

DOI: 10.12731/2218-7405-2013-8-73

INFORMATICS WITHOUT INFORMATION¹

Okulov S.M.

The article is devoted to identification of the logical contradiction underlying the modern school course of Informatics (Computer Science). As Informatics is based on the notion "information", the informational processes running in the systems of various nature should be studied, including technical systems and human societies. In actual fact the school course doesn't follow this directive. The exclusion of the notion "information" determines the wholeness of the course and its logical completeness.

Keywords: school course of Informatics (Computer Science), information, information technologies.

ИНФОРМАТИКА БЕЗ ИНФОРМАЦИИ

Окулов С.М.

Работа посвящена выявлению логических противоречий, лежащих в основе современного школьного курса информатики. Базирование на понятии «информации» приводит к необходимости изучения информационных процессов представления, передачи, обработки информации в объектах различной природы, включая технические системы и человеческие сообщества. Фактический же курс нарушает эту установку. Исключение понятия «информация» приводит к цельности курса и его логической завершенности.

¹ The author means «The school course of Computer Science» that in Russia has a name based on the term «Information» / Работа выполнена при финансовой поддержке ФЦП «Научные и научно-педагогические кадры инновационной России на 2009 – 2013 годы» (соглашение 14.В37.21.1014)

Ключевые слова: школьный курс информатики, информация, информационные технологии.

Nowadays the school course of Informatics is connected with the notion “information technology”. There is one essential idea in system analysis and in our existence: openness of any system leads to its disappearance and the system dissolves in the environment, depriving its content.

This variety is a consequence of the two circumstances. The first is concerned with the vagueness of the notion “information” and as a consequence with notions “informational object”, “informational process”, etc. Different segments of subject field of Informatics are distinguished (technical, biological, social, physical) and from fundamental nature of the notion “information” the fundamental nature of Informatics is concluded. Then this exhaustive understanding is projected onto the school course of Informatics.

Let’s consider the notion “information”, basing on a laconic definition [3, p.]:

- 1) a message, a report of progress, data about something, transmitted by people;
- 2) vagueness being reduced, disambiguated as a result of a message received;
- 3) a message, connected with management, signals in unity of syntactic, semantic, pragmatic characteristics;
- 4) transfer, reflection of a variety in any objects and processes (in wildlife and inanimate nature)

The first definition is distributed in collective consciousness, but it is logically contradictory. Information is defined as a message, data, which are not specified and a message is often understood as information, thus it forms a closed-circuit. But the key point in this definition is “by people” and consequently information has some meaning, which is expressed in sign form. Minimum three constituents are supposed in this scheme: data source, data recipient and transmitting medium. Information is not transmitted as such. Data carrier is a message which is formed by a data source in a code version. The message is transmitted by a data channel in the form of signals. They can have different nature (electrical, acoustical, etc.), but encoding is done in

accordance with the chosen data channel. The signal containing information is received by a data recipient, but this fact doesn't mean that the information is received. The data recipient must retrieve the meaning from the message and this meaning is the information which the data recipient has.

There is no person in the second definition of information, but it goes back to K. Shannon's works on abstract theory of information giving grounds for the quantitative approach of research of information. This definition implies that the varieties of messages which have different contents on different questions are described by a language, and information transmitted by these messages can be quantitatively valued. At the same time the form of the messages is not important, we abstract our minds from the signal, etc. The formula to determine the quantity of information can be found in almost every school textbook on Informatics, but the connection of this topic with the further materia can not.

The third understanding of information is connected with the development of cybernetics as a science which studies the process of management. Dissemination of this methodology on biological life leads to the conclusion that information is the main component of adaptation and development of nature. Information can be classified according to the forms of existence, perception and its usage. The primary nature information is perceived by the organs of sense. These phenomena are stated by characteristic information kept in the memory of living beings. Social-communicative information appears in societies. Information on a natural language is the basic feature of the human society. This information can be analyzed in three ways: technical, semantic, pragmatic. In the first case accuracy, safety, speed of transmitting of information, data channels are studied; in the second case the point is if the meaning, content of messages is transmitted and encoded qualitatively and in the third case the value of the message in the context of its user is analyzed. The idea that information is something independent appeared in cybernetics. At that, analogies between the role of information in management and processes of learning are stated which are the subject of philosophy.

In the second half of the 20th century the notion of information was comprehended in philosophy. And the two conceptions of information were suggested. They are attribute and functional. The followers of the former believe that information is an attribute of matter. After analysing and comparing more than 300 works A.D.Ursul defined information as a quantity degree of reflection. The category of measure in philosophy is defined as dialectical unity of quality and quantity or the interval of quantitative changes where qualitative distinctness of objects is preserved.

The latter conception connects the notion of information with the work of complicated self-organising systems. The information is understood as signal transmission in controlling systems. The mentioned notions – information and feedback – are considered to be not worthy.

Attempts to integrate the two conceptions were done (for example, the work by R.F.Abdeeva [1]). Information is divided into structural and operational. The former is peculiar to objects of wildlife and inanimate nature. It appears as a result of selection, fixation, strengthening in systems in the form of certain structural changes of its positive interaction with outside environment. The latter acts between objects of the physical world and is used in processes of management in wildlife, technical objects and human society. In fact the cybernetic understanding of systems with two regenerative loops is spread upon wildlife and human society.

In the first loop there is operational information as simple fixation of deviations of the system from given parameters. In the second loop of technical systems some filtration of information of the first loop from the point of view of some objective function takes place. Accumulation of such information predetermines its transformation into structural. On the basis of this information self-development of the system takes place. In this case we may say that cybernetic ideology is distributed onto wildlife and human society, as they say about three forms of information: biological (inside living beings and between them), machine and social. But it is not all. The same ideology is distributed on the processes of learning; some similarity to processes of management is stated.

These theses do not exhaust the understanding and discussing the notion of Informatics. There is huge understanding of information in the context “Information – knowledge”, where the notion of information is interpreted as total knowledge about actual data and dependences between them. Knowledge is structural information. In these latter days a new connection “information – goods, resource, product of labour”, notions “information resource” and “information society” appeared.

What must the course of Informatics be like on the basis of the given definition of Informatics and suggested statements to understand the notion of information and information processes? Here we mean a projection on the subject of a cross-disciplinary scientific direction. Logically outlines of the school course of Informatics must be like the following:

1. study of processes of presentation, transmitting, processing of information in wildlife and inanimate nature.
2. Information and information resources in technical systems.
3. Information and information processes in human societies.

Every part can be subdivided into several subparts and the point is not only to reveal common factors in the methods of information processing but also to show that despite clear difference there is similarity that let us speak about attribute information.

The real course of Informatics does not correspond to these statements.

The second fact connected with the variety of treatment of the subject giving even more uncertainty comes from necessity to consider information technologies. According to our laws information technologies are processes of searching, gathering, preserving, processing, presenting, disseminating information and ways of these processes and methods' performance. Means of realization of these technologies are software solutions worked up by Informatics, and the study of information technologies is the study of these solutions if they are included in the course of Informatics.

But let us imagine one result (a software solution), two results, one hundred results, one thousand results... What do we have? Many stones connected only because they are stones. There is no wholeness in the subject of Informatics. The use of the attribute “basic” to denote software solutions is a trick. If we include a text editor, why don’t we include another software solution? New software solutions allowing to create for instance more interesting presentations will appear in the future and logically we must include this software solution in Informatics and in the school course of Informatics.

Let’s discuss how this problem is solved in the school textbooks on Informatics. The topic “Information” is presented in textbooks similarly, practically every author follows the attribute conception. Sometimes information is not defined and stated as a fundamental notion (like notions “material”, “energy”, etc.). Then the authors write that the subject matter of Informatics is information, the ways of its presenting, transmitting and processing and a computer is a universal automatic device for work with information. And then they go on: computer organization, internal representation, logic items, algorithms and basic programming, hard software and software solutions as an all-powerful part. The topic “Information” is isolated and not connected with the other topics, what destroys wholeness. And numerous software solutions make from the subject of Informatics something huge and fuzzy.

Exclusion of the notion “information” is that it is as a key notion in understanding the subject because the information is some sense that appears as a result of getting information. Before becoming information something was so called “given”. In this case the definition of Informatics as an event of reality can be the following: “Informatics is a field of work connected with development of processing means of data using a computer”.

Let’s give a practical argument to prove this definition. If we imagine everything that has been done in Informatics since its origin (the time when the first computer was created), this everything is somehow connected with processing, preserving and transmitting of information. If we value works by famous specialists

(we exclude mathematical theory of information and cybernetics as they are separate parts of science and practice), we won't find notion variety of information but we'll find the results of problems of data processing. More complete explanation of understanding the subject and the logics of the course of Informatics is given in [2]. Computer (including computer networks), programming and algorithms are enlarge structural elements of the subject. Synthesis of these three parts lets build up means of data processing. In fact if variety in notions is "removed", these structural elements are just what school textbook on Informatics are devoted to.

References

1. Abdeev R.F. *Filosofiya informatsionnoy tsivilizatsii* [The philosophy of informational civilization]. Moscow: Vldos, 1994.
2. Okulov S.M. *Sistemno-deyatel'nostnyy analiz predmeta informatiki* [The analysis of the subject of Informatics]. Kirov, 2013.
3. *Filosofskiy entsiklopedicheskiy slovar* [Philosophical encyclopedia]. Moscow, 1989.

Список литературы

1. Абдеев Р. Ф. Философия информационной цивилизации. М.: Владос, 1994.
2. Окулов С. М. Системно-деятельностный анализ предмета информатики. Киров, 2013.
3. Философский энциклопедический словарь. М., 1989.

DATA ABOUT THE AUTHOR

Okulov Stanislav Mikhaylovich, Doctor of Pedagogy, professor

Vyatka State University of Humanities

23, Krasnoarmeyskaya Str., Kirov, Kirov region, 610002, Russia

e-mail: okulov@vshu.kirov.ru

ДАННЫЕ ОБ АВТОРЕ

Окулов Станислав Михайлович, профессор кафедры прикладной математики и информатики Вятского государственного гуманитарного университета, доктор педагогических наук

Вятского государственного гуманитарного университета

ул. Красноармейская д. 23, г. Киров, Кировская область, 610002, Россия

e-mail: okulov@vshu.kirov.ru