Management System of Information Technology Studies for the Students of Professional Development Courses

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ABSTRACT

The relevance of the present research is explained by the need in such a management system of information technology studies for the students of professional development courses that will allow the teachers to boost the process of students' developing necessary skills and make it in a way that is found comfortable for the latter and takes into consideration their individual characteristics. The research aims at determining peculiarities of management systems of information technology studies for the students of professional development courses, the leading method of the research being the learner centered approach that focuses on the ways of teacher-student cooperation in the learning process. The research encompasses the key components of the information technology studies management as in the case of the *Tochka Dostupa* system (Transl.: Access point) which now sees the implementation of an information system "AIS Nalog-3" (Transl.: Information system Tax-3). The use of the said components of the *Tochka Dostupa* system helps to form students' professional skills necessary for fulfilment of various professional tasks. The materials can be used not only in the management of information technology studies for the students of professional development courses but also for the university and vocational courses students.

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1. INTRODUCTION

In recent years, the real economy sector witnesses a new social trend. The employees are required to attend professional development courses not in accordance with some pre-arranged plan, prescribing to enhance one's qualification, say, once in 3-5 years, but following actual changes in a certain professional field, these including information technologies and means of production. This new tendency needs a profound sociological research. A few decades ago, there was a demand for specialists with one fundamental university degree (Yalalov, 2015). Nowadays one's competitiveness is determined by the number of their fields of expertise – The fact that is true for both recent graduates and practicing sociologists. We shall agree with Nigmatullina (2014) that there is an ever-increasing "demand for highly qualified

specialists ready to develop and acquire new knowledge during their whole life." The need to intensify and broaden professional studies urges to review the structure and contents of professional development courses which should now include various types of group and individual activities, distant and in-class methods of learning.

It is the time when information technologies assume a very special role by ensuring the fulfilment of various tasks of educational process. Information technologies ensure and enhance professional communication. Acquisition of this IT knowledge increases a specialist's competitiveness and their status in professional society, as per the research made by Bystritskaya and Panova (2015). This knowledge allows the specialists to broaden the range of both professional and personal interests (Panova, 2015),

boost information exchange in large social groups (Kalimullin and Schaydullina, 2015), encourage self-fulfillment and self-identification of the students (Bystritskaya and Burhanova, 2015). That is to say that nowadays IT studies have become a socially important issue.

Analysis of scientific researches of the recent years shows that the topic of the management of information technology studies for the students of professional development courses has been scarcely touched upon by the scientists, including creation of such management systems based upon student-teacher cooperation.

2. METHODOLOGICAL FRAMEWORK

2.1. Glossary

The *Tochka Dostupa* system is the main management system of information technology studies on the basis of teacher-student cooperation subdivided into on-line and off-line methods.

The *Tochka Dostupa* system comprises the following components: Motivational, content-related (informational), technical, communicative, reflexive-evaluative.

The motivation block aims to define and establish purposes of education, meet students' need in acquiring new competences including IT, increasing the achievement motivation with the help of educational cooperation roadmaps and facilitating professional communication among the IT specialists.

The informational component function is to transmit information from the teacher to the course participant and to receive the feedback. The component includes structured theoretical and practical materials based upon a new conceptual block which enables the students to single out relevant information, relate it to the already existing knowledge and apply it properly.

The technical component due to its diversity is constituted by a variety of information portals that form an education cooperation roadmap. Ways of presenting educational material are as follows: A lection, an interactive lesson with lecture component, video materials, electronic books, labs and practical classes, trainings, etc.

The communicative component is the basis for the students' communication as well as the student-teacher cooperation. The educational roadmaps encompass on-line and off-line communication in comfortable conditions (tempo, rhythm, etc.) and make it possible to involve various specialists (e.g. employer's representatives, like the Federal Tax Service employees) in the learning process management.

The reflexive-evaluative component fulfills the functions of evaluation and control. The control block contains tests, interim and end of term assessment including an integrative estimation of academic and practical training of professional development course students, peer and self-assessment on the basis of objective and subjective criteria.

All of the aforementioned components are designed not only to form professional competence but also to arouse positive emotions caused by overcoming the difficulties of IT learning. Being the basis of the system, the personality and activity approach enables the teacher to manage the process with the help of education cooperation roadmaps.

Education cooperation roadmap is an individual-centered course and student activity management system formed and put into practice under the teacher´s control in the process of education cooperation aiming to identify needs and problems faced while mastering the information technologies and to establish the most effective methods of professional competence formation.

2.2. Literature Review

The standards of national qualification structure should be a result of cooperation between potential employers, students and teachers that are part of the university education system or additional qualification courses. And this, according to Kallimullin and Shaidullina (2015), will allow to get over current "discrepancy between the employment market and education." Only creation of an education road map implemented under control of professional teachers can ensure such cooperation between parties. The thing is now this kind of cooperation system has not been finished in either its three-party option or even the binary one which presupposes student-teacher cooperation.

Lectures and seminars are basic components of university education and additional qualification courses. Lecture as one of educational activities is still understood as a teacher's monologue, the fact that makes it rather conservative and ineffective. Introduction of innovational technologies, meaning a web-lecture, slide-lecture or interactive lecture instead of a traditional one, facilitates organization of an effective web communication and implementation of innovational education methods (Gaynutdinov, 2014). However, despite all the novelty, the lecture remains an ordinary education activity, so that it does not provoke anxiety and, quite the opposite, makes the classes psychologically comfortable for students.

The IT learning problems specified by the authors normally occur in the classroom, during live communication, while, as proved by practical experience and numerous research papers, distant communication during, before and after the courses allows a more effective management of the learning process.

The analysis of various learning tasks fulfilled by the students of professional development courses (Pechnikova and Zhilina, 2013) showed the following results: Despite the fact that certain materials for self-directed learning were sent to all tax institutions, only one third of the employees have studied them. Our research also revealed that the majority of the students experienced difficulties with understanding of the explanations and recommendations presented in AIS Nalog-3 video materials. One third of the canvassed students pointed out the need in additional explanations from the teacher including interpretation of new terms and their role in the new information system.

According to our research, the learning of the new information system terminology and concepts proved to be the most complicated

and least interesting aspect for the students (Bystritskaya and Panova, 2015).

Communication between the students is possible not only during their classes but also in the Internet chat-rooms and on forums, while distant teacher-student interaction can be realized on webinars (on-line), using e-mail and forums (off-line) (Nazarenko, 2013). We assume that communicative aspect plays a critical role in the learning process while the wide range of options of communication with the teacher and fellow students allows the students to choose the most suitable one for themselves.

The students' interest in more active and interactive methods of learning can be increased with the help of group learning approaches where the students have an opportunity to assess and correct each other and are put into competitive conditions. So that, this research proves the point of cooperative learning approach in the structure of additional professional training (Khairova, 2014).

2.3. Problems
We can single out the following social and management aspects of the studied problem:
1. Managing the process of acquiring professional competence necessary to navigate the society information space and to work successfully when mastering conceptual and terminological system, this being the basis of IT studies, become a stumbling stone.
2. Finding efficient ways of managing employers, teachers and students' cooperation not only to carry out professional activity but also to cope with certain personal and professional tasks that boost students' social and professional development.
3. Establishing communication and cooperation, in the framework of ever-developing information technologies, among the members of the professional society and other people involved in the field who differ in:
   • Level of IT operation skills;
   • Individual and age peculiarities;
   • Professional experience and status;
   • Professional and non-professional fields of interests;
   • Motives for information technologies study.

Thus, the problem singled out in the present research is the necessity to establish an education teacher-student cooperation system that will make it possible to apply individual-centered management to the professional development training process, to allow the students to acquire necessary professional competence.

Therefore, the purpose of the present research is to work out a management system of information technology studies for the students of professional development courses on the basis of educational cooperation approach for the students' professional development and competence enhancement.

3. RESULTS

3.1. Research Aimed at Determining the Components of the IT Studies Management System
The *Tochka Dostupa* system has been designed for this purpose. In the framework of the system's test period, we questioned

the students from different regions, attending professional development courses of the Privolzhsky Institute of Professional Development of Federal Tax Service of Russia. The participants of the monitoring were asked to explain their position on the matter of IT studies and also give their opinion upon the methods of learning process management. All in all 49 students took part in the research. Methods of the research included questioning (questionnaires and interviews), observation (participant and non-participant) and analysis of the respondents' work. The monitoring results were processed using mathematical processing method.

Our research also revealed that the majority of students experienced difficulties with understanding of explanations and recommendations presented in AIS Nalog-3 video materials. One third of the questioned students pointed out the need in additional explanations from the teacher including interpretation of unknown terms and their role in the new information system.

Almost half of the respondents have difficulties understanding information from the new terminological and conceptual systems. More than half of the students claim that they first need the teacher's explanation to be able to start working with information systems and organize this work properly. Probably, we can improve the said situation by establishing an effective cooperation between the students and the teachers.

Only the tenth part of the students choose distant on-the-job learning as the most effective and preferable option. At the same time, the respondents are interested in interactive methods of learning, e.g. mind maps helping to visually organize the information. Mind map has the same principle as education road map. Working with mind map is ensured by the methods of didactic modelling that enable the students to systematize new knowledge and find the connection between this and the knowledge acquired more early. The students actively participate in panel discussions and round tables.

Students' interest in interactive methods of cooperative learning is a positive trend in the professional courses development.

The conclusions made on the basis of the monitoring are as follows:
• The strongest motivational factor proved to be live student-teacher interaction in a classroom or on-line in either actual or virtual presence of fellow students and potential employers;
• Learning new concepts and terminology is most effectively fulfilled with the help of interactive methods of individual learning accompanied by teacher's supervision;
• The specialists' professional self-confidence and comfort in the face of innovations are best achieved with group learning approach which includes vast use of visualization and modelling of profession-related situations;
• Students' learning efficiency self-assessment in many ways depends on teacher-student interaction;
• Interactive methods of learning are preferable as they initiate students' self-directed learning by working out their individual education road map which includes an area of their current development and allows modelling an area of their development in the near future.

All opinions were taken into consideration during the review of the components of the *Tochka Dostupa* system, designed for training of specialists that use IT as instruments in their work.

3.2. Educational Potential of the Management System of IT Studies for the Purpose of Professional Competence Formation

According to the research, all the *Tochka Dostupa* components can fulfill different functions depending on the purpose of the use of the system. The actualization of the knowledge base is an essential part of the system for the students who have an opportunity to interact with the teacher by means of in-class or on-line learning. The multi-optional character of the *Tochka Dostupa* system enables the students to use various components on-line or off-line ensuring access to necessary information, thus they can study the material whenever they want.

Table 1 shows cross-cultural and professional competence of the students of professional development courses aimed by the *Tochka Dostupa* system implementation.

Diverse educational material of the informational block, variety of technology components aim to overcome principal barriers emerging while studying information technologies as well as mastering the basic conceptual and terminological block by means of following an individual education roadmap which reflects peculiarities of a certain student's cognitive activity.

4. DISCUSSIONS

4.1. Pedagogical Factors of the *Tochka Dostupa* System Implementation

Our research revealed that the most challenging aspect of IT learning for the students of professional development courses is acquisition of a new conceptual structure. The easiest to digest is practical material, describing the methods of work in the new automatic information system. However, in case of a systemic training with possibility of on-the-job retraining, the conceptual basis is acquired prior to some practical skills, as the *Tochka Dostupa* cooperative system participants are highly motivated for self-directed learning and communication within their professional society which seems impossible without a profound conceptual and terminological basis.

Unfavorable factors that lower the system's effectiveness are as follows:
- In the majority of cases learning of IT constitutes a problem for those who use IT only as an auxiliary tool to their main work, its content and purpose not directly connected to IT. That's exactly the type of problem the employees of Tax Service have come across;
- One of the major difficulties lies in the introduction of new terminology to every-day professional communication;
- According to our research, there is a direct relation between the successfulness of new terminology acquisition and the means of learning it. This influences the solution of the sociological issue i.e., learning of IT, especially its concepts and terminology.

Table 1: Students' competence aimed by the *Tochka Dostupa* system implementation

Competence	Technology	Planned result
Acquiring information	Interactive lessons with lecture component, video materials, electronic books	Selecting and studying relevant information
Finding, analyzing, defining the purpose and finding the ways of its achievement	Research methods of education, individual learning roadmaps, problem-based learning (case method, situation modeling), forums for discussion of topical issues, live interaction - on-line (webinars) and in-class	Acquiring an ability to find, analyze, define the purpose, predicting and choosing the ways of its achievement, self-directed study motivation
Understanding the essence and role of information in the development of the contemporary information society, realizing the dangers and threats emerging in the process, complying with the main requirements of information security including official secrets protection	Memory cards to study the conceptual and terminological system, on-line and off-line interaction Problem-based learning, research methods	Forming conceptual and terminological framework. Acquiring knowledge and skills to provide information security
Mastering the basic methods, ways and means of obtaining, storing and processing information, to be able to work with computer, as a means of information management	Active methods of teaching, teacher-student e-mail communication, live interaction (in class and on-line: Webinars, chats), training, labs and practical classes	Acquiring abilities to obtain, store and process the information necessary in practice
Work with information in global computer networks	Labs and practical classes	Acquiring abilities to work with information in global computer networks
Using modern technical means and information technologies to achieve analysis and research objectives	Training, lab and practical classes, case method	Acquiring abilities to use modern technical means and information technologies to achieve certain analysis and research goals
Using modern technical means and information technologies to organize communicative process	Active teaching methods, on-line and off-line interaction	Acquiring abilities to use modern techniques and information technologies to organize communicative process

Favorable conditions are as follows:

- Students are highly motivated to learn IT, this motivation boosted by the employers;
- Students have an opportunity to increase the number of professional skills which allows speeding up promotion and increasing an employee's social status;
- The variety of education approaches allows the establishment of a long-term student-centered cooperation aiming at enhancing students' professional skills and professional self-assessment.

4.2. Areas of Teacher-Student Education Cooperation in the *Tochka Dostupa* System

It is necessary to elaborate upon the educational cooperation roadmaps which enable students to master all the IT components in a convenient infotechnical form. For instance, acquiring conceptual basis can be achieved in one or several ways:

1. By means of practice;
2. By demonstration of visual means;
3. In a form of information array (glossary, vocabulary);
4. In a form of sign system (scheme, algorithm, diagram);
5. In a form of structured information array categorized by types of activities;
6. In a form of abstract understanding of the process etc.

One of the main objectives of the *Tochka Dostupa* system was to incorporate the aforementioned models. Each of them constitutes a basis for separate "bunches" of cooperation roadmaps.

The variety of educational cooperation roadmaps makes it possible to take into account individual characteristics of learning activity, students' abilities, professional and educational needs as well as the tempo and rhythm of learning.

The results of the present research can justify a statement that the *Tochka Dostupa* system provides an efficient way of cooperation between a teacher and students of professional development course which, due to its multi-optional character, eases social, physiological and pedagogical problems while studying the IT.

5. CONCLUSION

Due to the fact that information technologies form an integral part of society, they have become a meaningful phenomenon. To investigate the issue studied in the article we organized a monitoring for the students of the Privolzhsky Institute of Professional Development of Federal Tax Service of Russia. As a part of the study certain educational system components have been established, which enable professional development course students to master information technologies in the most efficient way in spite of the lack of in-class hours.

The research reveals and explains the management system components of mastering IT by the *Tochka Dostupa* professional development course students. The system was tested on the basis of the Federal Tax Service employees mastering the automated information system "AIS Nalog – 3" (Transl.: AIS Tax - 3). Based upon the activity approach the motivation, informational,

technical, reflexive-evolutional components of the system have been established which led to the creation of the "bunch" of educational teacher-student cooperation roadmaps. The directions of study (vectors) of education cooperation have been singled out. The objective of the *Tochka Dostupa* system realization is comprised of professional competence vital in the professional and social activity.

The developed management system of information technology studies for the students of professional development courses aiming at forming professional skills solves a number of social, professional and psychological issues typical of the additional education process. The established multidirectional teacher-student cooperation enables the teachers to pin the problems of specialists' professional training in the field of information technologies, and the students to acquire the necessary knowledge in a more comfortable and efficient way thanks to the multi-optional character of educational roadmaps.

6. RECOMMENDATIONS

The research results presented in the article can be used to design educational cooperation roadmaps for the systems of elementary, high-school, higher and vocational education. The *Tochka Dostupa* system can be implemented to organize intramural and extramural university studies as well as independent on-line and off-line work of bachelor and master's degree students.

Certain components of the management system of information technology studies may be introduced to organize independent students' work, become a self-directed study basis to develop professional qualifications, career promotion and to secure social status.

The design of the *Tochka Dostupa* system also plays an important part in establishment of teachers, students and employers' cooperation which is essential in the development of new educational standards and programs of professional and additional education.

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