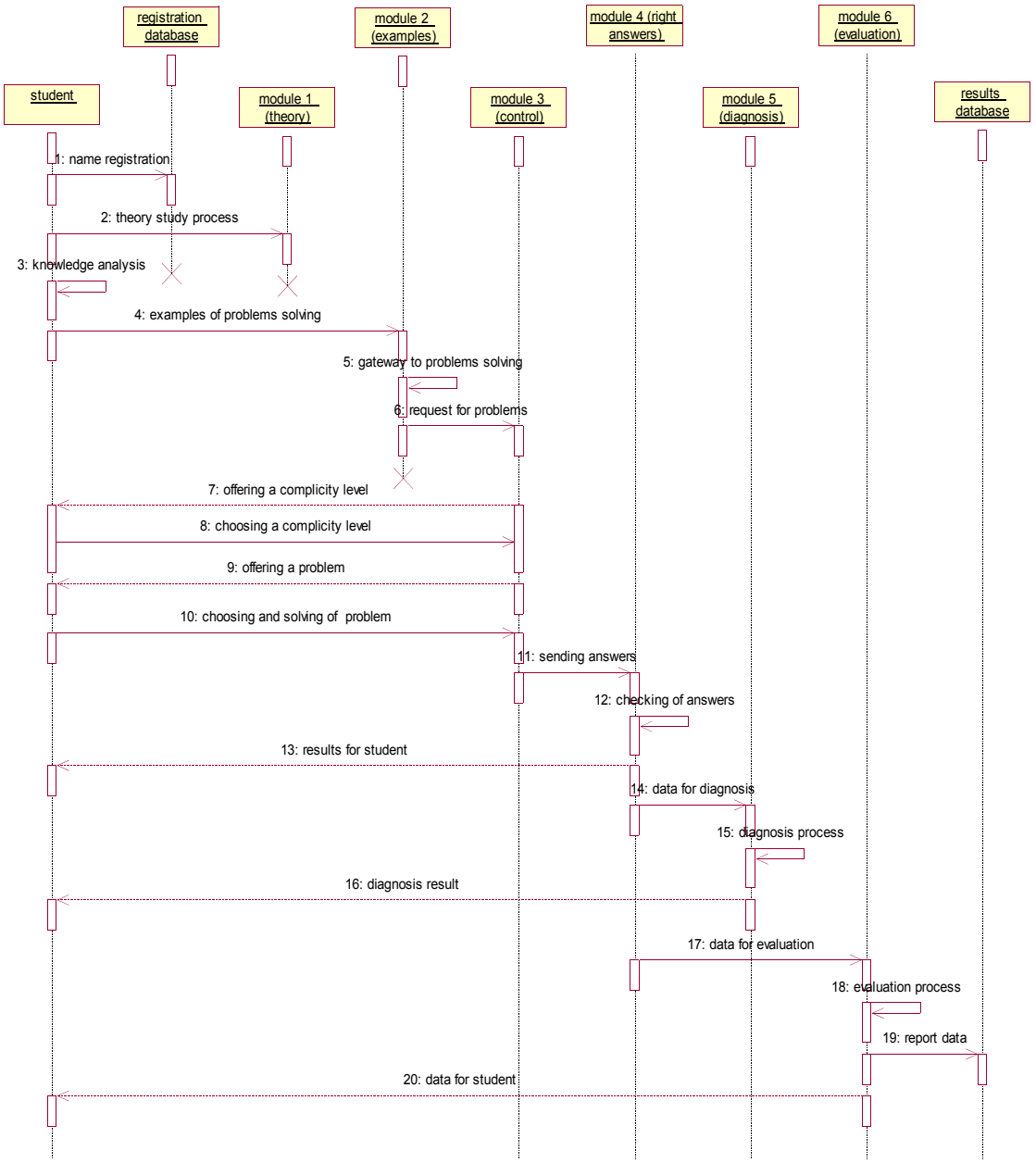

Figure 3. Sequence Diagram of the Interaction of the Modules of an E-Learning System

The presented diagrams reflect the way the system modules communicate in dynamics and show the interaction of classes and transmitted messages for a better understanding of user's requirements. A part of the transition state diagram (the receipt of a student's answer and the comparison with the correct variant) is shown in Figure 4 and forms a complete and clear understanding of the mechanism of a finite number of states.

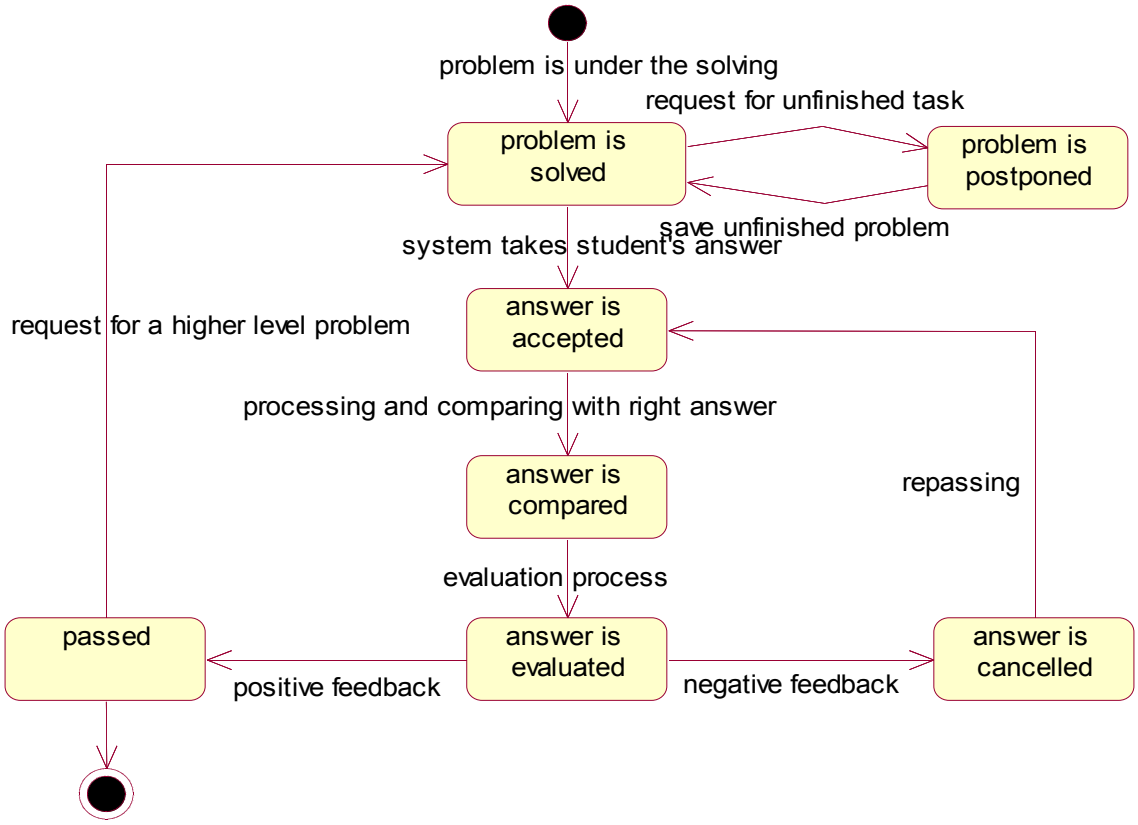

Figure 4. Part of a State Diagram of an E-Learning System

The state diagram which contains three types of elements – initial states, final states and transitions - shows the transition between the states, not as part of the processes performed by the system, but as the only possible state of changes associated with these processes. The transition diagram helps to understand the expected behavior of the system, check whether all the necessary state transitions are described correctly and completely as for the functional requirements.

The presented models are different diagrams related to each other and with their common data definitions in the data dictionary that allows you to maintain a model in a consistent state, and in accordance with the functional and user's requirements for filling software content. A visual modeling intelligent e-learning system is a way of perception of the problem with the help of visual abstractions, concepts and reproduces the behavior of objects in the subject area.

Thus, the problems of analysis and modeling requirements in the development of e-learning systems with feedback during the business analysts' training have been defined, the subject area requirements have been determined; the choice of CASE-tools to create models for the generated domain has been proved. The visual model of functional requirements and the requirements of users in the form of graphs showing the development of behavior and logical structure of the system, which allows to identify incorrect, inconsistent, missing or redundant requirements has been developed. Visual models of user and functional requirements of the system of e-learning have been developed on the basis of CASE- tools and provide information support, explaining the events and the corresponding response. It is the interaction of modules at a higher level of understanding than the text

specification requirements give, but it cannot completely replace the technical task in natural language, as each type of modeling has its advantages and its limitations. E-learning system modelling is an effective procedure to reflect changes in functional and user's requirements which resulted in the optimal sequence determined by its design which improves the quality of the development system by the criterion of coverage and treatment of the considered types of claims and accordingly improve the efficiency of its use by students.

On the Application of Knowledge-Oriented Social Networking Web-Sites on the Internet in Competitive Specialists' Training

With the rapid development of information technology and weave of all spheres of social life with the Internet technologies the importance of research in the field of education and improving the training quality has enhanced. Given the rapid pace of innovation in most organizations, a modern person must not only know and successfully fulfill all his or her responsibilities, but also to be capable to permanent self-learning.

The employees who have been working in organizations for a long time, have the knowledge necessary for young professionals, but unfortunately most of them do not pay enough time to self-education and further researches. Thus valuable knowledge of experts (their intellectual capital) is a load of knowledge, which is not being improved over time, becomes obsolete and non-relevant. Young professionals have the opposite problem, with basic skills and desire to learn they cannot get work experience and acquire the necessary social capital before the actual start of work in the organization.

To effectively solve this problem it is advisable to use modern methods and technologies of knowledge management, in particular the use of knowledge-oriented social networking sites on the Internet as an essential element of the educational process. For their effective functioning, consider the following factors:

1. Menu and structure of a social network should be user-oriented (the method of systemological classification analysis is strongly recommended).

2. A framework of motivational techniques to engage the students, academics and experts into work should be developed.

3. The interaction between the specialists should be based on interest in communication and solving the set problems.

4. The system of interaction between students of junior and senior courses, graduates of previous years and teachers should be implemented at the universities.

5. The use of the proposed social networks in the work of practice communities is reasonable.

The use of a social network on the Internet to solve the problems of education and its integration into the real economy will:

- Increase the competitiveness of graduates, adapting their skills to the needs of business and industry of their activities.
- Improve the social capital of graduates and employees of organizations.
- Find new ideas and valuable employees for employers.
- Accelerate the exchange of knowledge and the solution of typical problems in the subject area as a result.
- Quickly introduce modern technology in the educational process and the work of the organization.
- Find sources of funding for researches and the practical implementation of scientific developments.

- Consolidate the knowledge and efforts of specialists from different regions and countries to meet the challenges of science, business and education, thus ensuring the sustainable development of the state and society.

Implementation of the proposed project on the practice will consolidate the efforts of specialists of subject areas and to further analyze the efficiency and quality of the training system in the Internet space with a view to making recommendations for its improvement.

On the Transformation of an Organization into a Learning Organization

One of the priorities of any organization in a competitive environment is the development and training of employees, the permanent being of the staff at the same level is not profitable for the company. The most appropriate form of development is a learning organization.

The emergence of a learning organization is seen as a natural reaction to the conditions of the transition from a knowledge-based economy to a knowledge economy, in which there is a need for a new organizational form, structure and instruments of coordination. A unique distinguishing feature of such an organization is not just staff combined with his experience and knowledge, but the culture of organizational learning and development, and staff perceives work as a process open to continuous improvement.

In learning organizations people are focused on the development of their potential to achieve common results; a new system of thought is formed, collective desire is expressed freely, and people are continuously learning how to learn together. A learning organization is an organization that creates, acquires, preserves and transmits knowledge. It is able to successfully change the type of their behavior to reflect new knowledge or projects that support the learning process in all fields, promoting training on how to learn [10].

The idea of a learning organization, continuous self-improvement and self-learning of an employee most closely matches the needs of the development of IT-sphere in modern conditions.

The concept of the learning organization becomes widespread in the knowledge management theory and practice. The knowledge production process is reduced to the study and development of latent characteristics and abilities of their staff by continuous training during daily activities.

The key provision of the concept of the learning organization is that any organization can be called learning, the only question is how big and recognized her ability to learn and self-development is. That is why non-learning organizations do not exist, and at the same time, there is no organization that can be called learning ones understanding this kind of a high degree of perfection and excellence. Thus, a learning organization is not a static condition which the company will sooner or later reach, but the process of continuous learning, self-improvement and development.

Learning organization is a team united by a common vision and values of employees who are able to develop and improve the work process (and the result of this process), relations arising in it, as well as their own understanding of the situation through constant feedback from your colleagues, clients, partners , heads, namely from the internal and external environment [10].

Distinctive features of a learning organization are system thinking, which allows to make holistic view of the processes and phenomena and their most effective change; encouraging employees to develop, determines the identification of values workers and their consistency with the objectives of the organization and society; creating a common vision to reach the common goal [10].

It should be pointed out that a single model of a learning organization does not exist - it is rather a philosophical attitude to the fact that there is such an organization and there are some certain roles of its employees. In a learning organization, each of them can participate in the identification and resolution of problems based on knowledge, intelligence and lessons organizational values and culture, and that allows the company to experiment continuously, to use the newly emerging opportunities. In this case, turn the heads of his subordinates in the partners, and their main task is to create conditions for the development of learning abilities and make fuller use of energy and knowledge workers.

Education in some ways improves the efficiency of the company, but no significant impact on the business process in the company and its financial performance. The consequence of this is the lack of loyalty of the company and its employees. In a stable industrial environment these are the normal conditions of profitable functioning of "economic companies." But these companies are unlikely going to be the leaders in the global market and allow our country to make a breakthrough to the "knowledge economy".

We consider the transformation of a learning organization within the information technology industry, which is one of the fastest growing industries. According to Datamonitor Research Company, the information technologies industry consists of two main markets:

1) data processing and outsourcing services (divided into electronic data processing, IT outsourcing and business process outsourcing services);

2) IT consulting services (service integration and development, support for hardware and software infrastructure and proper IT consulting). Market BPO brings 43% (239.3 billion dollars) of industry profits, giving the way to IT outsourcing (50.4%, 280.3 billion dollars). The industry of data processing services and outsourcing has steadily grown by an average of 11.1% per year companies for 5 years.

Today information technologies can make a decisive contribution to strengthening the relationship between labour productivity growth, investment and employment. New types of services distributed over networks are able to create a lot of jobs, and that is confirmed by the practice of recent years.

A number of stages in the transformation of a learning organization with systemological analysis employed have been investigated:

1. Formation of a highly qualified staff as an intellectual and professional basis of a company.
2. Development and implementation of quality system standards to monitor their compliance to them.
3. Formation of the company's development strategy, including staff development.
4. The introduction of instant availability of necessary information.
5. Improvement of non-financial motivation of employees and the strengthening of staff.

Effective training of an organization is the constant and purposeful process of obtaining a competitive advantage being held and quality as a key resource of the enterprise which allows to realize the concept of a learning organization through its constant transformation.

Findings

The paper brings up some solutions proposed to improve the training of highly qualified analysts for consolidated information having noospheric system thinking, new information and organizational culture and use of innovative knowledge-oriented tools and methods in their work (for instance, the systemological classification analysis) aimed at increasing the intellectual capital and sustainable development of the organization.

Features of high-quality training of consolidated information analysts define a key role of the teacher in teaching students due to the need to analyze the qualitative aspect of the content of information and knowledge, describing the studied subject area. E-learning system is an auxiliary tool in the training of highly qualified analysts and is considered to be an additional opportunity to provide an interactive media student. The proposed approach allows to partially implement the most significant part of the training – a feedback by which the gradual control of the learning process is to determine the place of error in some cases to recognize their causes, to form the recommendations, to address them and to improve the results.

The application of systemological cognitive methods and knowledge management is useful in various fields and can improve the problem-solving education and improve its quality. In some companies, as yet, the knowledge management system is a sphere of activity of the professionals working with staff and IT-departments (technical ability to provide knowledge management for the system activities). The potential of a knowledge management system is not used to the full; knowledge, human factors, cognitive features of employees are not being taken into account to the proper extent. Therefore, the actual problem of improving knowledge management in organizations and the formation of learning organizations that are designed to perform analytics experts - analysts for consolidated information [11, 12].

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