

Social Aspects of Information System and Computer Technology Professionals' Practice-oriented Training

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Abstract: *The article describes the social and pedagogical aspects of training a computer specialist in the modern information space. The features of the virtual environment of activity are considered, attention is paid to the social directions of professional training of a computer specialist, in particular, ethical responsibility. Attention is focused on the nature and types of social consequences and spiritual and cultural changes generated by the informatization of society, determined by the social conditions in which the informatization process takes place, and the problem itself is due to the relationship between the man, computer, and society. The advantages and risks of training professionals in the given specialty are indicated and the main possible approaches are substantiated. It is shown that with the emergence of a new type of information life, which is considered as a general humanitarian philosophical problem, it is necessary to humanize professional education. The problems of the theoretical analysis and determination of the ontological status of virtual reality, the phenomenon of human computer dependence are described. It is indicated that a special responsibility lies with computer specialists, whose professional training should include not only the assimilation of educational material to ensure successful professional activity in the future, but it must take into account the social needs of society.*

Keywords: *computer science professional, social pre-conditions, professional training*

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1. Introduction

In the problems of social aspects of the informatization of society, there are at least three important areas: technical (technological), which determines the stratification of society on the basis of digital literacy and the availability of information and communication technologies (ICT); psychological, which is partly related to the previous aspect but it is not always characterized by positive effects on mental (often somatic) human health; educational, which combines the two previous ones.

The study of the role of the social aspects of information systems and computer technologies in the training of information technology (IT) specialists is relevant. Computing has caused a permanent revolution – everything that happens in this area leads to changes in human history, as wrote Ziaziun (2009).

The social context determines the features of thinking and perception of the world around us. Today, modern youth tend to develop clip, fragmentary thinking. The contradiction between the cognitive styles of students and the style of presenting information in a textbook or by teachers is becoming apparent. The figurative-emotional, clip style of thinking of young people, which is formed and maintained through constant communication with the media, runs counter to the predominantly verbal, declarative style of presentation of educational information. Therefore, with the emergence of a new type of information life, which is now regarded as a general humanitarian philosophical problem, it is necessary to humanize professional education, thus improving the possibilities of socialization of future IT specialists.

The development of market relations initiated the emergence of non-state educational institutions, primarily where the training of specialists is insufficiently provided by public educational institutions. The newly established educational institutions successfully interact with the social partners, and this provides solutions to employment problems of graduates, ensuring quality control of their training, forecasting the needs of specialists in certain professions, improving the content of professional programs in accordance with modern production.

2. Literature review

With the development of modern IT, a new concept has emerged – “virtual reality”, which means that a person can see, hear, experience with a personal computer and a global computer network. Developers of anthropocentric systems also focus on the analysis of human sensorimotor skills in a wide range of human activities. Increasing the availability and quality of educational information has given rise to a phenomenon in education called “three-subject didactics” (Lapinskyi, et al., 2010; Spivakovsky & Petukhova, 2011).

At the same time, in the information society the human dependence on computer technology is growing, so in the formation of the content of professional training of future IT professionals, in addition to the didactic component, it is significantly increasing the role of socio-philosophical, humanistic content, moral responsibility and worldviews. It is possible due to the use of an integrative approach that combines learning and education, the purposeful and controlled formation of personality.

The development of IT has a significant impact on all areas of science and human activity in society. For an education impact it is true even at the paradigmatic level IT has been studied by many scholars and in publications (Lapinskyi et al., 2010; Hurzhii et al., 2015). The main ideas are reflected and summarized in Figure 1.

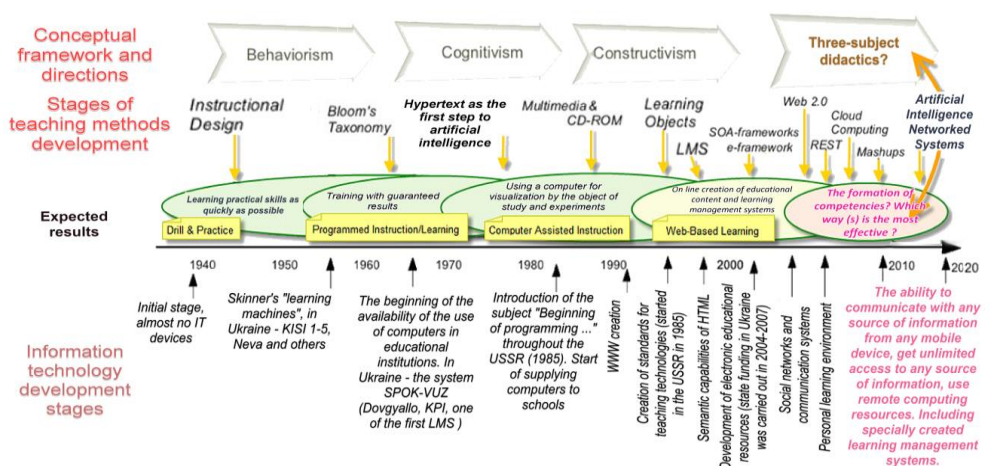


Fig. 1. Relationship between paradigmatic attitudes of the educational process and the level of formation of ICT components of society.

Source: Honcharenko & Kushnir (2008); Hurzhii et al., 2015)

It is due to the intellectualization of software, the approximation of algorithms of interaction between the subjects of learning and software to the subject-subject interaction. There is a problem of changing the emphasis in the management of learning with the use of Electronic Educational Resources (EER), which accumulates more and more knowledge and experience of teachers who create it. EER performs part of the subject-subject interaction; human-computer pseudo-dialogue approaches the real dialogue between the subject and the teacher (its model, reproducible EER, created by the authors of the didactic content and management system of the educational process).

In making judgments about the subjectivity level of the above-mentioned factual dialogue, it must now be borne in mind that modern computer systems even at the level of an office computer (not to mention gaming systems that could compete with missile defence systems in most countries), even connected to network databases, may withstand the Turing test better (longer in time, which has long been determined not by the reaction of the computer, and man) than a system with a person on the “opposite” side.

3. Design and research methods

These empirical research methods have been used:

- analysis of normative documents and documentation of educational institutions (Honcharenko & Kushnir, 2008);
- analysis of the results of social sciences (Hurzhii et al., 2015) statistics on employment of graduates, in particular of educational institutions in the IT field (Korchevskyi, 2014), (Mykytenko & Lapinskyi, 2020).
- questionnaires, surveys, and interviews, the recipients of which were the subjects of the educational process (Honcharenko & Kushnir, 2008; Mykytenko & Lapinskyi, 2020; Korchevskyi, 2017).

The aims of the exploration and the implementation of its results were as follows:

1) analysis of socially conditioned requirements to the content of training and formation of competencies (professional and key) as a result of the educational process of IT specialists;

2) formation of the content of education as integrated (search for the maximum possible number of interdisciplinary connections and the formation of the educational process on their basis);

3) determining the "entry level" of the training of subjects and adjusting the educational process according to its results;

4) determining the results of the educational process, taking into account not only the knowledge component, but also the long-term learning outcomes, in specifying the success of the alumnus in society.

Position 4 was key in the next strategic planning of the educational process, in particular the formation of content, forms and methods of teaching (position 2).

The specificity of the research problem did not always allow the use of traditional forms of organization of pedagogical research – comparative pedagogical experiment, the analysis of the sections of levels of education standardized at the level of educational qualifications (EQF). The existence of a wide network of educational institutions in the system, for which it was necessary to form strategies for the formation of content, forms, and tools of learning adapted to regional specifics was also an important factor in finding generalized approaches to local learning requirements and designing the educational process. The basic part of the results should be independent of the localization of the IT education of the institution (Korchevskyi, 2014).

4. Research results – statistical data and their interpretation

Training of any modern specialist for a dynamic society, whose future will be based not so much on material and labour resources as on knowledge and social experience of their use, should take into account and be organized, according to the authors of the study, with the awareness of the future role in society of professional training recipients.

For ICT professionals, this should be not only a personal complex “ability to learn throughout life”, the formation of which is now required for a specialist in any specialty. ICT professionals must also develop the ability

to spread their attitude to IT among the people around them, ongoing “activities aimed at removing the barrier to IT availability”. From a psychological point of view, this means not only the formation of professional knowledge and the ability to supplement it (lifelong learning), but also a certain level of tolerance for people who do not have sufficient IT competence, focusing on helping to disseminate relevant knowledge in society (Korchevskiy, 2014).

The future IT professionals in Ukraine, educational process content and results are defined by the EQF, and the procedure for verifying the compliance of the personal knowledge model with the pedagogical knowledge model of a particular industry is created and applied at the level of the educational institution. In other countries, the regulatory framework and legal factors are somewhat different, but everywhere the main indicator of the effectiveness of the educational process should be to enable the subject to become successful in society (Korchevskiy, 2014).

The above requirements for the results of professional training of specialists in computer graphics and design, allowed the use of approaches to determine the effectiveness of training, based on determining the level of readiness of the subject to perform a certain professional activity, their competence as a specialist.

Socio-pedagogical aspects of training a computer specialist to work in the modern information space were taken into account both in the planning of the educational process (added new forms of activity, including group-training projects) and in special planning of business practice.

The content of training included elements (educational tasks and special disciplines), the content of which is the basis for the formation of a specialist who meets the social needs of society. Necessary textbooks and toolkits have been created (Computer Academy “STEP”, 2020).

It is taken into account that with the emergence of a new type of information life, which today is considered a general humanitarian and philosophical problem, it is necessary to strengthen the humanization of vocational education (Hurzhii & Lapinskyi, 2015, Lapinskyi et al., 2010). Features of the virtual environment are considered, attention is focused on social features of the professional training of the computer specialist, in

particular - ethical responsibility. The problems of theoretical analysis and determination of the ontological status of virtual reality, the phenomenon of human dependence on the computer are substantiated. Based on the obtained results, appropriate training programs have been created, which are adjusted annually (Korchevskiy, 2017).

Operational assessment of the results of the educational process was based on the results of the educational process, which gave an additional opportunity to adapt the forms, methods and tools of teaching, in a broad sense – pedagogical actions (Ziaziun, 2009), to the end of student learning (Korchevskiy, 2017).

The above approach to assessing the effectiveness of learning and management of the learning process is not new, but its application, further justified by the use of the apparatus of criteria presented in the works of Korchevskiy (2014), Mikitenko & Lapinskyi (2020), provided an opportunity to assess learning outcomes and effectively manage it. Additionally, the motivational component of the educational activities of students of several specialties was analyzed by questionnaires (Fig. 2).

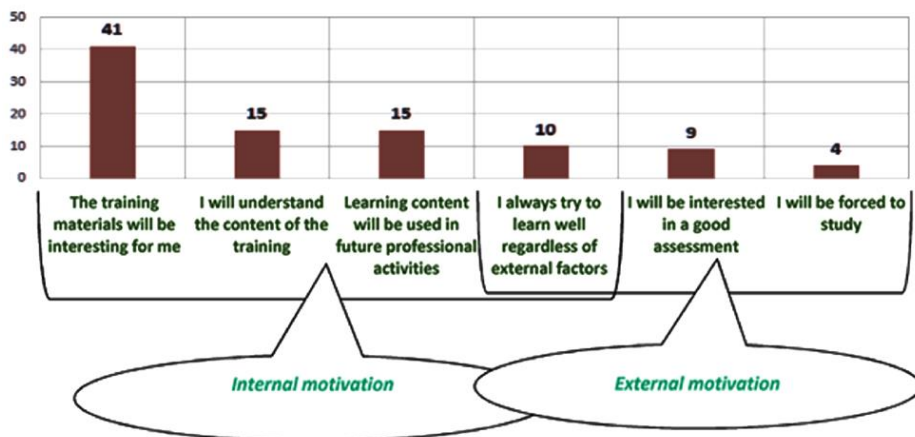


Fig. 2. Analysis of motivational components of students' learning activities

Source: the materials by Korchevskiy (2017) and Mikitenko & Lapinskyi (2020)

To obtain the data presented in Fig. 2, students (second year, the sample of respondents - 48 people) were offered a questionnaire with the following possible answers (choice - one of many, anonymous).

1. The study material will be interesting for me.
2. I will be able to understand the study material.
3. Training material will be needed for future professional activities.
4. I always try to learn regardless of external factors.
5. I will be interested in a good grade.
6. I will be forced to study.

There is no doubt that modern students will choose the first three answers. Not surprisingly, many of them chose the last two. This clearly indicates the existence of a reserve for improving the educational process.

Table 1. Distinctive features of the effectiveness of vocational training, sources and criteria for data collection methods; **Source:** Authors own contribution

	Criteria for distinguishing a trait	Levels of manifestation of the sign	Data sources	Method of obtaining data	Methods of processing and analysis
Integral	Successful professional activity of a university graduate (work or study in the specialty)	High Sufficient Medium Primary	Monitoring of the graduate's activity after graduation, graduate	Collection of objective data (place of work, study), questionnaires	Analysis of data obtained over several years
	Self-assessment of the possibility of successful activities in the workplace		Student	Questionnaire survey	Histogram analysis, comparison
	General assessment for production practice		Documents	Document analysis	Graphical and statistical analysis
Local	The rate of how soon a trainee gets to work	Quickly With a slight delay Slowly Undefined	Internship supervisor	Internship supervisor's and tutor's observations, document analysis	Statistical analysis
	The level of independence in the	High Sufficient Medium	Internship supervisor's documents	Document analysis	Comparison, statistical analysis

	workplace	Primary			
	Quality of filling in the reporting documentation by a trainee	High Sufficient Medium Primary	Trainee`s documentation. Documentation of the educational institution	Analysis of the trainee`s and tutor`s documentation by an internship supervisor	Statistical analysis

A very important stage in the training of ICT specialists of any level is their internship. It should take place under conditions close to the future workplace. Of course, it is the best when it takes place in the team in which the graduate will work. However, this is not always possible, so for the internship, jobs were chosen with conditions as close as possible to the place of future employment.

Standardization of the apparatus of criteria for assigning the value of the level of manifestation of the trait in the process of control measures in accordance with the criteria defined in the specialty EQF does not require additional justification of the data collection process at these stages of training.

Among the signs of the quality of education in the educational institution at the stage of their internship, the criteria of which and data sources are given in table 1, two features are used, the values of which are determined using standardized methods and criteria. These are the general assessment of production practice, which is determined in accordance with the criteria defined in the specialty EQF, and the quality of filling in the student reporting documentation.

The use of these features helps to avoid gross errors and provides, in our opinion, the overall validation of data sets.

We considered internship as the first step (the first stage), at which the results of the educational process are actually revealed. Therefore, the evaluation results of its course and outcomes are given as "Part 1" of the study findings presentation, in contrast to the division into stages used in the previous study (Korchevskyi, 2017).

It was assumed that a significant increase in the educational process effectiveness achieved due to the above-described improvements is expected to affect the quality of graduates` work, their adaptation in society, in

particular, their socialization in both professional and general civil aspects. Therefore, the name "Part 2" in the presentation of research results corresponds to the data obtained after a graduate has worked in the workplace for at least a year (Fig. 3).

The criteria and methods of obtaining data are similar to those used in Part 1, but for obvious reasons, the methods for determining the levels of academic progress have been removed.

A relatively small group (67 people) of graduates was studied.

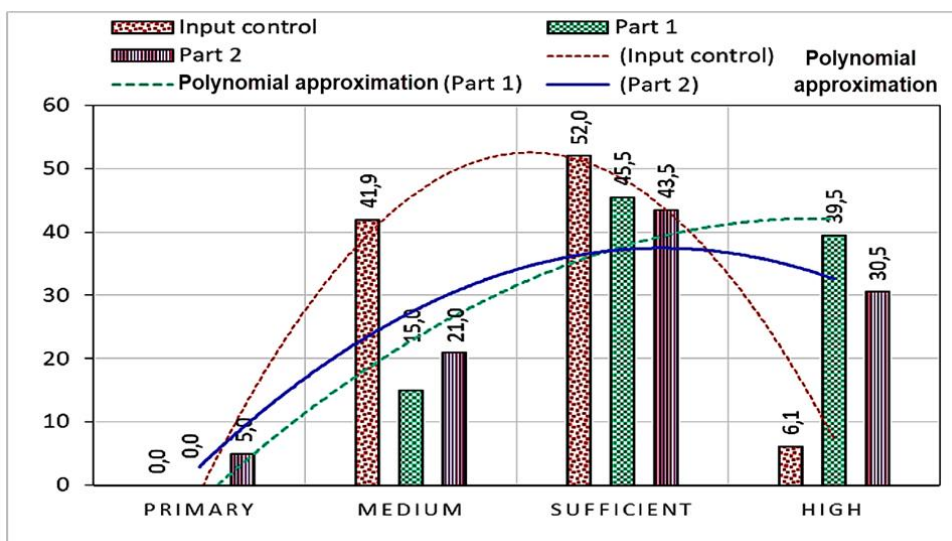


Fig. 3. Comparison of the evaluation results of the preparation levels of IT specialists for the internship (Input control), after the internship (Part 1) and after a year of work (Part 2). Vertical axis – the relative frequency of the obtained values of estimates, percentage

Source: Authors own contribution

As you can see in Figure 3, for Part 2 data, there is a very small but such that cannot be neglected share of values of the primary level - 5%. In our opinion, this may indicate both the low self-esteem of recent graduates who have to join the team of experienced professionals and the lack of preparation for the tasks they have to perform as a part of real job duties. It is also necessary to take into account differences of assessment and difficulties that may arise in the evaluation process (it is sometimes ill mannered to even ask the head of a particular company about an employee's

suitability for the position, especially about the tasks they perform, because these tasks are usually a commercial secret).

In general, comparing the trend lines for Part 1 and Part 2, we can conclude that there is a high correlation between them (the calculated value according to Pearson is 0.97), i.e. the best students are almost always better workers and adapt faster in the teams of colleagues. Despite the apparent obviousness, these findings are very important because it is the result of scientifically substantiated development and implementation of a system of pedagogical influences and the rational organization of the educational process.

5. Conclusions

The socio-pedagogical aspects of training a computer specialist for the modern information society can be successfully implemented by fulfilling the pedagogical conditions for the formation of professional knowledge. They may be as follows:

- planning of the educational process and its content based on the integration of academic disciplines, which will further provide the opportunity to participate in interdisciplinary projects;

- the use of competency-based learning tasks where students should apply knowledge and skills from different disciplines. It will form a basis for their active interaction with the environment in the future;

- introduction of a system of training exercises contributing to the formation of the anticipatory basis of the student's activity in the internship and future professional activity;

- incorporation into teaching forms and methods of activities that require explicit or indirect interpersonal interaction, namely – pair and group (team) types of training activities, group projects, especially interdisciplinary ones;

- early planning of internship – a student decides on its training place 6 months ahead, which allows choosing training content in line with their specific activities in the internship process.

It is important that the problem of interaction between the educational institution and the assumed Customer has not been solved. For the public

utility of educational institutions' activity, it is necessary to distinguish between the Customer of educational services (as their direct recipient) and society as the final consumer of the product. A solution to this problem will determine the success of the educational institution itself.

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