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TASKS OF DEVELOPMENT OF STANDARDS OF ICT-EDUCATION FOR HIGHER EDUCATION INSTITUTIONS OF AZERBAIJAN

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At the current stage of world development, organization of information society is a strategically important task, determining the level of economic development; and knowledge presented as an information resource, becomes the main asset of the society.

Organization of information society in Azerbaijan is impossible without development and improvement of scientific-methodical and technological base of information industry – information technologies. Information technologies have become the most important sector determining the scientific-technical progress. Solution of this task requires modern education environment for preparation of highly professional specialist that are capable of using and implanting leading projects of information technologies in actual practice. Higher education institutions of the Republic are responsible for the solution of this task.

At the end of the last century, diversification of activity of ICT specialists took place, which lead to development of family of five disciplines [6]: "Computer Engineering – CE", "Computer Science", "Information systems", "Information Technology" and "Software Engineering".

Structure of higher ICT education in Azerbaijan, effective from 01.01.2010 for tens of directions (specialties) and for different levels of education, is fragmented to 17 aggregative training groups. Among directions effective in ICT-education sphere, there are directions duplicating each other which are extremely limited in modern conditions and out-of-date.

In such situation, there is an impelling need in development of a unique methodological approach to determination of directions of specialist training and contents of education. Such methodology must consider tendencies of organization of information society in the Republic, requirements of international standards, legal base of the Republic of Azerbaijan and national specifics, as well as national standards of branch normative-technical and methodical documents on ICT.

In different years, as of 2001, within the framework of joint project of Association for Computing Machinery (ACM Education board) and IEEE (IEEE Computer Society Educational Activities Board) several standards were developed for teaching of ICT in higher education institutions. A maximal number of interested persons were engaged in development of these standards, as well as representatives of different stakeholders, also from the industrial field, government institutions and all ranges of higher education institutions teaching computer science.

It was indicated in the documents that these standards must be useful for the entire world community. Although, requirements to teaching curriculum differ from one country to another, it must be useful for teachers of information technology worldwide.

Documents consist of two main parts: description of body of knowledge and description of certain education courses.

Description of body of knowledge consists of a three-level hierarchy. Spheres of knowledge, which represent certain disciplinary fields are located on the highest level and are indicated with two-letter abbreviations. Each sphere consists of thematic modules, which are indicated with the abbreviation of the sphere with the addition of index number. Each module consists of subjects, which are the lowest level of hierarchy. Recommended number of lectures and extracurricular hours are indicated in each subject.

Following correlations between volumes of educational parts forming the ICT program are considered in the standards:

1) ***Scientific Base*** – fundamental knowledge and methodologies including mathematical training (a strong correlation between scientific base and nuclear technologies are presumed) – 30%
2) ***Technology Base*** – study of basics of nuclear technologies, principals of coverage are important – 30%
3) ***Application Base and Systems Thinking*** – development of systematic thinking, study of applied technology– 25%
4) - development of ***Personal & Business Skills***, including the team projects, modeling of commercial activity, art of negotiation, preparation of presentations etc – 15%
5) ***Practical Work Experience*** – minimum 3 months
6) Final (Project Work) – minimum 3 months.

Education in universities of the United States is directed to research work. Universities, usually have quite a large number of teacher staff, allowing to learn computer science with a sufficient level of thoroughness and fullness. Computer Science education program is designed for three years. In such cases, presumed target is usually teaching all students on a level sufficient for their consequent professional or scientific career.

Some universities of North America (University of California, Massachusetts Institute of Technology, California Institute of Technology) adhere to dividing an academic year in three semesters. With three semesters instead of two, universities assume that four courses will be taught within the duration of each semester. Given template illustrates an option, in which main courses on program engineering are delayed until third year of education at the university.

Some countries, including the major part of Great Britain (Cambridge University UK, Oxford University UK, Sheffield University UK), adhere to secondary school system, which gives students a higher level of knowledge in mathematics and science. Such systems also have a tendency for concentrated education about certain subjects after graduation of secondary school, setting forth significantly less requirements to general education (humanitarian studies etc).

In Japan, (Tokyo Institute of Technology Japan, Osaka University Japan, Kyoto University Japan) science and exact sciences are mandatory for audience. A large number of mandatory computer sciences courses, general education courses and additional programming courses are mainly conducted during the first year. Different number of hours can be allocated for each course in the curriculum.

Many universities of Australia (Monash University Australia, Melbourne University Australia, Australian National University Australia) tend towards teaching of four courses a semester, which gives students an opportunity to learn more during one course, than if they would be taking five or six courses at a time. For example, material on discrete mathematics in combined in a longer course.

Structural-logic charts (SLC) of professions proposed by the groups of authors, which find their application in the actual practice of ICT education, should be expediently used during development of the model of education process. [2] During the use of SLC, curriculum disciplines are studied in interrelation and consecutiveness of education process modules is specified by volume and content of knowledge and abilities mastered in advance.

Education charts are constructed under structural-logic chart; each discipline consumes a strictly determined place. Curriculum takes on characteristic of algorithm describing the trajectory of educational activity of the student. Formalized character of presentation of curriculums under structural-logic chart allows examining it as an effective methodological basis for development of combination of educational-methodological complexes, which allows using them as departure point during formation of module curriculums in combination with dictionaries and ontologisms of subject fields.

Currently, ontologisms are the universally accepted method of identification of complex objects such as education sphere, based on which it is not only possible to determine simple concepts composing a complex concept, but also the relation between complex concepts (for

example similarity or difference level between them). These concepts are constitutive concepts for consecutive formation of specialist' competency set.

Ontologisms are used as a general basis during the work with structured information, for capability of reusing the knowledge in subject fields; and also for separation of supporting knowledge from operative knowledge in subject field.

Development of ontologisms in different subject fields is currently one of the most actual tasks. Research centers and international organizations are currently involved in its solution on different levels. We must note the extensive application of "the ACM Computing Classification System" [2006 Version] classifier during development of contents of education standards and contents of profile disciplines, in which facetted classification model is applied. There are approximately 1500 categories (concepts) in this classifier.

Ontologisms have a meaning only in case of continuous conduction of works for their improvement. Methods of expert-statistic systems of classification can serve as useful tools for such improvement. [4]

Projects of reform structures and contents of ICT-education are discussed in USA, EC countries and Azerbaijan at the end of XX century. Considering these circumstances, we can come to a conclusion that development of methods of contents and nomenclature of professions in ICT sphere is an important scientific problem.

There are more than 20 institutions of higher education in Azerbaijan, which graduate specialist in different fields of information technology. Among them, we must emphasize Azerbaijan Technical University, Baku State University, Azerbaijan State Oil Academy and others. Currently there are highly skilled specialists with vast experience and potential in the Republic.

However, it is necessary to consider that development of IT sets forth new requirements. If we look through the list of professions in-demand for West in IT field proposed by Career Space [8] consortium, then currently none of the institutes provide education for such professions. Consequently, it is necessary to incorporate trainings on professions which will be useful in the near future.

At the end of the last year, Ministry of Communication and Information Technologies of the Republic of Azerbaijan completed the development of initial version of Government program on development of communications and information-communication technologies for 2009-2012 years. This program is the continuation of "Electron Azerbaijan" program effective until the end of 2008 y. the new program targets full realization of potential of ICT-sector with its placement in leading position (alongside with oil-gas sector) in the economy of Azerbaijan and will be designed for 2009-2012 y. [9].

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