

FORMATION AND DEVELOPMENT OF DISTANCE LEARNING COMPETENCES OF THE FUTURE INFORMATION SCIENCE TEACHERS

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***Abstract:** Nowadays, informatics competences are used for formation and development of distance learning competences of the future information science teachers. The future information science teachers learn some theoretical and practical aspects of working with distance learning systems during the different courses of study. Integrating of distance learning elements and traditional training of the future information science teachers allows implementing of the blended learning. Distance learning competences are used for formation of skills in working with new computer technologies and for formation of lifelong learning skills.*

Keywords: distance learning, future information science teachers, informatics competences, distance learning competences, blended learning

INTRODUCTION

Modern society is oriented towards the wide use of information and communication technologies (ICT). In this respect, the use of ICT is constantly expanding in school education of many European countries. This trend is also observed in Ukraine. Hence, there is an urgent problem of preparing future teachers for the wide use of ICT in their professional activity.

Besides, distance learning technologies are actively introduced into the learning process of many higher educational institutions and schools recently. This causes solving of the issue concerning specialist training in the field of distance learning.

1. ANALYSIS OF DEVELOPMENT ASPECTS OF DISTANCE LEARNING IN UKRAINE

On the basis of Smyrnova-Trybulska (2007) research and personal experience, we can conclude that no higher educational institution (HEI) prepares future distance

learning teachers (tutors) in Ukraine. Unfortunately, the present situation has not changed. The main problems in this area are as follows:

- the existing legislation in the field of distance learning is imperfect;
- programs for training of distance learning tutors are not drawn up at the national level;
- undefined legal status of the distance learning tutor, crude qualification characteristics of the tutor, no methods of the distance learning tutor preparation, no teaching loads norms etc.;
- unified structure of distance courses is undetermined at the national level;
- unelaborated mechanisms of copyright protection and protection of distance courses from distribution of teaching and learning materials via the Internet (without permission of the authors);
- lack of the government attention to this issue causes underfunding, and as a consequence, poor technical equipment of educational institutions.

Nowadays, there are only qualification upgrading courses of distance learning in Ukraine mostly oriented on secondary schools teachers.

The latest legal document (in the field of distance learning) is the Order of the Ministry of Education and Science of Ukraine dated 25/04/2013 "On Approval of Distance Learning Regulations". The document defines the concept of distance learning, its purpose, tasks, and methods of implementation; observes the peculiarities of the organization of distance learning educational process and distance learning provision. Issue of the training of future distance learning tutors is not considered.

Nevertheless, issues concerning distance learning specialist training is not resolved at the national level; it is important to start the training of these teachers right now. Due to the fact that distance technologies are being actively implemented in the education and other areas of society, solving of this issue shall be started with professional development of educators and future teachers who have good skills in ICT using. These students are the future information science teachers.

2. PLACE OF DISTANCE LEARNING COMPETENCES IN THE COMPETENCES SYSTEM OF FUTURE INFORMATION SCIENCE TEACHERS

In spite of imperfection of the existing legislation in the field of distance learning, distance learning technologies are being intensively introduced in the learning process of HEI and schools. Scientific and pedagogical project of the Ministry of Education and Science of Ukraine "Distance learning of pupils" was implemented by Bogachkov (2009) on site <http://testportal.org.ua/dls>.

In this regard, there is an urgent need for training of specialists who have appropriate competences.

For this purpose, it is necessary to conduct training of working teachers and to introduce training of future information science teachers into the areas of use of distance learning technologies.

In our opinion, future information science teachers are the most prepared (between the students) to use distance learning technologies in their future professional activity.

For proving this, we describe the place of distance learning competences in the system of professional competences of future information science teachers. Therefore, we consider the structure of the professional competences of information science teachers.

A lot of researchers separately distinguish informatics competences and ICT-competences (in the structure of professional competences). We analyze the relation between these concepts.

Spirin (2009) concludes that **informatics competences** is the ability of individuals to satisfy their individual needs and social requirements for the formation of professional and specialized competences in the information science. So, this actually means that informatics competences as subject competences are formed within the process of training of information science specialists and future information science teachers.

Spirin (2009) also defines **ICT-competence (information and communication and technological competence)** as the ability of individuals to practically use ICT for satisfying of their individual needs and for solving of socially important (in particular, professional) tasks in a certain subject area.

Thus, considering professional training of information science teachers, the informatics competences concept is more general and includes the ICT-competences concept, because the ICT-skills is one of the components of scientific knowledge in information science (Spirin 2009).

To find the place of distance learning competences in the system of informatics competences of future information science teachers, we examine the results of the research by scientists who dealt with this issue.

Zhaldak, Ramskyi and Rafalska (2009) conclude that the system of informatics competences (i.e. subject competences) consists of the following components:

- informological and methodological competences;
- **information and technological competences;**
- computer competences;
- modeling competences;

- algorithmic competences.

Authors (Zhaldak, Ramskiy and Rafalska 2009) consider the following components of the information and technological competences of future information science teachers:

- working with information system (IS), the skills to use ICT;
- working in the area of data protection in the IS;
- skills and abilities of different data types processing;
- working with the basic services of the Internet;
- solving of a various of individually and socially important problems (the use of ICT in the education and research system, etc.);
- working with distance learning technologies.

Spirin (2009) examines the structure of professional and specialized competences (subject competences in information science, i.e. informatics competences) of future information science teachers. The researcher concludes that ICT-competences are included in the technological component:

- general professional competences;
- profiled-oriented competences (scientific subject competences and subject-pedagogical competences);
- **technological competences** (competences in pedagogical technology and ICT-competences);
- professional and practical competences.

Smyrnova-Trybulska (2007) argues that one of the tasks of formation of informatics competences of future teachers (in particular, future information science teachers) is the formation of distance learning competences.

Smyrnova-Trybulska (2007) defines the main general competences of distance learning tutors, which consist of:

- competences in the area of pedagogy, psychology, and new educational technologies via distance learning;
- ICT-competences and their application in education;
- competences in the use of Internet-technologies.

Apart from that, we can add competences in the area of organizing and managing distance learning to the group of distance learning competencies.

Summarizing, clarifying and specifying of the abovementioned, we can show the system of informatics competences of future information science teachers in Fig. 1:

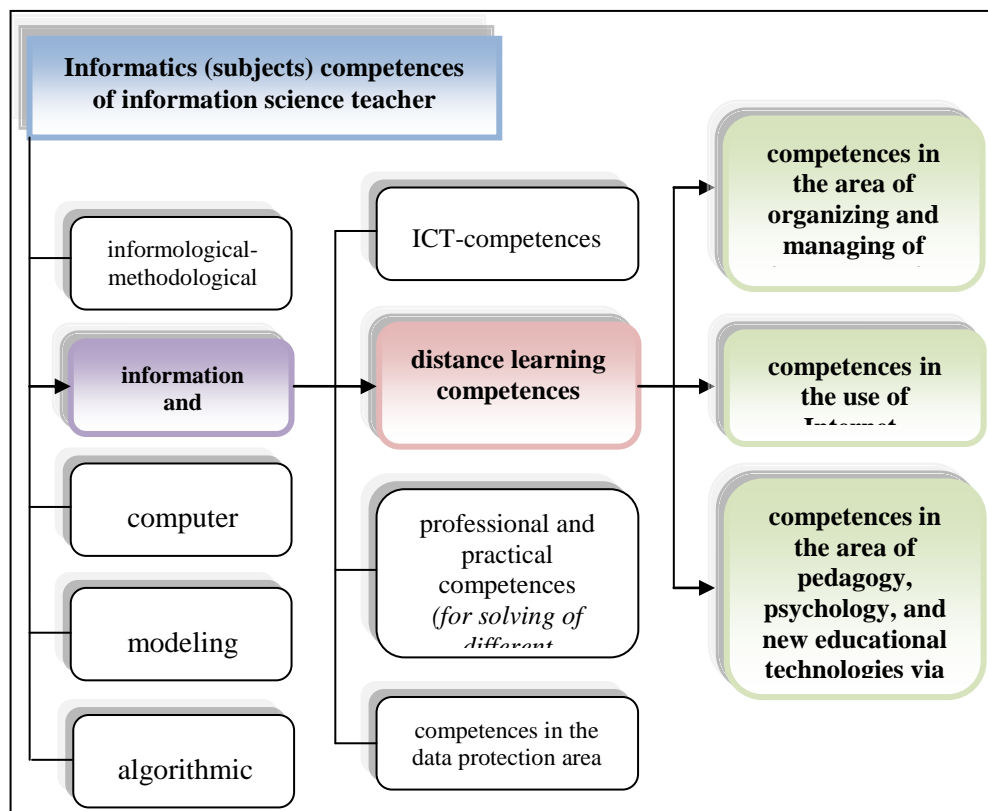


Figure 1. The System of Informatics Competences of Information Science Teacher

Source: Own elaboration based on (Zhaldak, Ramskyi and Rafalska 2009, Smyrnova-Trybulska 2007, Spirin 2009)

Thus, considering the abovementioned reasoning, we conclude that distance learning competences are included into informatics competences (in particular, into information and technological competences of future information science teachers).

3. CONDITIONS FOR FORMATION OF COMPETENCE IN DISTANCE LEARNING FOR FUTURE INFORMATION SCIENCE TEACHERS

3.1. Analysis of curriculum for bachelor of informatics

We analyze the curriculum for bachelors of informatics of 0403 "System sciences and Cybernetics", specialty 6.040302 "Information Science*" (qualification "information science teacher") to determine which distance learning competences can be gained by future information science teachers within the process of their training.

Curriculum for bachelors of informatics and future information science teachers consists of three cycles:

1. Cycle of humanistic and socioeconomic training.
2. Cycle of science and mathematics training.
3. **Cycle of professional and practical training:**
 - 3.1. Cycle of psychological and pedagogical disciplines.
 - 3.2. Cycle of objectively and professionally oriented methodical disciplines.
 - 3.3. Cycle of subject (informatics) training disciplines.
 - 3.4. Special courses and elective courses.

The fragment of the curriculum is shown in Figure 2:

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напрям підготовки: 6.040302 Інформатика*
спеціалізація: математика, фізика, економіка, англійська мова, освіти
випірювання

Форма навчання: денна
Термін навчання: 4 роки на базі повної загальної середньої освіти
Кваліфікація: вчитель інформатики загальноосвітнього навчального закладу II ступеня

Протокол № _____
"_____" _____ 2011 рік

1. Графік навчального процесу

Курс	Вересень	Жовтень	Листопад	Грудень	Січень	Лютий	Березень	Квітень	Травень	Червень	Липень	Серпень
I	1	2	3	4	5	6	7	8	9	10	11	12
II	13	14	15	16	17	18	19	20	21	22	23	24
III	25	26	27	28	29	30	31	1	2	3	4	5
IV	6	7	8	9	10	11	12	13	14	15	16	17
V	18	19	20	21	22	23	24	25	26	27	28	29
VI	30	31	1	2	3	4	5	6	7	8	9	10
VIІ	11	12	13	14	15	16	17	18	19	20	21	22
VIІІ	23	24	25	26	27	28	29	30	31	1	2	3
IX	4	5	6	7	8	9	10	11	12	13	14	15
X	16	17	18	19	20	21	22	23	24	25	26	27
XI	28	29	30	31	1	2	3	4	5	6	7	8
XII	9	10	11	12	13	14	15	16	17	18	19	20
XIII	21	22	23	24	25	26	27	28	29	30	31	1
XIV	2	3	4	5	6	7	8	9	10	11	12	13
XV	14	15	16	17	18	19	20	21	22	23	24	25
XVI	26	27	28	29	30	31	1	2	3	4	5	6
XVII	7	8	9	10	11	12	13	14	15	16	17	18
XVIII	19	20	21	22	23	24	25	26	27	28	29	30
XIX	31	1	2	3	4	5	6	7	8	9	10	11
XX	12	13	14	15	16	17	18	19	20	21	22	23
XXI	24	25	26	27	28	29	30	31	1	2	3	4
XXII	5	6	7	8	9	10	11	12	13	14	15	16
XXIII	17	18	19	20	21	22	23	24	25	26	27	28
XXIV	29	30	31	1	2	3	4	5	6	7	8	9
XXV	10	11	12	13	14	15	16	17	18	19	20	21
XXVI	22	23	24	25	26	27	28	29	30	31	1	2
XXVII	3	4	5	6	7	8	9	10	11	12	13	14
XXVIII	15	16	17	18	19	20	21	22	23	24	25	26
XXIX	27	28	29	30	31	1	2	3	4	5	6	7
XXX	8	9	10	11	12	13	14	15	16	17	18	19
XXXI	20	21	22	23	24	25	26	27	28	29	30	31
XXXII	1	2	3	4	5	6	7	8	9	10	11	12
XXXIII	13	14	15	16	17	18	19	20	21	22	23	24
XXXIV	25	26	27	28	29	30	31	1	2	3	4	5
XXXV	6	7	8	9	10	11	12	13	14	15	16	17
XXXVI	18	19	20	21	22	23	24	25	26	27	28	29
XXXVII	30	31	1	2	3	4	5	6	7	8	9	10
XXXVIII	11	12	13	14	15	16	17	18	19	20	21	22
XXXIX	23	24	25	26	27	28	29	30	31	1	2	3
XL	4	5	6	7	8	9	10	11	12	13	14	15
XLІ	16	17	18	19	20	21	22	23	24	25	26	27
XLІІ	28	29	30	31	1	2	3	4	5	6	7	8
XLІІІ	9	10	11	12	13	14	15	16	17	18	19	20
XLІV	21	22	23	24	25	26	27	28	29	30	31	1
XLV	2	3	4	5	6	7	8	9	10	11	12	13
XLVI	14	15	16	17	18	19	20	21	22	23	24	25
XLVІ	26	27	28	29	30	31	1	2	3	4	5	6
XLVІІ	7	8	9	10	11	12	13	14	15	16	17	18
XLVІІІ	19	20	21	22	23	24	25	26	27	28	29	30
XLVІІІІ	31	1	2	3	4	5	6	7	8	9	10	11
XLV	12	13	14	15	16	17	18	19	20	21	22	23
XLVI	24	25	26	27	28	29	30	31	1	2	3	4
XLVІ	5	6	7	8	9	10	11	12	13	14	15	16
XLVІІ	17	18	19	20	21	22	23	24	25	26	27	28
XLVІІІ	29	30	31	1	2	3	4	5	6	7	8	9
XLVІІІІ	10	11	12	13	14	15	16	17	18	19	20	21
XLV	22	23	24	25	26	27	28	29	30	31	1	2
XLVI	3	4	5	6	7	8	9	10	11	12	13	14
XLVІ	15	16	17	18	19	20	21	22	23	24	25	26
XLVІІ	27	28	29	30	31	1	2	3	4	5	6	7
XLVІІІ	8	9	10	11	12	13	14	15	16	17	18	19
XLVІІІІ	20	21	22	23	24	25	26	27	28	29	30	31
XLV	1	2	3	4	5	6	7	8	9	10	11	12
XLVI	13	14	15	16	17	18	19	20	21	22	23	24
XLVІ	25	26	27	28	29	30	31	1	2	3	4	5
XLVІІ	6	7	8	9	10	11	12	13	14	15	16	17
XLVІІІ	18	19	20	21	22	23	24	25	26	27	28	29
XLVІІІІ	30	31	1	2	3	4	5	6	7	8	9	10
XLV	11	12	13	14	15	16	17	18	19	20	21	22
XLVI	23	24	25	26	27	28	29	30	31	1	2	3
XLVІ	4	5	6	7	8	9	10	11	12	13	14	15
XLVІІ	16	17	18	19	20	21	22	23	24	25	26	27
XLVІІІ	28	29	30	31	1	2	3	4	5	6	7	8
XLVІІІІ	9	10	11	12	13	14	15	16	17	18	19	20
XLV	21	22	23	24	25	26	27	28	29	30	31	1
XLVI	2	3	4	5	6	7	8	9	10	11	12	13
XLVІ	14	15	16	17	18	19	20	21	22	23	24	25
XLVІІ	26	27	28	29	30	31	1	2	3	4	5	6
XLVІІІ	7	8	9	10	11	12	13	14	15	16	17	18
XLVІІІІ	19	20	21	22	23	24	25	26	27	28	29	30
XLV	31	1	2	3	4	5	6	7	8	9	10	11
XLVI	12	13	14	15	16	17	18	19	20	21	22	23
XLVІ	24	25	26	27	28	29	30	31	1	2	3	4
XLVІІ	5	6	7	8	9	10	11	12	13	14	15	16
XLVІІІ	17	18	19	20	21	22	23	24	25	26	27	28
XLVІІІІ	29	30	31	1	2	3	4	5	6	7	8	9
XLV	10	11	12	13	14	15	16	17	18	19	20	21
XLVI	22	23	24	25	26	27	28	29	30	31	1	2
XLVІ	3	4	5	6	7	8	9	10	11	12	13	14
XLVІІ	15	16	17	18	19	20	21	22	23	24	25	26
XLVІІІ	27	28	29	30	31	1	2	3	4	5	6	7
XLVІІІІ	8	9	10	11	12	13	14	15	16	17	18	19
XLV	20	21	22	23	24	25	26	27	28	29	30	31
XLVI	1	2	3	4	5	6	7	8	9	10	11	12
XLVІ	13	14	15	16	17	18	19	20	21	22	23	24
XLVІІ	25	26	27	28	29	30	31	1	2	3	4	5
XLVІІІ	6	7	8	9	10	11	12	13	14	15	16	17
XLVІІІІ	18	19	20	21	22	23	24	25	26	27	28	29
XLV	30	31	1	2	3	4	5	6	7	8	9	10
XLVI	11	12	13	14	15	16	17	18	19	20	21	22
XLVІ	23	24	25	26	27	28	29	30	31	1	2	3
XLVІІ	4	5	6	7	8	9	10	11	12	13	14	15
XLVІІІ	16	17	18	19	20	21	22	23	24	25	26	27
XLVІІІІ	28	29	30	31	1	2	3	4	5	6	7	8
XLV	9	10	11	12	13	14	15	16	17	18	19	20
XLVI	21	22	23	24	25	26	27	28	29	30	31	1
XLVІ	2	3	4	5	6	7	8	9	10	11	12	13
XLVІІ	14	15	16	17	18	19	20	21	22	23	24	25
XLVІІІ	26	27	28	29	30	31	1	2	3	4	5	6
XLVІІІІ	7	8	9	10	11	12	13	14	15	16	17	18
XLV	19	20	21	22	23	24	25	26	27	28	29	30
XLVI	31	1	2	3	4	5	6	7	8	9	10	11
XLVІ	12	13	14	15	16	17	18	19	20	21	22	23
XLVІІ	24	25	26	27	28	29	30	31	1	2	3	4
XLVІІІ	5	6	7	8	9	10	11	12	13	14	15	16
XLVІІІІ	17	18	19	20	21	22	23	24	25	26	27	28
XLV	29	30	31	1	2	3	4	5	6	7	8	9
XLVI	10	11	12	13	14	15	16	17	18	19	20	21
XLVІ	22	23	24	25	26	27	28	29	30	31	1	2
XLVІІ	3	4	5	6	7	8	9	10	11	12	13	14
XLVІІІ	15	16	17	18	19	20	21	22	23	24	25	26
XLVІІІІ	27	28	29	30	31	1	2	3	4	5	6	7
XLV	8	9	10	11	12	13	14	15	16	17	18	19
XLVI	20	21	22	23	24	25	26	27	28	29	30	

Table 1.

Number of hours for informatics, subject-methodological, psychological, and pedagogical disciplines provided by the curriculum for training of information science teachers)

№	Academic discipline	Course	Number of hours / ECTS credits	Final control
<i>Unit of professional psychological and pedagogical and subject-methodological training of students</i>				
1.	Psychology	1, 2	324 / 9	tests
2.	Pedagogy	1, 2	216 / 6	examination, test
3.	Methods of Subjects Learning	3, 4	540 / 15	tests, examinations
TOTAL:			1080 / 30	
<i>Unit of professional scientific and subject (informatics) training of students</i>				
4.	Computer Science	1	144 / 4	tests
5.	ICT	1	288 / 8	tests
6.	Programming	2, 3	576 / 16	examinations, tests
7.	Computer Networks and the Internet	2	180 / 5	examination
8.	Computer Architecture and Configuration of Computer Systems	2	216 / 6	test
9.	Computer Simulation	4	180 / 5	test
10.	Selected Issues of Informatics (elective course)	3	234 / 6,5	examination, test
11.	Selected Issues of Computer Engineering (elective course)	3	234 / 6,5	examination, test
12.	Selected Issues of Object-Oriented Information Technology and Programming (elective course)	4	216 / 6	test
13.	Selected Issues of pedagogical technology (elective course)	4	108 / 3	test

№	Academic discipline	Course	Number of hours / ECTS credits	Final control
14.	Information Resources Protection	2	162 / 4,5	test
15.	Mathematical Informatics	3	126 / 3,5	examination
16.	Computer-oriented learning systems of Natural Sciences	4	162 / 4,5	examination
17.	Special laboratory course of informatics	4	162 / 4,5	test
TOTAL:			2988 / 83	
<i>Unit of practical training of students</i>				
18.	Teaching Practice	4	486 / 13,5	reporting form
19.	The Practice for Creating Multimedia Learning Means	3, 4	162 / 4,5	reporting form
TOTAL:			648 / 18	
TOTAL for Units:			4716 / 131	

Source: Curriculum for bachelors of informatics

The curriculum totally provides for 7884 hours / 219 ECTS. Thus, the number of hours for informatics and subject-methodological disciplines (4716 hours / 131 credits ECTS) is more than half of all the hours. This makes provision for sufficient professional training of students in the area of psychological and pedagogical disciplines, informatics profiled disciplines, professionally-oriented and methodical subjects, ICT and the use of Internet-technologies.

3.2. Formation of distance learning competences of future information science teachers via blended learning

The curriculum for bachelors of informatics has been analyzed in the previous sub-chapter of this article. Also, it is necessary to describe the knowledge and skills which conduces to the formation and development of students' distance learning competences according to disciplines within which they are formed. This is shown in Table 2.

Table 2.

Analysis of the knowledge, ability and skills that conduces to the formation of students' distance learning competences

№	Summary of knowledge, ability and skills	Academic discipline	Course
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№	Summary of knowledge, ability and skills	Academic discipline	Course
1.	General information about distance learning, its application in the learning process, principles of organization, characteristics of distance learning systems, etc.	<ul style="list-style-type: none"> • Computer Networks and the Internet • Selected Issues of pedagogical technology 	2 4
2.	The ability and skills to use distance learning technology in own learning activities (for getting of learning materials, passing of questionnaire survey, and testing, etc.)	All the disciplines of the Table 1, except for psychology and pedagogy. Also under development is a resource for interaction between students with teachers and other students during teaching practice	1-4
3.	The ability and skills to create certain elements of the distance course	<ul style="list-style-type: none"> • Computer-oriented learning systems of Natural Sciences • Methods of Informatics Learning • The Practice for Creating Multimedia Learning Means 	4 3, 4 3, 4
4.	The ability and skills to process data in different forms, convert and prepare learning materials for publication on the Internet by using different software	<ul style="list-style-type: none"> • Computer Science • ICT • The Practice for Creating Multimedia Learning Means 	1 1 3, 4
5.	The ability and skills to create some themes of distance course to support training of pupils	<ul style="list-style-type: none"> • Computer-oriented learning systems of Natural Sciences 	4
6.	The ability and skills to design and create the structure of the distance course	<ul style="list-style-type: none"> • Computer-oriented learning systems of Natural Sciences 	4
7.	The ability and skills to organize of distance learning system operation and maintain availability of this system	<ul style="list-style-type: none"> • Computer Networks and the Internet • Selected Issues of Computer Engineering 	2 3
8.	The ability and skills to use telecommunications means of the Internet and distance learning system for interaction	<ul style="list-style-type: none"> • Computer Networks and the Internet • Computer-oriented learning 	2 4

№	Summary of knowledge, ability and skills	Academic discipline	Course
	between teachers and students	systems of Natural Sciences • Selected Issues of pedagogical technology • Selected Issues of Computer Engineering • Selected Issues of Object-Oriented Information Technology and Programming	4 3 4
9.	The ability and skills of information "navigation" to search and process data on the Internet, and to work with informational and educational resources	• Computer Networks and the Internet In fact, these skills are fragmentarily gained by the students during the learning process almost of all professional-oriented courses	2

Source: Own elaboration

Based on Table 2, we can conclude that following components of distance learning competences are formed due to the process of professional and practical training of the students:

- high level competences in the use of Internet-technologies;
- partial competences in the area of pedagogy and psychology via distance learning;
- insufficient (almost not formed) competences in the area of organizing and managing of distance learning.

As can be seen from Table 2, future teachers, starting from the first-year course in HEI, learn to effectively use modern ICT and distance technologies. They study pedagogy, psychology, modern educational technologies, and methods of teaching of basic subjects (mathematics, physics) with ICT using. So, students of informatics specialties are the most psychologically and professionally prepared to get qualification of distance learning tutor in future.

Working with the distance learning systems, such as Moodle, is an effective tool for formation, developing and improving of distance learning competences of future information science teachers. We will consider implementation conditions of this in Dragomanov National Pedagogical University (Kyiv, Ukraine).

Teachers of Institute of Informatics in Dragomanov National Pedagogical University add elements of distance learning to traditional training of the students. Educators

and learners work with distance learning system Moodle (<http://www.moodle.ii.npu.edu.ua>). By that, educators implement the blended learning.

According to the practice and researches, the current trend of full-time education is firmly evolving towards blended learning. Blended learning combines traditional and distance learning means. The idea of using distance learning elements in blended learning lies in the fact that students learn a certain portion of disciplines by means of traditional forms of learning, and the rest by the disciplines with the use of network technologies.

Blended learning is practiced as an element of full-time education during classroom and self-dependent work of students at the Institute of Informatics in Dragomanov National Pedagogical University (Kyiv).

Thus, integration of distance learning elements into traditional training allows not only implementing of the blended learning and gaining of relevant distance learning competences by students, but also formation of skills in working with new ICT and continuing education skills.

Based on these researches, we can conclude that future information science teachers, who get qualification of bachelor of informatics, are the most prepared to use distance learning technologies in their future professional activity. Distance learning competences of students are formed and developed during the learning process. This can allow them to be qualified as distance learning tutors in the future.

4. CONCLUSION

Based on the conducted research, we consider that future information science teachers are not only ready for active use of distance technologies for their learning, but also for getting qualification of the distance learning tutor in their further education; since they gain appropriate distance learning competences within the training process.

Based on the analysis of researchers (Smyrnova-Trybulska 2007, Polat 2004, etc.) as well as on personal experience, developing of relevant courses content is planned in the following areas:

1. Distance Education in Ukraine and abroad.
2. Basics of distance education and learning. Characteristics of distance learning systems.
3. Methods and didactics of distance learning.
4. Theoretical and practical aspects of organizing and managing of distance learning process.

5. ICT, telecommunications networks, the computer network Internet, and possibility of their use via distance learning.
6. Pedagogical monitoring, evaluation of the effectiveness of the learning process via distance learning.
7. The modern person-oriented forms and methods of training in distance learning.

Our further research concerning this problem shall be focused on exploration of foreign experience in training of distance learning tutors, development of the curriculum, training programs and courses for the specialization *Distance Learning Tutor* (taking into account this experience), and introduction of these ideas to the learning process of the Institute of Informatics in Dragomanov National Pedagogical University (Kyiv), in particular, in the learning process of future information science teachers.

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