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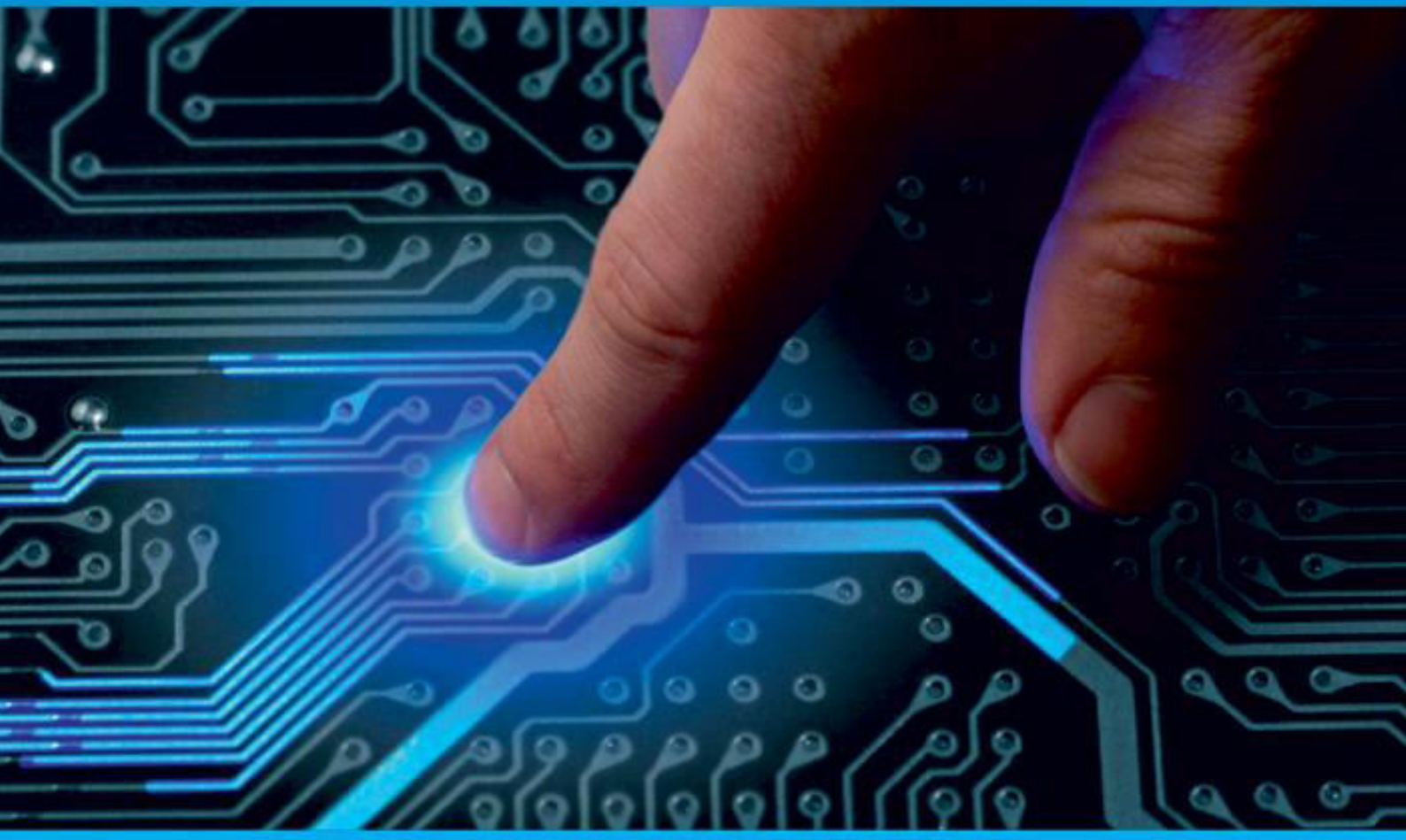

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New Ways to in Teaching Informatics and Information Technologies

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ABSTRACT: This article provides ideas on the consistency, place and importance of teaching computer science and information technology in the higher education system.

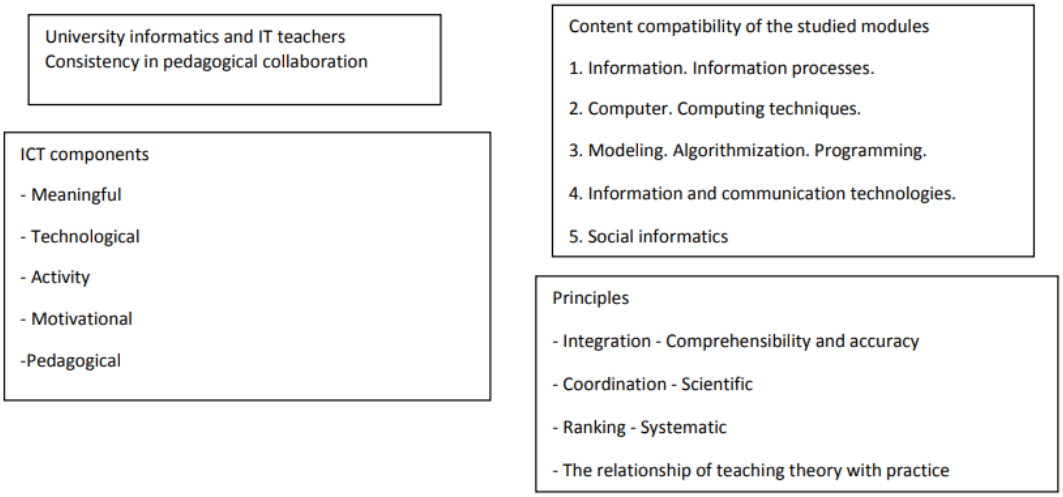
KEYWORDS: ICT components, horizontal level, vertical level, technological and didactic.

I. INTRODUCTION

Consistency in the teaching of computer science and information technology can be considered at two levels: "horizontal" - in the context of a single educational institution (consistency between components of the general system of educational process) and "vertical" - in the context of different educational institutions (secondary and higher education). The internal position of the learner for the effective implementation of consistency in the teaching of computer science and information technology (hereinafter - IT), his willingness to strengthen and improve the knowledge acquired at an earlier stage, as well as external influences (society, educational needs of the population, economy, culture, etc.).

An important aspect in the study of the problem of consistency in the higher education system is to identify the links between the stages. Understanding the systemic nature of the process of training a specialist who can confidently use computer technology, information and communication technologies in their professional activities creates a real basis for ensuring consistency in the education system. The unity and continuity of the consistent formation of specific skills and abilities is determined by the curricula at all stages of training. Curricula in computer science are interconnected within the field of education, they reveal the goals, values, organizational forms, methods and tools of teaching computer science, Analysis of curricula in terms of information support features shows that the content of the training course is aimed at the formation of both educational skills and special skills in the information society provides the necessary information base.

The sequence of pedagogical cooperation of teachers of informatics and information technologies in higher education institutions can be seen in Table 1.



The sequence of pedagogical cooperation of teachers of higher education informatics and information technology in the table above depends on the content relevance of the studied modules, ICT components and principles. The semantic-logical compatibility of the studied directions in teaching computer science and IT requires the formation of a high level of information and communication literacy in accordance with the logic of teaching. At each stage of teaching, the

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student and the student acquire additional knowledge masters, expands practical skills and abilities, they gradually form a solid system of knowledge, form a person's worldview, develop thinking, increase the level of information and communication literacy.

On the basis of a systematic approach, we determine the content of invariant course curricula and distinguish five main areas of study, which form the basis of the disciplines "Computer Science" and "Information Technology" in schools and universities:

1. Information. Information processes.
2. Computer. Computing techniques.
3. Modeling. Algorithmizing. Programming.
4. Information and communication technologies.
5. Social informatics.

The study of the invariant part of the curriculum should be organized "in a spiral" in the process of teaching computer science in secondary school. First - to get acquainted with the concepts of all the studied content networks, and then, at the next level of training, - to study the issues of those modules, but now in terms of quality on a new basis, deeper, by adding some new concepts relevant to this network. Depending on the number of study hours allocated for computer science, such "packages" can be two or three, and in higher education institutions a new "package" goes with in-depth and specialized study of modules.

In conclusion, it provides consistency of the course of computer science and information technology in the higher education system, in the field of computer science acquired at school regulates knowledge and deepens it in higher education, taking into account the future profession, develops the necessary skills and competencies to work with information and communication technologies, expands their practical application in the study of other disciplines.

The meeting of the World Economic Forum in 2019 emphasized the changes in modern life and education in the era of the fourth industrial revolution (Industry 4.0). Manifestations of these changes was divided into physical, digital and biological by Klaus Schwab.

In particular, he includes to the physical innovations:

a) unmanned vehicles, which are controlled by user distantly or by software (based on machine learning methods);
b) 3D-printing, which provides the ability to materialize models created in computer-aided design systems;
c) advanced robotics, which is based on machine vision technologies, machine learning methods and other artificial intelligence technologies.

Klaus Schwab considers that such a representative of the digital block as the Internet of Things is “one of the main bridges between physical and digital reality” [15]. To build this bridge, workers of the near future must have the following leading skills: solving complex problems (projected demand – 36%), communication skills (19%), information processing skills (18%), system skills (17%), etc. Among other digital technologies in Industry 4.0, Schwab includes new computing technologies (mobile, cloud, and quantum computing), as well as blockchain and other distributed technologies. Among the technologies that change human existence, he identifies neurotechnology, augmented and virtual reality technology as the leading

The development, implementation and effective use of Industry 4.0 technologies requires advanced key competences in mathematics, science, technology and engineering, and digital competence. This requires the transformation of education as a component of social transformation: from a society of steel and oil (III and IV technological stage) to the information society with computers, telecommunications and nanotechnology (V and VI technological stage). The main characteristic this society is a high level of information technology, developed infrastructures that provide the production of information resources and access to them, the processes of accelerated automation and robotisation of all branches of production and management, radical changes in socio-professional structures, resulting in the expansion of information activities.

The Recommendations of the 2016 Parliamentary Hearings on “Information and Communication Technologies Reforms and the Development of the Ukraine Information Space” [4] state that ICTs are becoming one of the most important factors of stimulating economic growth at the present stage of the global community’s transition to the information society. It is also stated that ICT help to bridge the “digital divide”. Regarding education and formation of ICT skills in the information society, it is recommended, in particular, to introduce compulsory study of programming principles in secondary schools within the subject “Informatics” and the subject “Programming” in senior classes of schools that specialise in physics and mathematics, information and communication technologies

Among the especially relevant scientific, technical and socio-economic problems Myroslav I. Zhaldak refers to “problems of informatisation – the creation of a system of effective provision of timely, reliable and comprehensive information and data of all socially significant human activities, conditions for operational, thorough and comprehensive analysis of researched processes and phenomena, forecasting their development, predicting the consequences of decisions made.

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Their solution is inseparable from the solution of the problems of informatisation of the education system, which on the one hand reflects the achieved level of scientific, technical and socio-economic development of society and depends on it, and, on the other hand, significantly determines it"

The implementation of this Concept envisages radical changes in the field of education. Modern students need an interesting school filled with research and experiments using modern technologies. The use of digital technologies in school should be cross-platform in nature, i.e., to be used not only in Informatics lessons in a separate computer science class, as usual, but when teaching other subjects, when students interact with each other, with teachers, and with real experts, when students research and learn individually

According to the Concept of development of digital economy and society of Ukraine for 2018-2020 [6] the main directions of digitalisation of education are:

– development and implementation of innovative computer, multimedia and computer-oriented learning tools and equipment for creating a digital learning environment (multimedia classes, research STEM-centers, laboratories, inclusive classes, blended learning classes);

– development of distance education using cognitive and multimedia technologies.

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