Russian Educational Standards of Informatics and Informatics Technologies (ICT): Aims, Content, Perspectives

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Abstract. Educational standards fixes three main parameters in informatics and informatics' technology: the goals for every step of education (primary step, intermediate step and pre-professional step), the obligatory component of the content, and the level of it's acquaintance. The basic course is the course of 8-9 classes. Informatics' technology of solving tasks is in the focus of the basic course. There are three aspects of the technology: "Informatics' processes and their automatisation", "Informatics models" and "Informatics' point in managing". The three aspects are fixed in the standard and are common for the permanent course of informatics (taught from the second to the eleventh class).

Educational standards set three main parameters for studies in informatics and informatics technologies: the purpose for every step of learning (introductory, intermediary and pre-professional), the obligatory component of the content, and the level of its acquaintance.

The issue of the content of education is one of the main issues of the course in informatics. In Russian schools this course is provided as a part of general education in schools as well as universities and teachers training colleges.

As with any course which constitues a part of general education in Russia, the contents of a course in informatics is based on two main principles:

- the requirement to cover the main issues of informatics; and
- the emphasis on the main types of information activities.

This approach leads to segregation of two concenters of the content of the course in informatics, namely “informational processes” and ‘informational technologies”. “Informational technology” is a process resulting in the creation of information products with specified qualities, in particular with the aid of computer and its software.

According to the modern standards and basic curriculum of Russian schools, a course in informatics is given continually from the 2^{nd} to 11^{th} (last) year of school and, as a rule, at universities. There are three main learning steps: introductory (2^{nd} to 5^{th} years of school), intermediary (7^{th} to 9^{th} years) and pre-professional (10^{th} and 11^{th} years). To maintain the uniformity of all steps, the course in informatics is based on three main topics which are covered throughout the course and are the sort of “axiomatic statements” of the modern course in informatics: “Information and informational processes”, “Informational modelling” and “Informational basics of management”.

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These three continuous course topics in informatics are covered at every step of learning but of course in various depths. We will consider below those topics in more details.

The scope of issues traditionally covered by the topic "Information and informational processes" is significant for the course in informatics. At the introductory step, the choice of tasks and learning materials is aimed at providing full description of the concept of usage of multimedia in all fields of human activities and problems of subjective interpretation of information. It lays the grounds for further studying of informational modelling, algorithms etc.

In the pre-professional step, the procedure of interpretation of information is again in the foreground, but in a different light. Here, the perspectives are the as various ways of interaction with technical and social systems. Generally, the steps of learning of informational process are described in Table 1.

Table 1. Main learning steps of the topic "Information and informational processes"

Learning step	Aspects of the course in informatics	Main studied processes
Introductory	Information as a message in the form of sequence of symbols	Encryption, interpretation
Intermediary	Information as a message in the form of sequence of symbols that are stored, transferred and processed through technical equipment	Storing, transferring, processing
Intermediary and pre-professional	Information as a message transferable via channels which can be kept and processed according to certain rules	Modelling, characterisation, algorithmisation
Pre-professional	Information as data and methods of its processing	Information technologies, automatisation
Pre-professional and higher education	Information as semantical feature of matter	Interpretation, methods of learning and communication
Higher education	Information as a resourse, product, tool and instrument of professional activities	Methods of practical activities, decision generation and decision making

The modern stage of the development of education is characterised by increased attention to the notion of model and the methodology of modelling.

Table 2. Main learning steps of the topic "Informational modelling"

Learning step	Aspects of the course in informatics	Main studied processes
Introductory	Modelling as substitute for a subject in the process of learning, interaction and practical activities	Comparison, collating, examination of models
Intermediary	Modelling as a simplified version of a real subject. Informational modelling as a scheme, image or description of a studied subject.	Formalised representation of text, graphic, numerical, and audio information
Intermediary and pre-professional	Modelling as a new subject which reflects certain qualities of an original subject which are material for the purposes of modelling	Characterisation, creation and interpretation of tables, diagrams, flow charts, schemes, formulas and algorithms
Pre-professional	Modelling as a way of knowledge, means of communication, tool of practical activities	Structuring of data and knowledge
Pre-professional and higher education	Modelling as physical or informational equivalent of a subject which operates in certain characteristics in a way similar to that of an original subject	Creation of valuation criteria, valuation check of modellings
Higher education	Modelling as a new subject (real, informational or imaginary) different from an original subject, having and reflecting qualities material for the modelling purposes of which allow it to fully replace the original subject for the given purpose	Systematic analysis, design, impact analysis

The course in informatics helps, to the largest extent possible, to classify the knowledge that learners have about models and conscious application of informational modelling in their learning and then in their professional activities. The creation of models in the courses of mathematics, physics, chemistry and biology is fortified by learning, in the course in informatics, about issues related to the stages of creation of models, analysis of their qualities, validity checks in respect of the model and the

object and the aim of modelling, examining the influence of the choice of modelling language on the quality of obtained information etc.

The process of learning modelling should be organised in such a way as to enable a learner to try the roles of creator, observer and user of models because trying different roles is especially important in modelling.

The main learning stages for modelling in different learning steps are described in Table 2.

Informational technologies of task solutions are directly related to management techniques. The main learning steps of this topic are described in Table 3.

Table 3. Main learning steps of the topic "Informational basics for management"

Learning step	**Aspects of the course in informatics**	**Main studied processes**
Introductory	Management as handling activities of somebody or something	Work with operators
Intermediary	Management as a governing act transferred by way of instructions	Algorithmisation, operating of work of computer, operators by way of instructions
Pre-professional	Management as directed informational interaction between a managed object and the system of management	Purpose, mechanisms, methods, results, valuation of quality of management
Pre-professional and professional	Management as a mechanism of self-organisation of complex systems	Systematic and functional analysis
Professional	Management as a sum of principles, methods, forms and ways of influence to an object of management with the purpose of reaching specified characteristics of its functioning and/or expected results of its activities	Preparation, making, realisation of management decisions

The issues described above served as a ground for the Federal component of a Russian standard for general studies (2004). They are also employed in key textbooks that are used for the course in informatics in Russian schools, among them [1, 2, 3]:

References

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