



Information and Communication Technologies in Education as a Factor of Students Motivation

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ABSTRACT

The increased application of funds and information and communications technologies (ICTs) in vocational education has significantly changed the joint activities and communication between teachers and students. The objective of the article is to reveal the potential of ICTs in education as a means of the students' development. The authors have studied the peculiarities of motivation development by means of modern information technology which contributes to the thorough selection of the teaching forms, methods and techniques. The results of the experiment on students' motivation in the process of achieving legal competence with the help of ICTs are submitted. Through diagnostic tools 300 students were evaluated and the importance of ICT in the formation of university students' motivation to learn was proved. The article is devoted for teachers and researchers engaged in the implementation of co-temporary teaching methods in the educational process of the university.

Keywords: Higher Education, Learning Motivation, Information and Communication Technology, Development

JEL Classifications: A23, I23, I26

1. INTRODUCTION

1.1. Background

Nowadays the Russian Society Development, the growing influence of education on people's lives and concurrent education reforming impose new requirements for training a specialist of any specialization (Kruchinin and Kruchinina, 2012; Zakirova and Levina, 2013; Nasibullov et al., 2015). At the moment, there is a considerable gap between the requirements to graduates and the level of their professional competence, increasing public demand for young professionals with the skills and willingness to carry out independently and successfully their professional activities.

The Federal Target Program "The Information Society Development Strategy in the Russian Federation," "The National Doctrine on Education in the Russian Federation 2000-2025"

focus on introducing the electronic educational tools, modern information and communication technologies (ICTs) into the education system that will contribute to the creation of a single information space, improve the quality, availability and competitiveness of domestic education.

1.2. The Status of a Problem

Nowadays we need such methods and learning tools that would facilitate and accelerate the transfer of knowledge to the students, activate the process of knowledge assimilation, teach them the methods of independent work with educational material, increase the efficiency of the learning processes (Dubovitskaya, 2002; Grebenyuk and Grebenyuk, 2000; Komelina et al., 2016). Thus, there we can observe a paradigm shift from traditional teaching to the one that is focused on designing the ways to get new knowledge, i.e., the knowledge that is non-present in the

student's subjective experience, but which is necessary to solve the task, to overcome either tutorial or social challenge. To train the professional and competent specialists able to navigate in the ever-changing flow of information, think creatively and independently it is required to use ICTs in all their manifestations.

Among the most important qualities of a modern man there are: Active intellectual activity, commitment, tolerance, competitiveness, professional competence, the desire and ability to acquire knowledge independently (Ibragimov et al., 2015; Zakirova et al., 2016). At the same time, the role and significance of information as an important factor, determining the development direction of future specialists' training process is increased. Traditional means of transmitting information given way to the computer and interactive learning tools, the use of which in the educational process should provide improving the quality of pre-preparation specialists of the future. Under the ICT training technology the totality of methods and technical means for collecting, organizing, storing, processing, transmission and provision of information, spreading knowledge of the people and developing their capabilities is understood. The urgency of technology use in the educational process is dictated primarily by pedagogical needs to improve the effectiveness of training on the pointed disciplines, to find adequate means to implement the main requirements of the standards of the third generation in combination with students' health-saving.

Within the analysis of the existing studies it can be stated that the effective use of the ICTs in vocational training is a dynamically developing area of research (Kruchinin, 2010). However, despite the considerable number of scientific papers on the issue many theoretical and practical questions are not yet resolved.

1.3. The Research Hypothesis

Modern training and methodological support that ensures high performance of the educational process at the university, must comply with educational standards, maintain computerized teaching methods implemented with the help of modern tools, have the ability to students' self-learning activities, thereby improving the quality of education.

This article deals with the opportunities to encourage students to learn through the ICTs.

2. MATERIALS AND METHODS

2.1. The Objectives of the Research

The authors of the study have set the following objectives: (1) Show the potential use of ICTs in high schools students' professional training on an example of their law training; (2) implement gradation of students' motivation kinds in the study of law disciplines; (3) to conduct an experiment study on the analysis of students' motivation to learning using the ICTs.

2.2. The Theoretical and Empirical Methods

The research methods include such experimental methods as observation, surveying, questionnaire, self-assessment, peer review, interviews, studying the student activities, testing, the diagnostic method on learning motivation focus.

2.3. The Basis of the Research

The experiment took place at the State Educational Institution of Higher Professional Training "Lobachevsky State University of Nizhni Novgorod," "Volga State Engineering and Pedagogical University." Pedagogical experiment was attended by more than 300 undergraduate and graduate students of universities from non-core departments for which the author's technique of law training was implemented.

2.4. The Students' Motivation Types

One of the key objectives of a university teacher is to help the student in his development, and the humanistic pedagogical practices should be directed at the development of all his essential powers. This is true for all major areas: Intellectual, motivational, emotional, volitional, materialistic and practical, existential, the scope of self-regulation. The motivational sphere comprises a set of needs, motives and goals of the student who has been forming and developing throughout his learning and cognitive activity at university. However, the most essential part of the student's motivational sphere is learning motivation (Grebnyuk and Grebnyuk, 2000; Lisitzina et al., 2015; Yusupova et al., 2015).

Motivation in the broad sense is explained as something that induces a person to perform one or another activity. The objectives are one of the most important forms of expressing motives. It is proved in psychology that the motives are performed in activity in the form of the content-relevant objectives. The peculiarities of learning motivation and personality factors are, in fact, the indicators of the vocational education quality.

It is commonly assumed for many researchers both in the field of psychology and professional pedagogy to distinguish between intrinsic and extrinsic motives among various learning motives. Dubovitskaya (2002) emphasizes that a motif is intrinsic if it coincides with the objective. That is, in terms of educational activities acquiring the content of the subject is at the same time a motive and an objective. The intrinsic motives are related to the students' cognitive need. Acquiring legal disciplines is the students' learning objective. The prevailing intrinsic motivation manifests itself in future specialist's educational activity.

The learning activity becomes externally motivated when the law acquisition is not the objective but a means to achieve other goals. In terms of extrinsic motivation knowledge is not a teaching goal. In this case, studying law for the student is not accepted intrinsically or internally. Its content does not get to him personally meaningful.

Of particular importance is developing reflection while studying law. It helps students to understand the legal knowledge they obtained, the skills, the motives of their training activities.

3. RESULTS

3.1. The Assessment of the ICTs Potential to make University Students Motivated

ICTs are aimed at increasing of students' motivation, improving the quality of learning, development of their skills and abilities

on the pointed disciplines. Their didactic opportunities enable to implement information communications between the teacher and students, facilitating the process of transmission and perception of training information due to its different types of visualization and creation of Kvazi-professional activities' model.

In traditional approach to teaching the teacher shares knowledge with the group of students at once. It results in the lack of time, less attention paid to the independent and individual work with every student. The computer technology helps every student to achieve his own results. At the same time the computation model contributes to the development of such cognitive techniques as an analysis of problematic situation, and thereupon, identification of the relations and patterns providing system operation. Thus, the ICTs transform individual learning activities through modeling the activities of the specialist.

In addition, the intensive growth of scientific and technical information volume, rapidly changing technologies require from a qualified person the ability to quickly learn new technologies and skills of self-education.

The use of carefully selected and well-founded didactic ICTs in high school students' vocational training of any structure is surely to contribute to such development at a greater extent.

In general, the ICTs can be considered as a subject matter, a means of communication and a learning tool. All these areas can be claimed by educational activities. For a modern specialist it is vital to master information technology at the level of information culture (information technology as a subject of study), i.e., the skill to determine their information need, look for it, evaluate and use effectively. The most demanded quality of information technologies is increasing the speed of knowledge delivery to the student (information technology as a means of communication) requires access to the expensive information resources: High-speed internet access to the newsgroups, forums, chat rooms, etc. Creating an interactive educational environment (information technology as a means of teaching) requires the development of new psychological and pedagogical approaches to the development of the educational environment using information technology.

3.2. ICTs in University Legal Education

Applying the ICT in professional education has modified the joint activity and communication between teachers and students. Using the capabilities and resources of computer networks has brought changes to the psychological structure of students' activity. These changes affect almost all spheres - cognitive, communicative, etc., modify the activity performance link, its motivational regulation, goal-setting processes. The research on motivation of students' activity in forming legal competence as a component of professional competence under the conditions of education informatization are scarcely explored though are very interesting.

There is no doubt, the teacher should pay great attention to the analysis of the existing forms and methods of teaching and use those that have a significant impact to make students motivated: The methods of problem-based learning, training games, project

method and other methods and forms of active teaching. One of the leading tools of developing motivation is a reflection over the activity on the internet.

The motives of students' activity depend on their experience (in the broad social sense). Of course, the motives of using the ICT tools and particularly the resources and opportunities of the Internet depend on students' experience in operating the web which includes the relevant knowledge and skills. Our research has shown that the majority of students (82%) participated in the experiment have an opportunity to work with a computer at home including working with internet resources (both at home and university).

The inclusion of the discipline "Law" in the state educational standard of higher professional education (cycle "General Humanitarian and Socio-economic Disciplines" of federal component) allowed to provide students' basic training in the field of law, increased motivation to study and interest in law knowledge.

One of the main tasks of a high school teacher is to help the students in their development and humanistic pedagogical practices should be directed to the development of all their essential powers. This is concerns all major areas of their development: Intellectual, motivational, emotional, strong-willed, material and practical, existential and self-regulation. Motivational sphere comprises a set of needs, motives and goals of the students, which are formed and developed throughout their learning and cognitive activity in high school.

Along with the traditional teaching methods the innovative forms, based on ICTs of students law training of non-law professions have been introduced by the authors: Different kinds of lectures (presentation, visualization, problem lectures), systems helping in search, law library, student projects, computer tests, possessing as a control, so training nature and so on. At the same time, the greatest emphasis was made on independent "production of knowledge" by students through ICT.

3.3. Students' Motivation while Forming Legal Competence by Using ICTs and Materials

We have performed the pilot study aimed at assessing the intrinsic and extrinsic motivation in developing legal competence among the students of non-legal majors while studying law in conditions of higher education informatization.

The legal studies promotes developing such components of legal competence as motivational and axiological, cognitive and pragmatic, emotional and volitional.

To identify the level of motivational-axiological component of the legal competence there were used the questionnaires in which the students were asked to rate on a five-point scale (1 point - The minimum value; 5 points - The maximum): The interest in practical applying the ICTs in modern society and in the process of studying at university including law-studies; the interest to various types of training sessions while studying law - The traditional ones (a lecture, a seminar) and the innovative ones ("brainstorming,"

discussion, role play, group work based on the method of projects), the use of ICT tools including legal resources on the internet; desire to use the basic and advanced versions of the electronic training complex “Law Case” we have developed in various types of training and cognitive activities, etc.

We have compared the selected parameters of the motivational - axiological, cognitive-pragmatic and emotional - volitional components of the legal competence for the students of diverse levels of motivation (intrinsic and extrinsic, and in more detail - low, medium and high levels of intrinsic motivation for learning).

We shall consider the way the students with the intrinsic and extrinsic motivation assess the provisions related to the computerization of society and education and ICT use in education generally and legal studies, in particular. The data is presented in Table 1.

The students with both extrinsic and intrinsic motivation for learning equally appreciate the use of ICTs in human activity in contemporary society (M2 = 4.67 points, M1 = 4.50 points), the figure of using computer technologies in professional work of the students with intrinsic motivation is slightly higher compared to the students with the extrinsic motivation for learning (M2 = 4.77 points, M1 = 4.44 Ball-la). The students with diverse levels of motivation to learning have concurrent opinions about the necessity for every educated person to work with the computer as a user (M2 = 4.73 points, M1 = 4.67 points) and assessment of working with computer in special subjects at university (M2 = 3.94 points, M1 = 3.44 points).

The students with intrinsic and extrinsic motivation show statistically significant differences in: Working with a computer while studying law (M2 = 3.70 points, 2.61 points = M1) and desire to study jurisprudence using the means of ICTs (M2 = 4.30 points, 3.39 points = M1); getting acquainted with the content and principles of electronic legal reference systems (SPS) (M2 = 3.13 points, 2.50 points = M1); the desire to work with legal

reference system (M2 = 3.80 points, M1 = 3 points); the idea of the legal information provided on the internet (M2 = 3.10 points, 2.50 points = M1); the work experience with legal information provided on the internet (M2 = 2.63 points, M1 = 2.00 points; the necessity for electronic educational complex “Law Case” while getting ready for seminars (M2 = 3.70 points, M1 = 2.67 points), while working according to the project method (M2 = 3.90 points, M1 = 3.22 points), while getting ready for the exams (M2 = 4.07 points, M1 = 3.56 points).

We have developed the questions on the topics relevant to the provisions of the state educational standards in law and the Internet addresses with the relevant content. In the developed educational-methodical manual we have marked the portals and sites (indicating the mode of access to them), which present educational materials that can be used by the students in the law studies.

Let us consider how the students with diverse levels of intrinsic motivation to various kinds of training sessions get involved while getting to know jurisprudence the data is presented in Table 2.

Almost all kinds of the assessed educational and cognitive activities have shown the statistically different results among the students with diverse level of intrinsic motivation. The most significant difference is observed at lectures and note-taking (low intrinsic motivation [LIM] = 2.33 points, average intrinsic motivation [AIM] = 3.25 points, high internal motivation [HIM] = 3.80 points), “brainstorming” (LIM = 3.0 points, AIM = 3.67 points, HIM = 4.13 points), evaluating the work of the electronic legal reference systems (LIM = 2.67 points, AIM= 3.42 points, HM = 3.93 points), with internet resources on law (LM=2.56 points, AIM=3.38 points, HIM = 3.93 points), with the electronic teaching material “Law Case” (LIM = 2.78 points, AIM = 3.21 points, HIM= 3.93 points).

We can consider the assessment of the students with different levels of intrinsic motivation to learning acquired while studying law the results are presented in Table 3.

Table 1: The diversely-motivated students’ assessment of the provisions related to the computerization of society and education, the ICT in law-studies

The assessed parameters	Mean value (M)		Significance differences
	M2	M1	
The assessment of the ICT in human activity in society	4.67	4.50	
The assessment of using ICT in a specialist’s work	4.77	4.44	*
The assessment of the necessity for every person to work with the computer as a user	4.73	4.67	
The assessment of the computer supported working in special subjects	3.93	3.44	
The assessment of the PC supported law-studies at university.....current Potential	3.70	2.61	*
An introduction to the content and principles of the legal reference system	4.30	3,39	*
Familiarity with the legal reference systems	3.13	2.50	*
Evaluating the desire to work with the legal reference systems	3.53	2.50	*
The assessment of the overall awareness of the legal information provided on the internet	3.80	3.00	*
The assessment of the experience of working with legal information provided on the internet	3.10	2.50	*
The assessment of the educational complex “Law Case”	2.63	2.00	*
While getting ready for the seminars	3.70	2.67	*
While working on a project method	3.90	3.22	*
While getting ready for the exams	4.07	3.56	*

*Statistical significance. M1: Extrinsic motivation, M2: Intrinsic motivation, ICT: Information and communications technologies

Table 2: The students with diverse levels of intrinsic motivation showing interest to various types of training sessions while studying law

The assessed types of educational and cognitive activities	Mean value (M)			Significant differences		
	LIM	AIM	HIM	LIM/AIM	AIM/HIM	LIM/HIM
Listening and note-taking at lectures	2.33	3.25	3.80	*	*	*
Discussing law issues at seminars	3.33	3.88	4.43	*		*
“Brainstorming”	3.00	3.67	4.13	*	*	*
Discussion/debate	3.11	3.92	4.20	*		*
Working with electronic legal reference systems	2.67	3.42	3.93	*	*	*
Working with internet resources on law	2.56	3.38	3.93	*		*
Group work (the method of projects)	3.33	3.67	4.07			*
Business games	3.00	3.58	3.73			*
Working with electronic educational complex	2.78	3.21	3.93	*	*	*

*Significant differences. LIM: Low intrinsic motivation, AIM: Average intrinsic motivation, HIM: High internal motivation

Table 3: The reflection of the students with diverse levels of intrinsic motivation to learning while studying jurisprudence

As a result of the law course, I feel now	Mean value (M)			Significant differences		
	LIM	AIM	HIM	AIM	LIM	AIM
More confident when: Study legal documents	3.00	3.25	3.80		*	*
Read the professional literature on legal issues	2.78	3.44	3.83			*
Talk on the legal issues while discussing social problems	3.00	3.29	3.93		*	*
Discuss legal aspects of the professional activity	2.67	3.13	3.87			*
Express my thoughts on Law in writing	2.67	3.04	3.47			*
That I am more aware of my current and future needs in studying the fundamentals of law	2.78	3.42	4.23	*		*
I can make better use of additional resources (electronic legal reference systems, internet resources) while studying law	3.44	3.46	4.13		*	*
I am eager and able to manage my learning process better, improve the level of legal knowledge	3.11	3.54	4.07	*	*	*
You have used in this work: 1 - The extended version of the case; 2 - the case “Mini,” 3 - Have not used electronic materials	2.33	1.67	1.67	*		*

*Significant differences. LIM: Low intrinsic motivation, AIM: Average intrinsic motivation, HIM: High internal motivation

In this case, we observe the same trend as in the results of the students' answers presented in the preceding table: According to almost all highlighted statements the students with different levels of intrinsic motivation have given significantly different answers.

The maximum difference in the assessment is observed according to the following criteria: Feeling more confident when discussing the legal aspects of professional activity (LIM = 2.67 points, AIM = 3.13 points, HIM = 3.87 points), more aware of current and future needs in learning the foundations of law (LIM = 2.78 points, AIM = 3.42 points, HIM = 4.23 points) and others. The least difference is observed in the assessment of how students can use additional resources (online helping search systems and resources in the field of law) within the law-study process. The students' various responses according to this assessment criteria may be explained with the fact that they have used the teaching materials to a different extent. So some students with low motivation have not used electronic educational materials on law in the learning process; the students with medium and high level of motivation have used not only the “mini-case,” but also an extended version of the electronic-learning materials.

On the basis of our quantitative data we have performed a quality analysis of the experimental results. This allowed us to get an idea of the degree of learning motivation aspects among the students of non-legal majors in the conditions of higher education

informatization. We have found the correlation of intrinsic motivation of the students of non-legal majors to their awareness of the necessity to develop legal competence while studying law in the system of vocational training. The pilot implementation of the submitted ICTs (including the peculiarities of the subject area and professional software packages) while developing managerial competence (for bachelors in management), communicative competence (for undergraduate linguists), mathematic competence (for engineering students) have shown almost the same results in motivation.

4. DISCUSSIONS

The possibilities to improve learning efficiency using a variety of information technologies have been considered by many scientists. The introduction of the information technology into the educational process involves not only the development of the new training tools, but also introduction of the methods of their application. The issue of creating pedagogical techniques and common problems connected with their development were discussed in the works of Bepal'ko (1998), Verbitsky (1982), Gershunsky (1987), Zakharova (2005), Ivshina (2000), Kirilova (2008). The psycho-pedagogical foundations of using information technologies in the educational process are considered in the studies of Bashmakov and Bashmakov (2003), Mashbits (1998), Polat (2007), Robert (1994), Vlasova et al. (2015) and others.

However, the process of forming students' learning motivation in higher professional education while using the ICTs is yet understudied.

5. CONCLUSIONS

The data obtained by the experiment highlight the need for increased use of ICTs as a didactic means of professional competences' formation in high school students' teaching. Application of ICT in the law training of students has opened up access to new sources of information and allowed to move away from traditional forms of presentation. Using of the considered the methods on the basis of ICT allows, in addition to students' motivation increasing, to master in a larger volume new knowledge, to carry out the transition to activity approach, contributing to the formation of professional competencies and to differentiate the learning process.

It is the very ICTs, as a universal means of training, contribute not only to students' knowledge, skills, competencies' formation, but also develop the personality, enhancing motivation for learning. So, the place of ICT in university students' professional competencies' formation is in information support of educational activities, and their role is to enhance their educational opportunities, personality development, intensification, differentiation and individualization of their activities in the learning process, improving of the quality of education.

REFERENCES

- Bashmakov, A.I., Bashmakov, I.A. (2003), Development of Computer Textbooks and Training Systems. Moscow: Filin Press. p615.
- Bespal'ko, V.P. (1998), The Theory of the Textbook: Didactic Aspects. Moscow: Pedagogy Press. p192.
- Dubovitskaya, T.D. (2002), Diagnostic method directional learning motivation. *Psychological Science and Education*, 2, 42-45.
- Gershunsky, B.S. (1987), Computerization of Education: Problems and Prospects. Moscow: Pedagogy Press. p223.
- Grebenyuk, O., Grebenyuk, T. (2000), Fundamentals of Pedagogy Personality. Kaliningrad: House of the Kaliningrad University. p572.
- Ibragimov, I.D., Iskhakova, R.R., Galeeva, M.A., Kalashnikova, M.M., Ryseva, J.V., Galimzyanova, I.I., Sharonov, I.A. (2015), Optimization of research and methodology work at university in terms of the process approach. *Journal of Sustainable Development*, 8(3), 234-241.
- Ivshina, G.V. (2000), Information Technology for Monitoring the Quality of Educational Systems (Didactic Bases). Kazan: Press "Innovation Center". p136.
- Kirilova, G.I. (2008), Principles of information and environmental approach to the modernization of vocational training. *Kazan Pedagogical Journal*, 8, 54-60.
- Komelina, V.A., Mirzagalyamova, Z.N., Gabbasova, L.B., Rod, Y.S., Slobodyan, M.L., Esipova, S.A., Lavrentiev, S.Y., Kharisova, G.M. (2016), Features of students' economic competence formation. *International Review of Management and Marketing*, 6(1), 53-57.
- Kruchinin, M.V. (2010), Information and Communication Technologies in the Legal Preparation of Students of High Schools: Teaching Aid. Nizhny Novgorod: Press Nizhny Novgorod State University. p70.
- Kruchinin, M.V., Kruchinina, G.A. (2012), Formation of professional legal awareness of students in high school. *Bulletin of the Nizhny Novgorod State University. Lobachevsky. A series of "Innovation in Education"*, 3, 17-24.
- Lisitzina, T.B., Nikonov, V.V., Ilkevich, K.B., Ilkevich, T.G., Masalimova, A.R. (2015), The syllabus of the regional component of professionally motivational education developed for the students specializing in tourism. *Asian Social Science*, 11(2), 284-289.
- Mashbits, E.I. (1998), Psycho-Pedagogical Problems of Computerization of the Education. Moscow: Press Psychological and Social Institute. p231.
- Nasibullov, R.R., Kashapova, L.M., Shavaliyeva, Z.S. (2015), Conditions of formation of social successfulness of students with disabilities in the system of continuous inclusive education on the basis of value approach. *International Journal of Environmental and Science Education*, 10 (4), 543-552.
- Polat, E.S. (2007), Modern Pedagogic and Information Technologies in the Education System. Moscow: Press Academy. p224.
- Robert, I.V. (1994), Modern Information Technologies in Education: Didactic Problems and Prospects of Use. Moscow: School Press. p187.
- Verbitsky, A.A. (1982), Business game as a method of active learning. *Contemporary Higher Education*, 3(39), 129-142.
- Vlasova, V.K., Kirilova, G.I., Masalimova, A.R. (2015), Information and logistic foundations of pedagogical education design and content education. *Review of European Studies*, 7(4), 54-58.
- Yusupova, G.F., Podgorecki, J., Markova, N.G. (2015), Educating young people in multicultural educational environment of higher education institution. *International Journal of Environmental and Science Education*, 10(4), 561-570.
- Zakharova, I.G. (2005), Information Technology in Education. Moscow: Publishing Center "Academy". p192.
- Zakirova, E.Y., Levina, E.Y. (2013), The development of modular competency approach in vocational education. *European Social Science Journal*, 9(3), 80-85.
- Zakirova, V.G., Masalimova, A.R., Nikoghosyan, M.A. (2016), The contents, forms and methods of family upbringing studying based on the differentiated approach. *International Electronic Journal of Mathematics Education*, 11(1), 181-190.