

Distance Learning through Heuristic Approach

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Abstract. *The article highlights the possibility of improving distance learning through its combination of modern information and communication technology (ICT) with heuristic technologies in the university educational system. The paper is concerned with new method that contributes to the successful formation of basic professional competencies of distant students. It provides interactivity, creativity and productivity of the educational process and gives the opportunity for students to create their own, important educational products. It should be noted about available heuristic technologies for distance learning that contribute to better, meaningful development of educational material, increase students' motivation, develop their creative (methodological and cognitive) abilities, allow to increase their level of cognitive and creative autonomy, develop logical and creative skills. In accordance with modern requirements of the education the students' learning of professional development competences is oriented to the development of heuristic thinking and heuristic skills for students' successful professional and creative self-realization. It is stressed that the enrichment of traditional forms of distance education with heuristic tools requires not only the teacher's professional competence in the organization of distance learning, but also the ability to apply heuristic technologies, to organically combine them with the perfect knowledge of computer equipment, developed educational media programs, etc. The conclusion dwells upon the results of the evaluation of the student's oral report. Attention is drawn to the positive dynamic in the development of cognitive, creative, organizational skills. It has been experimentally proved that the digital and heuristic technologies, diagnosis of telepresentation contribute to the immersion of distant students in search-transforming, constructive, creative activity, allowing them to make a qualitative transition from a superficial understanding of their profession to a deeper and more creative one.*

Keywords: *distance learning; heuristic technology; information and communication technology; professional competencies; pedagogical diagnostics; evaluation criteria;*

Introduction

The dynamic of economic and socio-cultural processes taking place in the modern society contributes to the active introduction of distance education as one of the directions of reformation and strategic development of a higher education. Pedagogical opportunities of distance learning help to form the professional competencies of the future specialist. Distance learning creates more comfortable, compared to traditional types of training, conditions for creative expression of a personality; helps students to demonstrate the products of their creative activity to anyone; provides expert assessment of students' creative achievements. Distance learning involves the integration of information-communication and heuristic technologies, which together provide interactivity, creativity and productivity of the educational process. It gives the opportunity for students to create their own, important educational products, to constantly enhance students' educational achievements.

Material and Methods

Available heuristic technologies for distance learning contribute to better, meaningful development of educational material, increase students' motivation, develop their creative (methodological and cognitive) abilities, allow to increase their level of cognitive and creative autonomy, develop logical and creative skills. In accordance with modern requirements of the education the students' learning of professional development competences is oriented to the development of heuristic thinking and heuristic skills for students' successful professional and creative self-realization.

Researchers Nefedchenko, Nefedchenko, and Hladchenko (2021) found a certain difference between the concepts of “creative activity” and “heuristic activity”. The second concept is broader, it includes not only purely creative activities such as creating something new, original for a particular person, but also searching, transforming, constructing something new from already known components (such as own translation of the proposed text in native or foreign language) and, of course, creative activity, it means something exclusively creative (as the creation of new educational product). Due to the mentioned differences in the scientific Ukrainian school of Professor M. Lazarev, which includes researchers, lecturers of Foreign Languages Department of Sumy State University, T. Plokhuta, I. Zaitseva, O. Nefedchenko, N. Usenko, S. Mikhno, different levels of activity in heuristic education are revealed (with gradual complication): heuristic-search, transformative (reconstructive), constructive and creative. The highest level of heuristic education - creative activity - involves the creation of individual and team original projects, forecasts of educational and professional activities, professionally oriented works; reviews of scientific, literary, journalistic works; creation of models of dialogical cooperation, diagnostics and evaluation of created educational products, in particular with the use of

computer information and communication technologies (ICT); development of new algorithms for certain activities, tests for assessing knowledge and skills, etc.

Scientists Alammary, Sheard, and Garbone (2014), Bonk and Graham (2006), Lazarev (2014), Khutorsky (2005)) and others have proved that for effective organization of distance learning, it is necessary to have a combination in distance learning of different types of information and communication technologies (ICT) (information, interactive, diagnostic) and heuristic didactic forms, methods and means (educational design; dialogue interaction; professional-creative discussions; media conferences; heuristic test tasks on the use of some educational and creative questions; presentation of creative projects with their interactive discussion; creative computer games, etc.). This combination can lead to productive results. The application of the heuristic technologies in distance learning makes it possible to achieve the strategic goal of modern higher education - mastering by the future specialist the professional competencies at the creative level and successful implementation of them in practice.

The purpose of the article is to find out the conditions for successful formation of the future specialist's professional competences in distance learning of foreign languages using the heuristic technologies.

Theory

The enrichment of traditional forms of distance education with heuristic tools requires not only the teacher's professional competence in the organization of distance learning, but also the ability to apply heuristic technologies, to organically combine them with the perfect knowledge of computer equipment, developed educational media programs, etc. Therefore, the organization of distance learning with the usage of heuristic technologies includes (Zaitseva, 2016): 1) mastering the theoretical foundations of computer literacy and heuristic learning; 2) gaining the ability to work with computer hardware and other gadgets, including such know-how as creating and editing images, filling online resources with content, analyzing the functionality of a site for accessing it and sharing information; 3) creation through informative and communicative technologies (ICT) the creative educational products (projects, tables, diagrams, presentations, stories, letters, etc.); 4) achievement of communicative dialogic interaction of creative groups according to search, selection of new information, creation of innovative educational networks, complex projects (web pages, professional sites); 5) organizing the exchange of information, innovative ICT technologies with other departments, universities and experience in using the heuristic tools in distance learning, holding Internet conferences, presenting the professional and creative products.

Practical tasks of a distance course in foreign languages have detailed methodological recommendations for their implementation, some examples of algorithmic and heuristic actions. Particular attention is paid to the criteria for diagnosis and evaluation, forms and methods of presentation results, fulfilment terms and improvement of tasks. Distance learning has an active interaction of the teacher and students in real time with the analysis and assimilation of theoretical material and the developed skills. During this interaction, special types of heuristic questions were used, which required a sufficiently short answer with constant appeal to the lecture material and the list of recommended references and to solving problematic tasks. In the course of experimental work with the worked out distance courses the heuristic conversations are based on subject-subject dialogue interaction, group media discussions. A thorough attention was paid to creation and presentation by students the distant projects of heuristic content, stories, works, creative dialogues, types of heuristic questions; forming and solving problem situations, comparing, generalizing basic grammatical, lexical, literary categories, etc. (Zaitseva 11).

Students' independent cognitive and creative activity is effectively realised during heuristic learning, which is based on critical thinking of students, the ability to ask heuristic questions and provide open type tasks. It enhances the knowledge and skills acquired in the classroom, allows students to apply their own approaches to the study of educational phenomena and objects, often interdisciplinary, helps to create independent creative and educational products.

Researcher Khutorsky claims that in contrast to traditional learning, based on scientific theories, concepts and patterns corresponding to the world of real objects (dealing with which is very insignificant), heuristic learning offers the real objects of knowledge. The teacher exposes to students the ways of their cognition, helps to determine personal educational goals in accordance with the research topic, organizes and directs the process of students' independent work to create their own educational products. If the student does not have enough knowledge of cognitive activities in relation to unknown educational objects, the teacher suggests the use of certain methods of cognition and helps to carry out activities (Khutorsky).

Analysis of modern scientific sources proves the effectiveness of heuristic learning to enhance the independent cognitive and creative activities of students. So heuristic methods can:

1. Strengthen the content of the curriculum. Heuristic methods are effective for improving understanding of basic concepts. If the concept causes curiosity, it then increases the activity in the hippocampus (the part of the brain that is responsible for memory).

2. “Warm up” the brain for learning. Conducting a short survey at the beginning of the lesson can help students better absorb information during the lesson. Curiosity also prepares the brain for learning, allowing to increase the efficiency of understanding and memorizing concepts, acquiring skills. Heuristic questions help to start classes, stimulating interest, “provoking” it intellectually.

3. Contribute to a deeper understanding of information. Due to heuristic methods, many students understand how an idea develops, why a rule or formula works, in what way they can apply a rule, idea or formula correctly. This can be explained by the fact that the process of asking open type questions using original strategies enables students to take an active part in their learning. The same principle is applied to experimental learning, which puts students in the center of the learning process;

4. Form an initiative for self-improvement. Students can improve certain previously acquired skills through heuristic methods, many of which involve initiative and self-management. In particular, they learn to ask questions, search, discuss, collaborate and make their own conclusions. Although they can improve these skills through other activities, self-examination and analysis accelerate this development.

The study of heuristic methods has identified factors that increase the effectiveness of the educational process in the case of the using these methods in foreign language classes:

- individualization of training and creation of problem situations for the purpose of language abilities and skills development;
- intensification of creative and cognitive activities;
- increase motivation for creative and educational activities;
- creation of conditions for independent work.

Thus, heuristics facilitates decision-making by allowing the student to do it thoughtfully and productively. Analysts in any field use heuristics to solve various problems. Heuristic methods make the decision-making process simpler and faster with rationality and reasonable thinking.

As our observations have shown, students are generally positive about the perception and understanding of such heuristic assignments. However, in order to consolidate such a positive starting state and create real cognitive motives - strong inner impulses for active learning, we tried afterwards to constantly confirm the attractiveness of computer forms of distance education, which bring them interesting and colorful information and provide easy to master and test it. Meanwhile, they create a heuristic field for creative activity and according to their own choice make humanitarian products of their cognitive and creative self-realization - works, stories, descriptions, reviews, projects, etc. - the quality of which can be immediately measured and allowed for immediate improvement.

Here are some examples of creative tasks to enhance the independent cognitive and creative activities of students to prepare for a public speech in English at a training conference on the specialty.

Creative task 1 Use the list of questions provoking critical thinking (King) to research one of the suggested topics or your own topic.

Common Cybersecurity Topics

- 1 Network Security.
- 2 E-mail Security.
- 3 Web Security.
- 4 Next Generation Firewall (NGFW).
- 5 Data Loss Prevention (DLP).
- 6 Cloud Security .
- 7 Intrusion Detection Systems (IDS) or Intrusion Prevention Systems (IPS).
- 8 Identity and Access.
- 9 Cryptography.
- 10 Antivirus/anti-malware.
- 11 Ransomware.
- 12 Phishing Attacks.
- 13 Social engineering.
- 14 Advanced Persistent Threat.
- 15 Botnet.

CREATIVE QUESTIONS

(A thinking routine from Project Zero)

- 1 Pick one topic and brainstorm a list of questions about it.
- 2 Look over the list and transform some of the questions into questions that challenge the imagination. Do this by transforming questions along the lines of:
 - *What would it be like if ...*
 - *How would it be different if ...*
 - *Suppose that ...*
 - *What would change if ...*
 - *How would it look differently if ...*
- 3 Choose a question to imaginatively explore. Explore it by imaginatively playing out its possibilities. Do this by: Writing a story or essay, drawing a picture, creating a play or dialogue, inventing a scenario, conducting an imaginary interview, conducting a thought experiment.
- 4 Reflect: What new ideas do you have about the topic, concept or object that you didn't have before?

Creative task 2 Make a plan of your future presentation using your own list of questions provoking critical thinking and your own list of creative questions.

Creative task 3 Create PowerPoint Presentation to help you speak and make your public speech more attractive to the audience.

Creative task 4 Prepare a written report and an oral presentation on one of the suggested topics or other topic related to CYBERSECURITY to take part in the conference.

Students of major Cybersecurity were also offered useful links to modern sites for self-analysis and elaboration of requirements for PowerPoint presentations, glossary of the most common terms and abbreviations in the specialty, webinars of modern scientists on the most popular topics in cybersecurity and more.

Recommended Links

1 How to Make a Good PowerPoint Presentation (tips)

URL: <https://www.youtube.com/watch?v=grJ0FbpfvOw>.

2 How To Speak by Patrick Winston (video)

URL: <https://www.youtube.com/watch?v=Unzc731iCUY>.

3 *EnglishCLUB*

URL: <https://www.englishclub.com/speaking/presentations.htm>

4 Cybersecurity Glossary of Terms

URL: <https://www.globalknowledge.com/us-en/topics/cybersecurity/glossary-of-terms/>.

5 Perforce URL: https://www.perforce.com/p/kw/top-embedded-software-cybersecurity-vulnerabilities?utm_leadsource=cpc-googleadwords&utm_source=googleadwords&utm_medium=cpc&utm_campaign=KlocworkEMEA&utm_adgroup=Cybersecurity&gclid=CjwKCAiA_9r_BRBZEiwAHZ_v16pr3rrV9Av0ERYV7TmeT5g8P4orheyr5fmfeTW-dHHtTFOXxoUjKBoCC9sQAvD_BwE.

6 Everything Tech! Tweak library URL: <https://tweaklibrary.com>.

7 Brighttalk. Preventing Attacks on IoT Networks and Devices (webinar)

URL: https://www.brighttalk.com/webcast/16731/460529?utm_campaign=channel-feed&utm_source=brighttalk-portal&utm_medium=web.

8 Brighttalk. Protecting Cloud Assets from DDoS Threats (webinar)

URL: https://www.brighttalk.com/webcast/16731/457595?utm_campaign=channel-feed&utm_source=brighttalk-portal&utm_medium=web.

9 Brighttalk. End-to-End Autonomic Closed-Loop Security Management & Control for 5G Networks (webinar)

URL: https://www.brighttalk.com/webcast/16731/457497?utm_campaign=channel-feed&utm_source=brighttalk-portal&utm_medium=web.

10 Brighttalk. New Year, New Cloud

URL: https://www.brighttalk.com/webcast/16731/457175?utm_campaign=channel-feed&utm_source=brighttalk-portal&utm_medium=web.

The principles of heuristic questions (Morozov, 2000, p. 338) were taken into account in the classes on the subject “The Foreign language” to intensify the independent cognitive and creative activity of students:

1) optimality of the problem (through the method of skillful questioning the problem of the task is reduced to the optimal level);

2) fragmentation of information (heuristic questions allow to divide tasks into subtasks);

3) goal setting (each new heuristic question forms a new strategy - the purpose of the activity).

Before performing creative tasks, students need to consider a typology of questions based on the taxonomy (Bloom, 1956) the so-called “Bloom’s Chamomile”:

1) simple questions - while answering such questions you need to name specific facts, remember and reproduce certain information (“What?”, “Where?”, “When?”);

2) clarifying questions - questions aimed at obtaining unknown information (“What is the nature of ...?”, “What is the difference between... and...?”);

3) interpretation questions - questions aimed at establishing cause-and-effect relationships (“Why...?”);

4) creative questions - questions with elements of assumptions, predictions (“What would change in the world if...?”);

5) evaluation questions - questions aimed at clarifying the criteria for evaluating certain events, phenomena, facts (“Why is something good and something bad?”, “How is... different from...?”);

6) practical questions - questions aimed at establishing a relationship between theory and practice (“Where in everyday life can you observe...?”, “What would you do if you were...?”).

Also in practical, consulting classes and during independent work, students mastered the heuristic instructions (Onufrienko, 2007) for the preparation and conduct of public speaking, which are based on heuristic questions.

Heuristic instructions for training and public speaking

How to describe an object

1 What are the essential characteristics of the object (size, shape, properties)?

2 What is its structure (composition of elements, their connections and relationships)?

3 How is it different from similar objects?

- 4 What is the history of the object?
- 5 What is its purpose?
- 6 Who uses the object most often?
- 7 Where can it be used most efficiently?

Creative task. Describe a specific object, such as a computer, without or using a heuristic prescription. What is the difference?

How to describe an event

- 1 Who (what), when, why somebody did something?
- 2 What are the conditions and circumstances of the event?
- 3 How can the event be classified?
- 4 What are the similarities and differences from similar events?
- 5 What source do you know about the event from? Is it reliable?
- 6 Was it possible to change or avoid the event?
- 7 What are the possible consequences of the event?

Creative task. Try to describe a specific event without and following a heuristic purpose, and you will see that it significantly increases the effectiveness of your speech activity. For example, describe one of the last conflicts in your life.

How to make a statement in the process of proof or refutation

- 1 Divide the original statement into components.
- 2 What sequence is it better to use your statements in?
- 3 How can I change the statement by reinforcing it?
- 4 What is the main thing in the statement, how can this be proved?
- 5 On the basis of what you have established the truth or falsity of the statement (authoritative opinion, statistics, observation, personal experience, etc.)?
- 6 What follows from your statements?
- 7 What is the degree of proof or refutation that you achieve as a result of your statements?
- 8 Does your evidence or statement call for action?

Creative task. Try first without a heuristic purpose, and then use it to prove that knowledge of two foreign languages makes a graduate more competitive and in what situations?

Another example of a critical thinking question tool, which was applied for group discussion of information and individual thinking is a process designed by Edward de Bono that uses “Six Thinking Hats” to get a group to think, evaluate the outcomes of that thinking, and decide what should be done next. “Six Thinking Hats” merely offers an alternative way to look at things (Worksheet for 6 Thinking Hats).

CRITICAL THINKING QUESTION TOOL

Six Thinking Hats

Blue Hat – manages the thinking. It is the “control” hat. Blue hat organizes the

thinking, sets the focus and agenda, summarizes and concludes, and ensures the rules are observed. Sequences always begin and end with a blue hat. The person with the blue hat orchestrates the process, keeps everyone wearing the proper hat at a given time to maintain parallel thinking.

Sample Questions

- What is the problem?
- What is the decision we are after?
- What sequence of thinking hats ought we use?
- What process will we use to work each hat?
- How will we move on to the next hat?
- How do we get each hat to play off the other?

White Hat – the information hat. Identifies information we have, need and lack. Wonders what questions need asking to get the right information and how we are going to get that information. Emphasizes that facts and figures cannot be treated objectively when put forward as part of an argument. Reminds us of the difference between a checked fact and unchecked fact (belief). Asks us to take the mindset of a computer. This is also called a “neutral” hat because it deals in facts, data and the like. A picture emerges from white hat thinking.

Sample Questions

- What is the objective?
- What is the framing assumption? (e.g. the supposition that is central to achieving the objective)
- What is the context (who, what, when, where, why, how, how much)?
- What are the beliefs and opinions in play?
- What are the facts we know vice interpretations we have?
- What information do we require?
- What questions need asking?
- What information is missing?
- Where can we find this information?

Red Hat – deals with emotion and intuition which are key ingredients in decision-making. The Red hat gives permission to express feelings with no need to justify them. It represents feelings right now and helps give insight as to “where people are coming from” in a non-punitive way. It opens the door for one to pull on tacit knowledge – views stemming from life experience to include bias, heuristics and pattern-recognition. The red hat is recommended to be used for a very short period to get a visceral gut reaction - about 30 seconds, and is a great way to start the process, “lay it out on the table.”

Sample Questions

- What do you think about this?

- What is your initial reaction?
- What kind of emotions does this bring out?
- What is your gut feeling?
- How might your feelings change over time?

Black Hat – is the hat of caution and survival. It helps identify risks, difficulties, and problems. Black hat is the skeptical view. Points out potential problems and thinking that does not fit the facts, experience, regulations, strategy, or values. Why will something not work? Why might it not be the right thing to do? It is the one hat that allows us to deconstruct the thinking process of the topic at hand. It can counter Yellow hat optimism and can deconstruct yellow hat arguments. In all instances, however, reasons must be given. Logic must dominate the black hat responses; if based on emotion then it is a red hat thought. As a general rule, we are all “natural” black hats. People who over-use the black hat tend to spend a lot of their energy finding fault in things.

Sample Questions

- What are the risks?
- What are the failure scenarios?
- What are the potential unintended consequences?
- Why won't this work?
- What are the weaknesses?
- What are we forgetting that will bite us?
- How do we know this will not work?
- What makes this more difficult than we might be assuming?
- What yellow hat opportunities can we deconstruct and show to be flawed?
- Where are there real dangers?
- Why should we not proceed?

Yellow Hat – deals with benefits and feasibility, not fantasy. It is the optimistic view. In fact, optimism is a requirement to use this hat. It helps find the benefits and values and considers both short- and long-term perspectives. Reasons must be given. However, if all one has is speculation, then go forward with it under this hat. Use the yellow hat to deconstruct and counter the black hat. Yellow hat takes more effort than black hat, because it forces optimism, and is usually easiest role for the project advocates to take. Where the Black hat is about risk, the yellow hat is about opportunity. In fact any opportunity the yellow hat identified can be given to the green hat to see how that opportunity can be exploited.

Sample Questions

- What makes this so successful?
- What are the benefits?

- How does this make things better?
- What other benefits are there not presented?
- How do you know this will be so beneficial?
- Why do you think this will be successful?
- What black hat concerns can we deconstruct and show to be flawed?
- What should the green hat expand upon to show how we can get there?
- What does success look like?

Green Hat – deals with new ideas and possibilities. It is the creative thinking hat, all about energy. The yellow hat identifies the opportunity but has no responsibility to explain how it can come about: the Green hat takes on that responsibility. Green seeks alternatives and possibilities, removes faults, and generates new concepts. It does not have to be logical. It provokes risk taking. It demands new approaches and replaces judgment with movement. Of all hats, our experience shows this is at once very difficult to role-play but also one of the most insightful.

Sample Questions

- Can we do this another way?
- What new ideas does this generate?
- What opportunity does this offer?
- What are the immediate steps after success?
- What yellow hat opportunities should we expand upon?
- What thought experiment could we do here?
- What risks ought we accept?
- What odd – even implausible - scenario could we come up with based on this idea just to generate more insights?
- What original white hat assumptions might we totally reverse just to see where it leads?

Thus, the proposed series of questions stimulate critical thinking, give students the opportunity to explore objects of knowledge from different angles, compare them with others, analyze and evaluate their advantages and disadvantages, find ways to use the object in everyday life and prospects for its further development. In the process of formulating heuristic questions and looking for answers to them, students outline the circle of the unknown and gradually fill it with meaningful data for themselves, find original ways to perform creative tasks.

During the preparation for the oral report, students majoring in speciality “Cybersecurity” were getting acquainted with the stages, goals, techniques and methods of public speaking (Table 1) and using these developments in the process of writing the text of the report.

The most important part of our experiment was the stage of evaluating public speaking. It was complicated by the fact that the oral form of information is transient, it is difficult to fix. Unlike a written work, article, abstract, which can be reviewed several times to find deficiencies and gaps, the oral report cannot be reproduced in the same original form again. Taking into account this fact, such type of speech as a telepresentation was chosen (Plokhuta and Zaitseva).

Video recording or voice recording of the student's oral presentation, particularly in English, allows to analyze the educational product in more detail, identify its advantages and disadvantages, compare with previous work of the student.

During the preparation and recording (carried out independently or with the help of other students) of the telepresentation of the scientific report, students majoring in speciality “Cybersecurity” had the opportunity to preview the video, analyze it, find errors and correct them. Preparing a telepresentation is a good opportunity for self-assessment and self-improvement.

Table 1 *Stages, goals, techniques and means of public speaking (Andreev, 1995)*

Stages	Goals	Techniques and Means
1 Introduction	Draw the audience's attention, interest them, gain trust	Start a speech with an unexpected remark, fact, humorous remarks
2 Problem statement	Highlight the relevance of the problem, analyze the main contradictions and subproblems, formulate a general problem	Addressing the interests of students, their needs, references to facts, documents, authoritative statements, analysis of established but incorrect views. Demonstration of personal interest in solving the problem
3 Dissection of problems on subproblems, tasks, questions	Clear allocation of the list of problems, tasks, questions, disclosure of their essence	Substantiation of logic development of the general scheme of the decision of a problem, idea, hypothesis, a way of solving, possible results
4 Presentation of approaches, ways solving problems	Disclosure in the comparative analysis of both own approaches and alternative points of view, ways to solve the	Evidential judgments, arguments, use of critical analysis, comparison

	problem	
5 Generalization, conclusion	Concentrate the audience on the main ideas, summarize them	The statement, which integrates the main ideas, opinions. Using the strongest argument, catchphrase, and aphorism.

The recording of the speech is also convenient to use for collective discussion of the advantages and disadvantages of the created product, peer assessment, self-assessment and during the final assessment of the results of independent cognitive and creative activities of students.

During the assessment of students' oral reports in English, their content, verbal and nonverbal effectiveness were considered, which are thoroughly described in Speech and Presentation Scoring Rubrics (Table 2).

Before giving a presentation, on different stages students were suggested working through these checklists to make sure they have not missed anything.

Quick checklist to avoid failure

- The topic is researched, and the facts are up to date.
- I can talk about the topic without reading it.
- I've practiced the presentation and timed a practice session, so I know about how long it'll take me.
- I'm aware of my body language and plan to make eye contact during the presentation.
- My slideshow presentation is professionally designed and makes use of visuals.
- The text on my presentation slides is legible and easy to read, even from a distance.
- I'm prepared for possible technical problems during the speech.
- My content is designed for my audience.
- My conclusion clearly explains what listeners can do next.

Planning and writing are key to your presentation's success.

Check off each step of the writing process as you complete it:

- Define the goal or purpose.
- Research (study) the topic.
- List your main ideas. Create an outline.
- Plan a presentation format.
- Write the introduction.
- Write the conclusion.

Table 2 *Speech and Presentation Scoring Rubrics (authors N. Mulina and T. Plokhuta)*

Speech and Presentation Scoring Rubric					Student _____		Date _____	
Criteria	Excellent (4 points)	Good (3 points)	Minimal (2 points)	Weak (1 point)	Self Assessment	Peer Assessment	Teacher	Average score
Content (8 points)								
Topic Relevance/ Subject Knowledge Oral presentations are expected to be appropriate for the task and target audience	The presentation is audience focused and relevant; grasps accurate original information; provides analysis, generalisation, details / examples	The presentation is partly audience focused and relevant; grasps major facts; provides some analysis and examples	The presentation needs more focus and relevance, contains some omissions and/or inaccurate facts	The presentation lacks focus or relevance; contains fact errors				
Organization / Clarity / Format Oral presentations are expected to be clearly organized with appropriate introduction, body and conclusion, logically ordered ideas, within the time limit	The presentation is effectively structured and logically organised with clear transitions between parts; within one minute of allotted time	The presentation is generally logical with adequate transition between major ideas; within two minutes of allotted time	The presentation is mixed up and lacks organisers and transition between ideas; within three minutes of allotted time	The presentation lacks clear structure and logical order, may be wordy in some parts; too long or too short				
Verbal Effectiveness (8 points)								
Language Use Presenters are expected to use proper vocabulary and correct grammar in slides and speech	Student uses familiar to the audience and proper vocabulary and grammar; language choice is precise, free of jargon	Student uses mainly proper vocabulary with no serious grammar errors; language choice is partly precise and mostly jargon-free	Student uses jargon in too long sentences to understand with some grammar errors	Student uses inadequate vocabulary; sentences are too long or incomplete with several major grammar errors				
Speech Accuracy / Fluency Presenters are expected to speak with enthusiasm, natural pace and clear pronunciation, diction	Student speaks with proper pace, distinct pronunciation and very few disfluencies	Student speaks with mostly natural pace, good pronunciation and few disfluencies	Student speaks with low enthusiasm, poor diction, and many disfluencies	Student speaks too slowly/fast with many disfluencies that prevent understanding, lacks distinct pronunciation				
Nonverbal Effectiveness (4 points)								
Interactions / Delivery Presenters are expected to keep eye contact with audience, speak confidently, listen and answer questions	Student speaks confidently with good volume, eye contact, and energy; excellent listener answers audience questions accurately	Student speaks mainly confidently with good volume, eye contact, and energy; as a good listener provides proper answers	Student speaks with low volume; better eye contact and listening skills are needed; some difficulties in answering questions	Students speaks with low volume, without eye contact; poor listening skills lead to inability to answer questions				
Creativity (Optional)	Very original presentation of material that involves different media or unique approach (3 bonus points)							

Speaker Practice Checklist

- My posture is good.
- My body language is good.
- I make eye contact.
- I remember to smile.
- The volume of my voice is audible.
- I'm not speaking too quickly.
- I'm not mumbling.
- My delivery isn't monotone.
- My presentation includes a relatable story.
- I'm familiar with the material.
- I'm not reading word for word.
- I avoid unnecessary phrases (um, like, you know, etc.).
- I've timed the speech, and it's neither too long nor too short.

Speaker Preparation Checklist (Day of Speech)

- I've practiced the material (see above).
- I'm well rested.
- I've eaten recently.

- My clothing is professional.
- My clothing is comfortable.
- I arrived at the facility early.
- I tested all the equipment.
- I imagine a successful outcome to my presentation.

Students' public speeches were assessed on the basis of respect, trust between the speakers and the reviewers. Otherwise, it could lead to hostile relations and even "creative stagnation".

The logical conclusion of the work on a professionally oriented report is its public presentation at conferences. Students majoring in specialty "Cybersecurity" have the opportunity to present their professional and creative achievements at the annual student scientific and practical conferences in English.

Results

Nowadays there is a tendency at Sumy State University to actively involve students in research activities, participation in independent scientific conferences. Making creative works is one of the important and relevant ways to develop students' skills of cognitive and creative activities, in particular to work efficiently with information, as well as analyze and present it. However, according to the analysis results of cognitive and creative tasks created by students (abstracts, article reviews of famous scientists, own student scientific articles, conference abstracts, oral reports in their field, scientific abstracts, etc.) it has proved that creative work, written in English, does not always meet the requirements of quality, and students do not have the skills of independent cognitive and creative activities.

It is possible to competently evaluate the results of this activity for their further adjustment, refinement, correction by the method of public approbation (from Latin approbation means approval) in the form of a scientific report at a practical lesson or scientific-practical conference. Using heuristic techniques, methods of generating new ideas in English language classes can help to solve problems during preparations of scientific reports, its content, forms. As part of the pedagogical experiment, the preparation and presentation of a scientific report in a foreign language (English) was carefully planned by the teacher, students of the specialty "Cybersecurity" were introduced to the main stages.

At the stage of mastering heuristic methods and techniques for developing the ability to analyze, organize, classify information, etc., students learned to formulate heuristic questions on a topic suggested by a teacher or other students, using the method of creative questions and a series of questions that stimulate critical thinking "Questions Provoking Critical Thinking" (Table 3) by American psychologist and teacher E. King (King).

Table 3
Questions Provoking Critical Thinking

Thinking Skills	Sample Action Prompts	Example Questions
Remembering	recognize, list, describe, identify, retrieve, name	What do we already know about...? What are the principles of ... ? How does ... tie in with what we learned before?
Understanding	describe, generalize, explain, estimate, predict	Summarize ... or Explain ... What will happen if ... ? What does ... mean?
Applying	implement, carry out, use, apply, show, solve, hypothesize	What would happen if...? What is a new example of...? How could ... be used to...? What is the counterargument for...?
Analyzing	compare, organize, deconstruct	Why is ... important? What is the difference between... and...? What are the implications of...? Explain why / Explain how? What is ... analogous to? How are ... and ... similar?
Evaluating	check, critique, judge, conclude, explain	How does ... affect...? Why is ... happening? What is the best ... and why? Do you agree or disagree with the statement...? What evidence is there to support your answer? What are the strengths and weakness of? What is the nature of...?
Creating	design, construct, plan, produce	What is the solution to the problem of...? What do you think causes...? Why? What is another way to look at...?

Here is an example of organizing and conducting a work on the author’s heuristic task of telepresentation within the discipline “The Foreign Language”. In our study, telepresentation is being viewed, on the one hand, as

a kind of heuristic task, the purpose of which is to search, analyze subjectively new information for a student in a foreign language (usually professional direction), followed by a written report on a video camera and its presentation to “the general public”; on the other hand, it is a tool for diagnosing, controlling and evaluating the results of students' cognitive-creative activity, which enables to measure objectively short-term oral report with the help of clearly defined control and diagnostic criteria, due to its “fixation” in the form of video recording and the possibility of more viewing to a student's cognitive product (Plokhuta and Zaitseva).

Work on the telepresentation was organized in stages. First of all, students got acquainted with the models of public reports in a foreign language, written by leading scientists, teachers, graduate students, undergraduates, students from the electronic database of Foreign Languages Department of Sumy State University. Students also found out more about a set of control and diagnostic criteria for comprehensive and objective evaluation of public speaking, on the basis of which they analyzed the suggested works, found drawbacks, mistakes, corrected them. The process of preparing students for public speaking was supported by the implementation of special heuristic exercises to form the ability to analyze, systematize, classify information etc.

In the first stage of the work students had the opportunity to choose, reformulate the topic of public speaking or formulate their own in the framework of the general topic offered by the teacher. The report could have a purely theoretical or experimental nature.

The next step involved discussing the topic independently, drawing up a preliminary plan of the presentation, getting acquainted with the scientific literature on the problem identified, and selecting sources that fully disclose the topic chosen.

The main component of the heuristic activity was the written presentation of the material in a foreign language in accordance with the draft plan, considering the logic of thoughts, terminological clarity. The students' attention was drawn to the fact that the scientific report should contain such compositional parts as the introduction, the main part and the conclusions.

During the preparation and recording of the telepresentation of the scientific report, the students had the opportunity to preview the video, analyze it, find errors and eliminate them in advance. Performing such kind of heuristic task as a telepresentation is a good opportunity for self-diagnosis and self-improvement. The recording of the speech is also convenient to use to identify the advantages and disadvantages of the final creative product, to carry out mutual evaluation and during the final evaluation of the results of students' independent cognitive and creative activity.

Regarding the specifics of the oral presentation of the scientific report, the diagnosis was performed according to the following criteria: compositional

integrity (logic of the plan and parts of the speech, sequence, introduction and conclusions); scientific level (erudition, analysis, consideration of novelty); connection with life (taking into account new directions); informative (at the level of facts, connections, approaches, conclusions); argumentation (logic of evidence, adequacy of examples of theory); culture of speech (correctness, emotionality, use of oratory techniques); speech technique (diction, intonation, tempo); duration of the speech (observance of the time norms set aside for the speech), etc.

During the diagnosis, control and evaluation of students' oral reports in English, the language and speech features (correct use of grammatical, lexical, stylistic units) were additionally taken into account.

The results of the evaluation of the student's oral report indicate that there is a positive dynamic in the development of cognitive, creative, organizational skills. This is facilitated by the qualitative organization of the preparation, execution and evaluation of the heuristic task, which is achieved through the use of methodological developments before the preparation of the oral English report (presentation), developed on the basis of the Council of Europe Recommendations on Language Education.

The experiment established the effectiveness of combining heuristic learning with distance learning. Thus, the number of students with creative level of formation of subject-methodical competence in the experimental group (EG) increased by 25%, information-communicative by 17.5%, diagnostic-prognostic by 5%, constructive-creative by 10%. In the control group (CG), the gains of these indicators were less significant, respectively: +15.6%, +3.9%, +1.3%, +5.2%.

The difference in the levels of key competencies development is clearly shown in Figures 1–4.

Figure 1 *Students' competence-developing stage (subject-methodical)*
(A - search-executive; B - heuristic; C - creative)

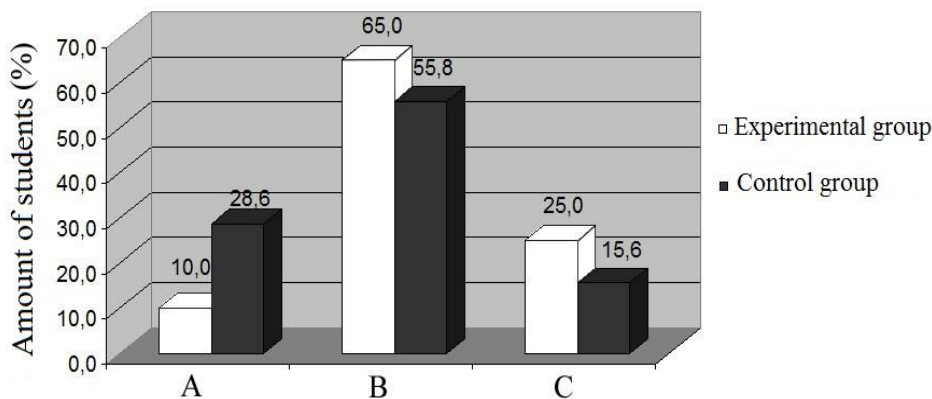


Figure 2 Students' competence-developing stage (information and communication) (A - search-executive; B - heuristic; C - creative)

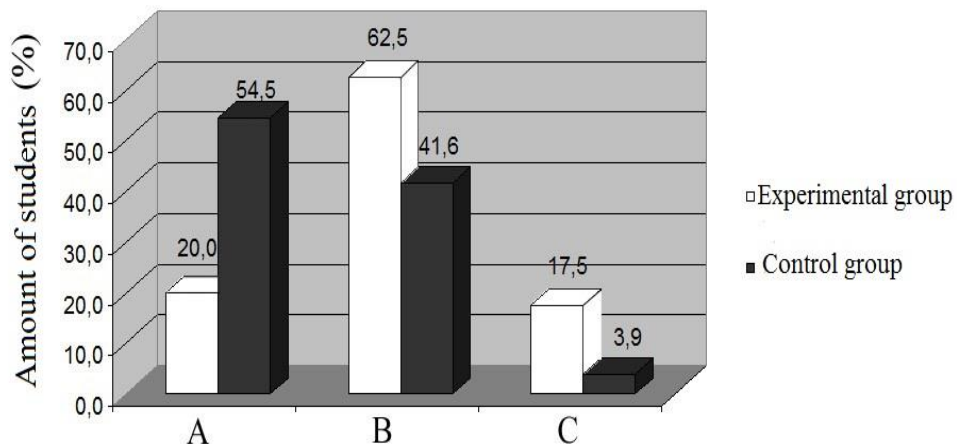


Figure 3 Students' competence-developing stage (constructive-creative) (A - search-executive; B - heuristic; C - creative)

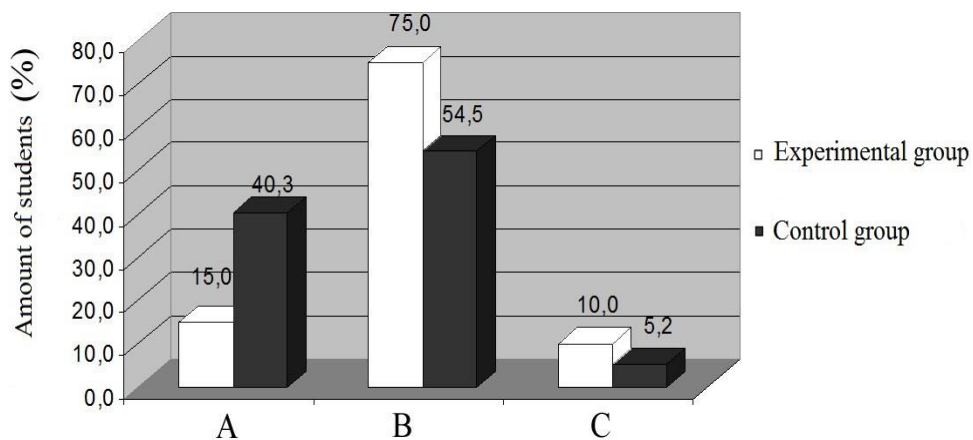
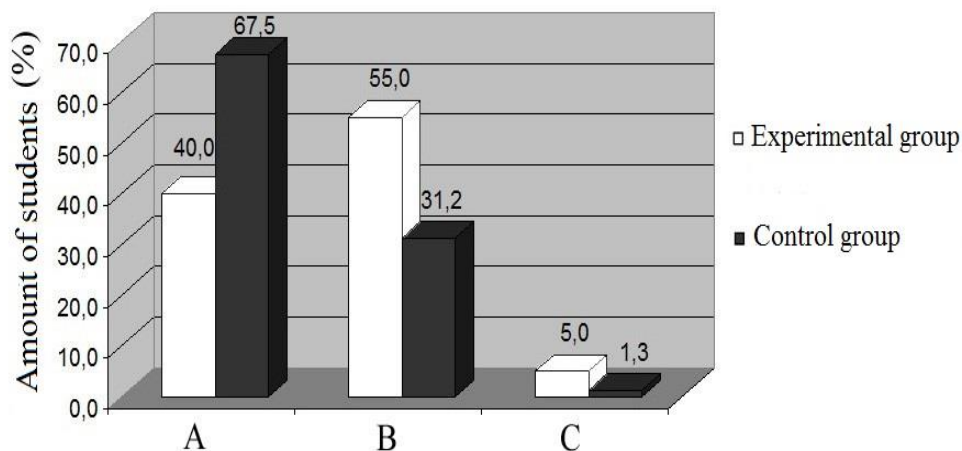


Figure 4 Students' competence-developing stage (diagnostic-predicted) (A - search-executive; B - heuristic; C - creative)



As a result of the experiment, the effectiveness of heuristic teaching methods for the activation of independent cognitive and creative activities of students majoring in speciality “Cybersecurity” was established. Thus, the practical application of the heuristic approach for students to perform creative tasks has proved that the ability to ask heuristic questions helps students to delineate the boundaries of known and unknown, to find novelty in the research problem, quickly and efficiently perform this task.

The study does not cover all aspects of the problem of using heuristic questions to enhance the independent cognitive and creative activities of students, which currently occupies an important place in vocational education. In our opinion, it is promising, in particular, to develop in more detail the content and structure of work on the preparation of quality educational products in the discipline “The Foreign Language” using a heuristic approach.

Responding to the questionnaire on the attitude to distance learning using heuristics, 73% of students (150 in total) expressed a desire to study as many subjects as possible using computer-based distance learning with extensive use of heuristics, and only 9% negatively assessed such an innovation. What are the benefits of such training that attract students? Firstly, heuristics + computer, like everything new, is of great interest: “interesting, exciting as a game”, “more interesting, unusual”, “the more learning tools, the better”, “enough creative tasks to choose from“, etc. Secondly, respondents point to new opportunities provided by computer heuristic learning. Some students highlight the informativeness: “the computer contains a huge amount of literature, other interesting sources”, “unlimited database”, “the ability to get instantly the information you need”, with the help of the Internet the whole world is open to you, and therefore opportunities training is significantly increased. Another part of the respondents emphasizes the increased clarity, rich imagery and dynamism of educational material provided by the multimedia functions of computers: “computers allow to achieve a higher level

of visibility of educational material”, “use of dynamic objects”, “this is not a static picture”. In addition, students note the interactive capabilities of computer programs: “computers expand significantly the possibilities of including various exercises in the learning process.” Thirdly, students hope to improve the quality of the computerized learning process compared to the traditional one. They call it a “convenient”, “effective way of learning” that promotes “better learning”, “simplifies the learning process”, “saves time”, “facilitates the work of the teacher” and provides “creative opportunities”.

Thus, the above-mentioned theoretical issues confirm the fact of using information tools that contribute already to the positive motivation of learning. It is not necessary to hope for automatic increase of cognitive interests only thanks to computer means, they can also lead to negative consequences.

Conclusions

Therefore, heuristic technologies, forms, methods, teaching aids available for distance learning contribute to qualitative, meaningful learning of educational material, increase the motivation of distant students, develop their creative abilities, allow to increase the level of cognitive and creative independence, developing professional competencies and creative self-realization of the personality.

It has been experimentally proved that the digital and heuristic technologies, diagnosis of telepresentation contribute to the immersion of distant students in search-transforming, constructive, creative activity, allowing them to make a qualitative transition from a superficial understanding of their profession to a deeper and more creative one. Video recording of a student’s oral speech, particularly in teaching and learning a foreign language, gives an opportunity to analyze the educational product in more details to identify its disadvantages and advantages, to compare it with the previous student’s work of the same format and to study the educational growth of his cognitive and creative achievements.

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