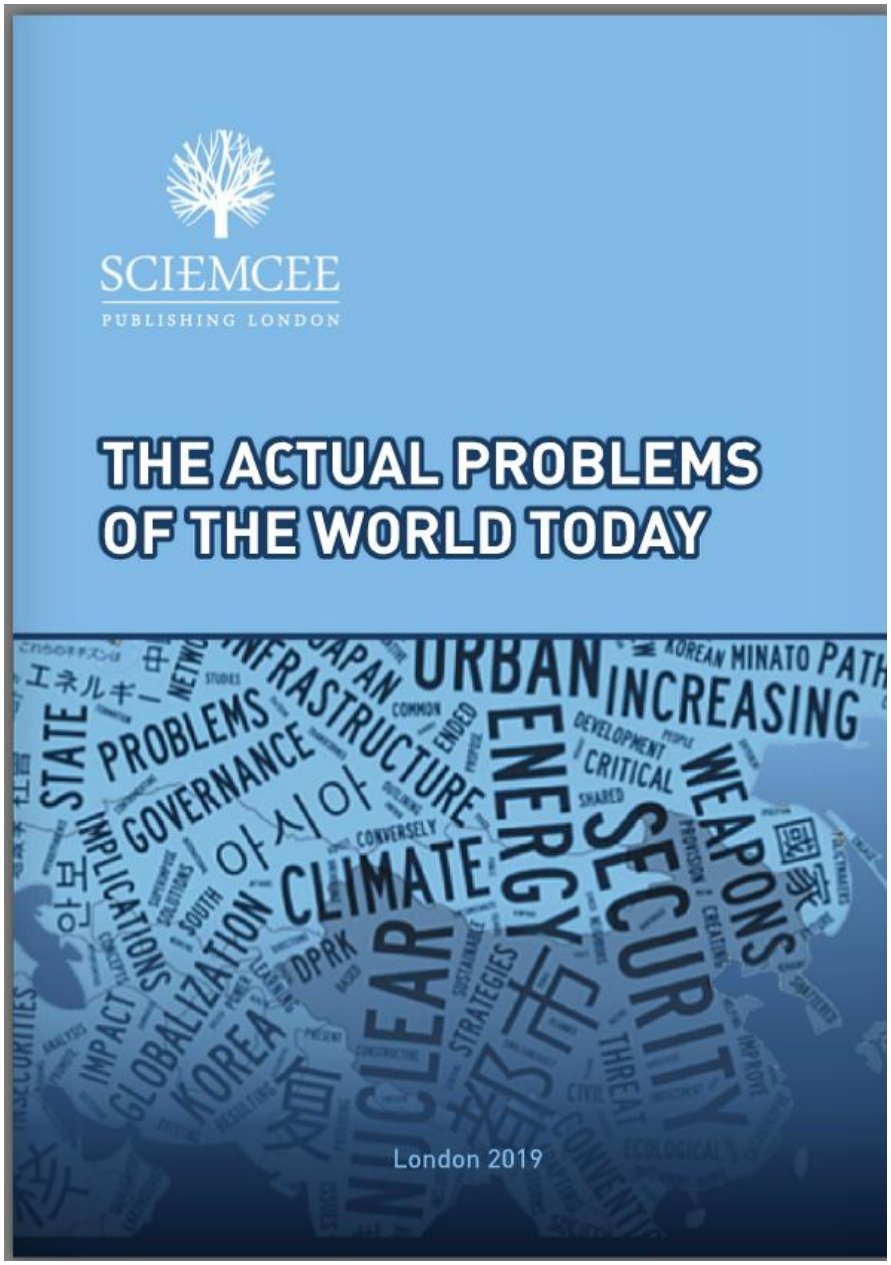
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THE ACTUAL PROBLEMS OF THE WORLD TODAY

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APPLICATION OF CLOUD-BASED LEARNING TECHNOLOGIES IN ORGANIZATION OF RESEARCH WORK OF STUDENTS OF HUMANITARIAN SPECIALTIES

Introduction The analysis of social and economic changes shows that Ukraine is undergoing constant restructuring of political, economic and social spheres, which models national priorities and influences on the innovative development of education. One of perspective decisions of the outlined problem, according to the experience of developed countries, is building up of innovative school on principles of cloud-based learning technologies introduction in an educational process.

The problem of implementation of cloud-based learning technologies in realization of bachelor program, including the course of informatics' disciplines on research basis, currently acquires actuality in connection with realization of Law on Higher Education (2014) and Decree of the President of Ukraine "National Strategy for the Development of Education in Ukraine for the period till 2021" (Strategy of 25.06.2013 № 344/2013)

The current state of ICT introduction in an educational process outlines the necessity of research of cloud-based learning technologies use during organizing of the research work of students of humanitarian specialties. Together with the analysis of cloud-based learning technologies application in educational process in course of informatics, appears another topical problem the forecasting further strategy and the creation and use of these technologies at preparation of students of humanitarian specialties.

The research work of students of humanitarian specialties in higher educational establishment, which is carried out in form of individual research work or in form of different level of qualifying works, it is possible to observe as the adjusted mechanism, which aims to ensure compliance of the outlined function, it is research-based study. In this paper, the usage of cloud-based learning technologies revealed the system of students' research work organization toward mastering ICT literacy. Task of research:

to establish a system of support of students' scientific-research work to master ICT literacy; to reveal the model of implementation of students' scientific-research work in the learning process of the computer science disciplines; to elaborate an algorithm for cloud-based learning technologies application in the organization of research work of students of humanitarian specialties; to outline recommendations for the structure and content of electronic learning materials in the study of cloud-based learning technologies.

The basics of this research are disclosed in the Ukrainian publication [1]. The current study is a logical continuation of the research, colleagues in the department joined him[2]. This study aims to involve European colleagues in the further testing of the given model – is the preparation of student research papers for participation in international projects. This study aims to involve European colleagues in the creation of joint international students' scholarly works for participation in international projects with the help of the model " Model of the organization of cloud-based learning technologies for the teaching of computer science disciplines for students of the humanities "

Research results. *1 Model of the organization of cloud-based learning technologies for the teaching of computer science disciplines for students of the humanities*

Carrying out the experiment with the use of network services and technologies in the course of informatics' disciplines, we have chosen, as the basis, the task of implementing ICT in higher education.

Education of Ukraine is oriented on the European standards, and now it appeared before the necessity of transition from the use of traditional forms and methods of education to implementation of new technologies in education. This is motivated by the fact, that the bulk of the students do not have time to learn the course during lectures and seminars, which are allotted in the curriculum. The increase of independent and individual part of work of students requires from a teacher the implementation of new learning technologies for mastering the required amount of information.

The carried out internet questioning among teachers of educational institutions and Internet users indicates a growing number of students who use e-learning technologies (http://www.voxru.net/arc/internet/interobraz2.html). The analysis of learning organization on research basis, in higher educational establishments of Ukraine gives grounds to assert that the introduction of new paradigm (for the Ukrainian educational space) in the educational process has fragmentary, spontaneous character mostly.

Thereby emphasizing the need of implementation of interdisciplinary connections based on information and communications technologies.

The strategic goal of implementing the cloud-based learning technologies in course of informatics' disciplines is to expand the informative space and also for realization of different principles of learning.

The tactical aim of development of this trend is the further improvement of use of modern information and communications technologies and teaching tools.

The tactical and strategic goals foresee the improvement of academics' expert knowledge in sphere of ICT [3,4].

The goal provides a specific solution of educational problems; it is the development of mechanism for the organization of students' research work toward mastery of ICT literacy that will provide its implementation in the educational process at various educational levels. The key components of academics' ICT expert knowledge are the ability to use digital technologies, tools and/or communications networks for the provision of educational services (this includes network services and cloud-based technology).

Use of cloud-based technologies in teaching subjects in course of informatics' disciplines requires special and diligent teacher training. In the conditions of students' research work implementing in the educational process, teacher (tutor) coordinates the learning process; activates the developmental potential of education; defines educational goals of high cognitive level; builds dialogical communication with students.

Didactic support of research-based learning involves extensive use of traditional teaching forms, there are lectures, seminars, consultations, independent work. The introduction of cloud-based technologies in the educational process involves the use of active methods such as business games, trainings, group discussions, individual training, etc. The choice of particular learning technology for each specialty and its detailing regarding discipline carries out at the level of departments and specialties.

The investigation of students' research work organization in course of informatics was carried out in three stages, they are:

The first stage (2008-2010 academic years) – students' research work was organized within limits of the scientific group "The use of ICT in education".

The second stage (2010-1012 academic years) - students' research work was organized within limits of the independent work in course of informatics, in module which calls "Network technologies in the learning process".

The third stage (2013-2017 academic years) - students' research work was organized with a combination of scientific group and project-oriented independent work of academic groups towards "Cloud-based technology in the educational process".

The model-table "Model of the organization of cloud-based learning technologies for the teaching of computer science disciplines for students of the humanities" was

formed for convenience (Table 1).

Table 1 The model-table "Model of the organization of cloud-based learning technologies for the teaching of computer science disciplines for students of the humanities"

Stage	Name of the stage	Activity	Term	
			Within limits of subject matter	Within limits of scientific group
I.	Uniting into the small groups	Uniting into the small groups (3-5 persons), determination of project manager, distribution of duties	The first lesson	1st meeting of the scientific group
II.	Determination of cloud service/technology	Determination of cloud servise/technologie among free online services. Choose a theme for a project	The second week of the educational process	2nd meeting of the scientific group
III.	Determination of goal and object	Work description for processing of service/technology	The third week of the educational process	3rd meeting of the scientific group
IV.	Distribution of tasks in group	The distribution of tasks and areas of research within the small group (according to the chosen and concerted tasks)	The third week of the educational process	3rd meeting of the scientific group
V.	Formation of publication's components	Preparing of materials for article and thesis about the use of chosen service or technology (according to each participats' concerted task)	Up to 8th week of the educational process	3rd-4th meeting of the scientific group
VI.	Layout and editing	Layout of publication in the unique unit, editing of mistakes, improvement of material	Up to 10th week of the educational process	7th meeting of the scientific group
VII.	Abstract presentation	Presentation of materials on the select conference (competitions, seminars, round table)	Up to 13th week of the educational process	8th meeting of the scientific group
VIII.	Conversion of materials to electronic teaching materials	Creation of electronic educational complex (for one subject) in the distance learning system based on materials (Moodle LMS)	Up to 16th week of the educational process	8th meeting of the scientific group
IX.	Report on the conference	The report should contain theoretical part and practical part, in particular experience of using selected services/technologies in a particular specialty	Up to 16th week of the educational process	Up to 8th meeting of the scientific group
X.	Preliminary project defense	Preliminary project defense within the academic group (sections of the science club)	17th week of the educational process	9th meeting of the scientific group
XI.	Project defense	Research project defense	18th week of the educational process	10th meeting of the scientific group

Source: developed by the author

In this table in the column "Term", we give two types of the organization of students' research work; the first one is within limits of independent work in course of informatics' disciplines (The quantity of ECTS-credits for discipline correspond to 2-4); the second one type of organization of students' research work is within limits of scientific group (the plan provides for 10 meetings for academic year, and the duration of meeting varies from 2 to 4 academic hours).

Outlined table-model based on results of activity of science club "The use of ICT in education" [5] and , which was founded in Borys Grinchenko Kyiv University in 2008. The results of activity of science club were publications in professional journals and presentations at conferences at various levels. Only certain high-level achievements were recommended to press. Number of printed material ranged from 3-7 publications per year. Main principles and results of the scientific research group were reported and discussed at international scientific conferences, there are: The innovative scientific technology: advanced world experience (Kirovograd, 2012); The professionalism of the teacher in the context of Ukraine's European choice: the quality of education - the foundation of competitiveness of the future expert (Yalta, 2011.2012); National survey of young researchers in the context of modern science (Kyiv, 2010, 2011); Information Technology (Kyiv, 2014); scientific and methodical seminars of Department of Information Technology and Mathematical Sciences Borys Grinchenko Kyiv University (2008-2017). Selected works has been published in professional journals.

According to a new paradigm of education which is related to the Law of the Ukraine on Higher Education (2014) and also related to the formation of the XXI century skills for future graduates from the university, and in accordance with the provisions of the Bologna process, the prospect of further approbation of outlined model is preparation of students' scientific works to participate in international projects.

The algorithm of cloud-based learning technologies application in the organization of research work of students of humanitarian specialties

Within the limits of cloud-based learning technologies application in professional training of future specialists, as the bases was selected academic group to work with, the bulk of participant involved in research were students from different specialties, who studied the course of informatics' disciplines.

Presentation of the outlined model-table is preceded the first stage of project « Model of the organization of cloud-based learning technologies for the teaching of computer science disciplines for students of the humanities ». This aspect can be attributed to the organizational component of cloud-based methodological training system in course of informatics' disciplines. It should be noted that this model is initial, and presented the following data (including the algorithm of organization of students'

research work in process of cloud-based technologies learning) is its derivative toward creation a system of cloud-based learning technologies in course of informatics' disciplines for future specialists of humanitarian specialties'.

The first stage is uniting into the small groups; it aims to make a creative teamwork or small research groups. These groups on principles of research-based study will investigate and will make a detailed analysis and systematization of material according to chosen theme.

In this small research groups, participants choose themselves comfortable roles. These roles are project manager, a technical manager, scientist and editor.

The second stage is determination of cloud service/technology; it can be realized in different ways, they are:

A. Some of project participants look for cloud services, define suitable one for use in their future professional activity. Then they form the theme of research, outline the problem of research.

B. Some small groups of project participants need a list of services among which to choose. They choose from this list and define the theme of research.

C. The most passive (at this stage) small research groups need to specify exactly which cloud service for research.

We give several variants of services (2-3) for possibility of election. If for participants of small groups are difficult to formulate a theme and problem of research, we will use a heuristic conversation, debate or discussion items, to suggest an idea for independent formation of theme and problem of research.

We want to notice, that important characteristics of selecting cloud-based services are free of charge and demand among network users.

The third stage is determination of goal and object. Despite the diversity of specialties that fall into experimental contingent, the objectives of research should include: the analysis of history and current state of the selected service; practices in this service; the possibility of use the service in future professional activity, it is the main recommendation for formation of objectives of research.

The fourth stage is distribution of tasks in group. Based on the selected at the first stage roles, at this stage, all members of small research group involved in use of word processor (MS Word / Google Docs), graphic editor (Addobe, PixelExpres etc.), means of analyzing network data (Google Scholar), means of carrying out of poll / questioning (Blogs, Google forms), and with selected cloud services.

At this stage, the head of a small research group creates and gives access to each member of this group to document Google Docs (pattern research), where they will be store up and edit the materials of research.

The fifth stage is formation of publication's components; students study existing sources, and make the draft of publications. As an example of materials preparing, were

given requirements for publications in leading Ukrainian professional journal "Information technology and learning tools" [6]. Moreover, the requirement for admission to the further production process is the test of material by the system of anti plagiarism. Also at this stage make the abstract for conference. The conferences (round tables, seminars), for approbation or press of materials, are selected randomly.

The materials are formed separately by each participant of small research group. For example: one is engaged in study of historical and theoretical aspects of using the selected service; the second provides step-by-step study of practices in the service, defines its functions, possibilities, advantages/disadvantages; the third examines the characteristics of cloud service in the specifics of the future specialist (in accordance with the specialty on which the student studies).

The sixth stage (Layout, editing) aims to build a clear structure of article. Before composing the material the group performed scientific processing, reviewing and editing of materials within a small research group. Created publication checked for compliance with all the requirements of writing scientific articles (according to the Decree of the Higher Attestation Commission of Ukraine dated 15.01.2003, № 7-05/1 and the requirements for the articles in electronic scientific edition "Information technologies and learning tools").

The realization of this stage of the study stimulates students to develop the skills and techniques of research.

The seventh stage (Abstract presentation) is intended to stimulate participants of the science club and participants involved in the project (in the framework of teaching computer science subjects) to trial the publication of the research results. Based on the created articles are formed abstracts (2-5 pages), then select the nearest (in time and geography) conference in the range of problems which includes student research and present on the conference materials (each study group separately). A frequent example of such conference is "Information technologies: Ukrainian conference of young scientists".

Note: during this stage is given access to all members to Electronic educational and scientific environment of distance learning in the system Moodle. This refers to the fact that for each specialty, which is involved in the project, is created a new course in the system Moodle. Where participants have the role of "teacher" – they can create, edit, and delete materials.

The eighth stage is conversion of materials to electronic teaching materials for electronic educational and scientific environment LMS Moodle. Note: articles must be peer review to pass on publishing in professional publications.

Structure and recommendations for the implementation of this part of the study (component "E-teaching materials in Moodle LMS") are given below in this article. This component acts as an element of the training course in LMS Moodle.

Similar to the work with the theoretical material in a small research group, students organize themselves so that all items were distributed evenly among the project participants. Such as:

•theoretical component: lecture, pages with theoretical data, additional material, glossary;

•practical part: laboratory/practical work, teaching materials for the execution of this assignment (perhaps an example of the work);

•multimedia component: presentation of theory, practice video manual;

•Means of verification: questionnaires/initial and thematic control/final control.

The ninth stage (Report on conference) aims to develop in students professional skills, such as demonstration of theoretical achievements, presentation and defense of the practical results of the research. During report is recommended to use the slides as demonstration of practical work in real mode. Experience of implementation of this stage gives grounds to assert that the crucial are the style of data presentation, the ability to identify the main aspects of the study and charisma of speakers. Special discussion and debates are caused by the reports with practice-oriented approach. This sets the range of projects-leaders who will continue to pretend to prizes (during the global defense).

At this stage enters into force methodological approach in teaching which calls research-based study that enables the development of students' productive activities and critical thinking.

The tenth stage is a preliminary project defense within the academic groups (science club). The main task is preparation for participation in events of scientific competition, the adjustment of evaluation criteria, taking into account the proportion of research content. An important aspect of the event is to develop scientific and critical thinking, as well as the improvement of cooperation between participants on the principles of counseling.

At this stage within the academic group or scientific club, the results of this project are the represented in any form. The intent of the project, it is provided access to view materials of competitors. Audience is randomly divided into "critics" and "followers". The task of critics is to outline the shortcomings of this project; "followers" should outline the benefits of this project.

Based on the statements of critics and followers, students schedule changes and clarification. This table makes it possible to improve the project. The groups have from one to two weeks for edits.

The eleventh stage is global defense of projects. In this event it is advisable to involve employees of the scientific part, representatives of the departments. The number of participants in the event may consist of 80 or more people; it is

recommended the election of a large auditorium (possible conference room) and each small research group should have access to the Internet.

By using cloud services (specifically Google Spreadsheets) the heads of the research groups granted access to the online resource, which has criteria for project evaluation and personal sheet for each group where they put points and comments to their competitors.

At this stage, the representatives of teaching staff are observers, according to observance of procedure of determining the winner.

As noted above, the table is stored in the cloud. The access to edit table is closed for 3-7 minutes after last report. According to the automatic scoring, the determination of rating of the conquered places is automatic.

Note: the participants should not see the final list, until the end of the completion of the assessment. This is done to reduce the possibility of "manipulation" of data.

The results are reported no later than 15 minutes after the completion of all reports. According to the results, for small research groups (academic groups), studying information discipline in the current semester there is reason to talk about the possibility of early getting good grades in the exam. The possibility of obtaining exam scores is only possible for those students who have fully completed all tasks of the curriculum of the discipline. The best articles, according to the decision of the Department's faculty, may be recommended for participation in competition of student's scientific works, or for publication in scientific journals.

Thus, the implementation of the model table "Organization of research work of students in the learning process of the computer science disciplines" enables full use of cloud oriented learning technologies and ensures the implementation of research-based training. In particular, there is the solution of a number of interdisciplinary research problems, such as: the change of attitude towards the student (from passive participant to active researcher, student is part of the scientific community); conducting academic research and receiving new competencies; students create their own approaches to research; students form own ideas and perceptions; students realized analysis of work carried out.

Recommendations for the structure and content of e-learning materials in the study of cloud-oriented learning technologies

Recommendations for the structure and content of e-learning materials in the study of cloud-based learning technologies are summarized in the table "Structure and recommendations for the content of the research topic" (component "E-learning materials in Moodle LMS") (Table 2).

Here is an example of implementation of this table in the system of distance learning Moodle (Fig. 1).

Table 2 Structure and recommendations for the content of the research topic (component "E-learning materials in Moodle LMS")

№	The name of the item	Type of activity or resource	Explanation	Note/example
1	The title of the topic	The inscription	Contains a theme, a goal, a small graphic element (service ID). People worked on the project	Up to 160 characters
2	The breakdown into components	The inscription	Use unified type, size, located on one level	Theoretical training material: main, additional. Self-control test, etc
3	Lecture	Lecture	Contains theoretical material and questions to theory (alternately). The theoretical material is 1,2-screen pages of text with a logical graphic accents, the highlighting of the base material. Question should formulate in that way, which would indicate that the student has mastered the material.	The number of lectures = the number of problems in the article. Evaluates the activities of 2-3 points
4	The points of theory	Page	Consists of: the problematic issue, the main material with a logical and graphic accents, final question, the main highlight of this material	Each item consist of 2-3 screen pages of materials
5	Presentation on the theory	File	15-20 slides: title, content, conclusions relevant to content, literature, 180-200 characters, not less than 16 type size	It is necessary to post demo version
6	Additional material	Page, file, web link	Additional materials that may interest potential users of this service	Video, book, article, etc.
7	Practical task	Task	Subject matter, objective, methodological support, the progress of work with detailed tasks (each task needs to have a point). Should include: evaluation criteria, deadline, literature	Evaluates the activities of 20-30 points. The number of tasks at least 20
8	Methodological recommendations for the practical assignment	File	Contains methodical recommendations about performance of practical tasks	Can be submitted in PDF format
9	Video	URL	Contains brief guidelines for using this service. Practice video manual.	Share on youtube
10	Test task	Test	30-35 questions (40% of closed type, 20% of matching questions, 20% of "Yes, no" questions, 20% of questions with short numeric answer)	It is not recommended to use open-ended questions
11	Vocabulary	Glossary	15-20 terms	With pictures (links)
12	Questionnaire / Survey	Feedback	It contains questions about service usage analysis	Not mandatory
13	The abstract for the conference	URL	Contains a link to Google Docs document "Abstracts"	Is shared on the period of project defense

Source: developed by the author

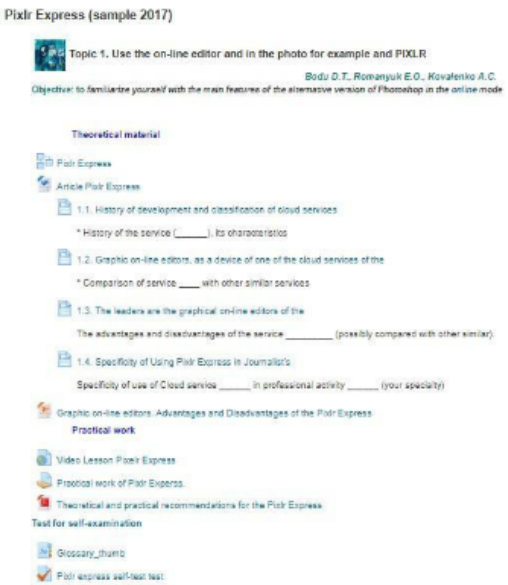
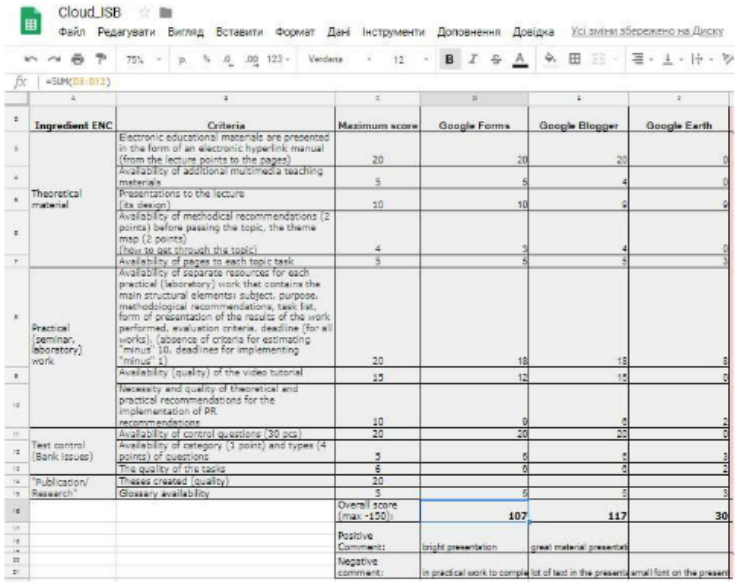


Figure 1. Example theme Pixl Express as e-tutorials
Source: developed by the author

This aspect of the work shows the ability of student to apply ICT competence in practice. As can be seen from table 2 and fig. 1, groups use a cloud-oriented services, video hosting services, video editors, and graphic editors for the formation of aterials, master the skills of working in distance learning system Moodle, learn skills of the XXI century.

Here is an example of the results of how students analyses projects of their competitors (Figure 2). The basis of the assessment criteria of the course was adopted Requirements to the examination of e-learning courses in Borys Grinchenko Kyiv University [7].

Therefore, requirements are formed according to the table "Semantic content of topics (elements of e-learning course)". Requirements designed to reveal the competence aspect of the training as a small research group in general and specifically for each student [8].



Cloud_ISB

Файл Редагувати Вигляд Вставити Формат Дані Інструменти Доповнення Довідка Усі зміни збережено на Диску

=SUM(D3:D12)

Ingredient ENC	Criteria	Maximum score	Google Forms	Google Blogger	Google Earth
Theoretical material	Electronic educational materials are presented in the form of an electronic hyperlink manual (from the lecture points to the pages)	20	20	20	0
	Availability of additional multimedia teaching materials	5	5	4	0
	Presentations to the lecture (its design)	10	10	9	9
	Availability of methodical recommendations (2 points) before passing the topic, the theme map (2 points) (how to get through the topic)	4	5	4	0
	Availability of pages to each topic task	5	5	5	3
Practical (seminar, laboratory) work	Availability of separate resources for each practical (laboratory) work that contains the main structural elements subject, purpose, methodological recommendations, task list, form of presentation of the results of the work performed, evaluation criteria, deadline (for all works), (absence of criteria for estimating "minus" 10, deadlines for implementing "minus" 5)	20	18	18	8
	Availability (quality) of the video tutorial	15	12	15	0
	Necessity and quality of theoretical and practical recommendations for the implementation of PR recommendations	10	0	0	2
	Availability of control questions (30 pcs)	20	20	20	0
Test control (Bank issues)	Availability of category (3 point) and types (4 points) of questions	7	5	5	3
	The quality of the tasks	8	0	0	2
"Publication/ Research"	Theses created (quality)	20			
	Glossary availability	5	5	5	5
	Overall score (max -150):		107	117	30
	Positive Comment:		bright presentation	great material presented	
	Negative comment:		in practical work to comple	lot of text in the present	small font on the present

Figure 2. Example of the results of evaluation of research projects
Source: developed by the author

To verify the effectiveness of designated model use was carried out statistical processing of the results of the initial and final control of knowledge of students while studying "Information learning technologies ", the theme "Cloud-oriented services and technologies in the educational process". The material was presented in the Moodle system for the control (93 persons) and experimental groups (82 persons) on their own consideration. The control group had mastered the learning material traditionally (in the framework of studying the topic using e-teaching materials in the Moodle system). The experimental group carried out the training according to the algorithm provided in this article. According to the results of the final test "Cloud-oriented services and technologies in the educational process" control and experimental groups' data were obtained. Here are the results of passing the final test for the experimental (EXG) and control (CG) groups as a percentage (Fig 3).

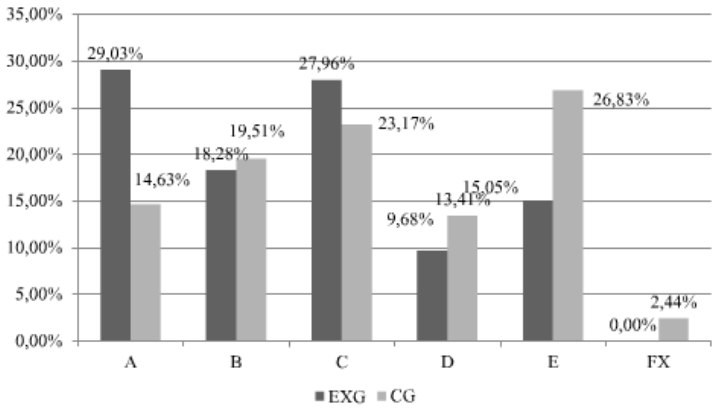


Figure 3.The results of passing the final test for the experimental (EXG) control (CG) groups represented by the ECTS scale
Source: developed by the author

As the contingent of the experiment covers the bachelors, masters there are individual cases of participation in the scientific group of postgraduate students it can be argued that, with the help of implementing of recommendations for the structure and content of e-learning materials in the study of cloud-based learning technologies is carrying out the following learning paths:

- Learning based on research;
- Learning focused on research;
- Research.

On the basis of the performed analysis of cloud-based learning technologies implementing in the computer science disciplines among various specialties can make some recommendations:

1. It is advisable to use the model-table "The organization of students' research work in course of informatics' disciplines", with appropriate adaptation for material and technical capacity of the particular institution (a specific structural unit or Department).
2. The number of stages can be varied depending on the purpose of research-based education.
3. The introduction of this model contributes to productive activity of students; development of new knowledge; and experience, which is close to requirements of the labor market; the development of students' critical thinking.

4. Should follow the research procedures of problems' decision that put before the participants of the experiment: identifying problems; definition, clarification of weighty issues; planning and development of educational actions; collection and processing (analysis and synthesis) data; implementation, generalization, drawing conclusions, verifying hypotheses; presentation of results; the implementation of a reflective analysis of the experiment.

CONCLUSION

1. The model-table "Model of the organization of cloud-based learning technologies for the teaching of computer science disciplines for students of the humanities" was formed. The model consists of the following components: Uniting into the small groups; Determination of cloud service/technology; Determination of goal and object; Distribution of tasks in group; Formation publication's components; Layout and editing; Abstract presentation; Conversion of materials to electronic teaching materials; Report on the conference; Preliminary project defense; Project defense. Each stage has a specific deadline and aims to use cloud-based learning technology on a research basis.

2. In accordance with the objectives of the study disclosed the algorithm the use of cloud-based learning technologies in the organization of students' research work. The algorithm contains eleven sequential steps, each one based on the previous one. In case of detection of gaps, students need to get back to work on this demanding stage. The result is the formation of articles, participation in the conference (Abstracts and approbation of the research results), and the creation of e-learning materials for a particular cloud service (Electronic teaching materials in LMS Moodle), the acquisition of ICT competencies by participants of the experiment.

3. Recommendations for the structure and content of e-learning materials in learning cloud-based learning technologies were described: a clear structure (theory, practice, and self-analysis), practice-oriented use of the investigated service (General function, the specific use in the future profession), completeness and conciseness of presentation topics (tasks, methodical recommendations, practice video manual). All the elements are aimed at getting the students of the twenty-first century skills (ICT literacy, communication skills and collaboration skills, critical thinking, etc) that makes them competitive in the labor market.

Prospects for further research are seen in the improvement of the model of "the Organization of scientific-research work of students in the learning process of the information disciplines" and detailing the specifics of its use in the training of students of humanitarian specialties.

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