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THE TECHNOLPGY OF ORGANIZING THE PROCESS OF FORMING THE COMPETENCE OF PLAUSIBLE REASONING OF FUTURE TEACHERS

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ABSTRACT

The article deals with the issues of the process of forming the competence of plausible reasoning in future teachers through collective constructive learning of problem-cognitive topics.

Based on the identified features of the life and professional activities of a modern school teacher, a conclusion is made about the need to modify the education system by moving from the paradigm of extensive cognitive-reproductive activity to an intensive creative-activity paradigm. Also, a brief review of works on the methods of deduction, induction and abduction was carried out and the idea of their combination was considered, which led to the emergence of the method of vortexing reasonable reasoning and the technology of organizing the process of forming the competence of reasonable reasoning. The swirl method is based on the processing of the plain text of the problem into a large amount of information, consisting of several sequential or time-integrated stages. The paper presents processing algorithms at each stage.

In the 2022-2023 academic years, in the process of preparing future teachers of mathematics at the South Kazakhstan State Pedagogical University, the technology we developed was tested; its usefulness and effectiveness were identified.

Keywords: Competence, Plausible Reasoning, Future Teacher, Open Tasks, Technology.

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GELECEKTEKİ ÖĞRETMENLERİN MAKUL AKIL YÜRÜTME YETKİNLİĞİNİ OLUŞTURMA SÜRECİNİ ORGANİZE ETME TEKNOLOJİSİ

ÖZET

Makale, problem-bilişsel konuların kolektif yapıcı öğrenimi yoluyla gelecekteki öğretmenlerde makul akıl yürütmenin yeterliliğini oluşturma süreci konularını ele almaktadır.

Modern bir okul öğretmeninin yaşamının ve mesleki faaliyetlerinin tanımlanmış özelliklerine dayanarak, kapsamlı bilişsel-üreme etkinliği paradigmasından yoğun bir yaratıcı etkinlik paradigmasına geçerek eğitim sistemini değiştirme ihtiyacı hakkında bir sonuca varılır. Ayrıca, tümdengelim, tümevarım ve kaçırma yöntemleriyle ilgili çalışmaların kısa bir incelemesi yapıldı ve bunların birleşimi fikri göz önünde bulunduruldu, bu da makul akıl yürütmeyi vorteksleme yönteminin ve makul akıl yürütmenin yeterliliğini oluşturma sürecini organize etme teknolojisinin ortaya çıkmasına yol açtı. Girdap yöntemi, sorunun düz metninin, birkaç ardışık veya zamana entegre aşamadan oluşan büyük miktarda bilgiye işlenmesine dayanır. Makale, her aşamada işleme algoritmaları sunmaktadır.

2022-2023 akademik yıllarında, Güney Kazakistan Devlet Pedagoji Üniversitesi'nde geleceğin matematik öğretmenlerini hazırlama sürecinde geliştirdiğimiz teknoloji test edildi, kullanışlılığı ve etkinliği belirlendi.

Anahtar Kelimeler: Yetkinlik, Makul Akıl Yürütme, Gelecekteki Öğretmen, Açık Görevler, Teknoloji.

1. INTRODUCTION

Everyone knows that the modern school teacher lives:

- in a rapidly changing information world, where the flow of information is growing;

- in the educational and technological world of professional activity, which is a technogenic environment;

- in your inner world; a testing ground where it is completely free to test.

The achievements of teachers in the technogenic environment are obvious - the unfavorable conditions of traditional education have been overcome, the benefits, conveniences and comforts associated with meeting the growing needs of teachers are widely available.

However, along with the benefits of the technogenic environment, teachers are increasingly feeling the consequences of their own technological activities:

- extensive cognitive-reproductive activity, which to some extent ensures the transfer of the “cultural strain” to the next generation (distorted copies of huge scientific arrays bearing semantically vague names such as “physics”, “chemistry”, “biology”, “history”, etc.). etc.; the transformation of a person into a functional element; the massification of production, which requires constant expansion and improvement of the technogenic environment);

- each new generation of school teachers today faces great difficulties in the process of adapting to the real uncertainty of the future, in addition, even in a lifetime, a teacher has to repeatedly adapt to reality;

- the teacher gradually loses his status and becomes an agent of communication, the hallmark of which is the lack of reflection, empathy, experience, he is only a subject of technology, living in an informed society, a bearer of rationalism and technology.

All this turns into the uncertainty of the teacher's future life due to the unpredictability of the consequences of the development of the technogenic environment, which, in turn, will lead to the instability of the inner world of each teacher - an existential crisis, which is observed in the daily life of the modern education system.

This state of modern pedagogical life presents the education system with the problem of its modification, the development of new education strategies that are adequate to the ongoing changes.

What should teacher education be like in order for it to become a real common good for all subjects of the education system and for all mankind?

The answer to this question has long been considered in the writings of scientists and educators. For example, V.P. Solomin wrote in his article that “Indeed, at the end of the 20th - beginning of the 21st century. a historical situation arose, which is characterized as a crisis of all the previous mechanisms of human development. Various manifestations of this crisis were characterized by M. Mesarovich and E. Pestel back in 1974 in the second report to the Club of Rome under the general title "Humanity at the crossroads." He also noted that in various options for explaining the essence of crisis processes and ways to overcome them, the concept of “Human qualities” inevitably arises [1].

Today we are witnessing issues raised back in the 1970s against the backdrop of emerging crises in education. We all know that the crisis is getting worse and worse today. Therefore, we give our answer to the question posed, defined in our research work, as follows.

Pedagogical education should give young people everything to become subjects, not only in adult life, but also in the active, responsible and professional activities of teachers. They must learn to be responsible and generous, placing cooperation over disagreement and stability over short-term gains. You need to learn how to set specific goals, communicate with colleagues, find new opportunities, and offer various solutions to problems.

This understanding of the meaning of modern teacher education convinced us that:

- his mission, that is, the main goal, the meaning of existence and the actual problem is the formation of a real Teacher (teacher), who has meta-abilities that allow him to actively design himself and his future, actively integrate into the educational environment and transform it adequately to the changes taking place in modern times, in the process their teaching activities;

- achieving the mission and solving the problem of modern teacher education is possible if:

1) the transition of the modern education system from the paradigm of extensive cognitive-reproductive activity, focused on outdated technologies, forms and methods of organizing the educational process, a simple increase in the amount of knowledge without their high-quality processing, to an intensive creative-active paradigm, focused on training a human creator of an unstable environment, the novelty of the process and result of human activity and meta-ability;

2) a methodology will be developed for organizing the process of forming meta-abilities (competences) of plausible reasoning - a way to generate new hypotheses in future teachers.

The purpose of the study: the formation of a real Teacher, who has meta-abilities that allow him to actively construct plausible reasoning and use hypotheses in solving a problem that arises in his pedagogical activity.

Object of research: the process of forming a real Teacher through the collective teaching of students to construct plausible reasoning in solving open problems of problem-cognitive topics of the discipline.

Subject of research: technology of organizing the process of forming the competence of plausible reasoning, collective constructive teaching of students to solve open problems of problem-cognitive topics of the discipline.

Research hypothesis: if the developed technology is introduced into the process of pedagogical education, then a real Teacher is formed, possessing the competencies of plausible reasoning, ready and able to solve the problems that have arisen in his pedagogical activity.

Methodological foundations of the study: provisions of competence-based, existential, epistemological and constructive approaches in education.

Theoretical foundations of the study: methods of plausible reasoning, provisions for the phased formation of mental actions (P. Ya. Galperin), enlargement of didactic units (P. M. Erdniev), problem-based learning (T.V. Kudryavtsev, A.M. Matyushkin, M.I. Makhmudov, V. Okon and others), collective mutual learning (A.G. Rivin), complete assimilation (J. Carroll and B. Bloom), design and solution of open problems (G.S. Altshuller, A.A. Gin)

Scientific and pedagogical research methods: theoretical (study and analysis of the problem under study in the scientific literature); empirical (observation, questioning, conversation), statistical (mathematical and statistical processing of the results obtained during the study).

2. MATERIALS AND METHODS

Plausible reasoning - reasoning (a sequence of sentences, through which the author tries to reveal the idea in the most capacious form, to convey his position to the reader) of a non-deductive nature, in which the rules of inference do not guarantee the truth of the conclusion, subject to the truth of the premises, but only provide a greater degree of its plausibility in comparison with the one that is available without taking into account the parcels; way of generating conclusions, hypotheses.

To date, eleven characteristics defining plausible reasoning are known [2]:

1. Plausible reasoning proceeds from premises that are more plausible to a conclusion that was less plausible before the emergence of a plausible argument.

2. Something is considered plausible when listeners have examples in their own minds.

3. Plausible reasoning is based on well-known facts.

4. Plausible reasoning is refutable.

5. Plausible reasoning is based on how things usually work in familiar situations.

6. Plausible reasoning can be used to fill in implicit premises in incomplete arguments.

7. Plausible reasoning is usually based on the representations received as a result of perception.

8. Stability is an important characteristic of plausible reasoning.

9. Plausible reasoning can be tested and thus confirmed or refuted.

10. Finding plausible arguments in dialogue is a way to test them.

11. Plausible reasoning allows for powers by testing, but of a different kind than the standard probabilities and Bayesian rules used in Pascalian probability.

What is the essence of plausible judgments? In no case should plausible reasoning be given evaluative characteristics in the moral spirit, that is, bad, good, etc. This is neither good nor bad, it is a fact that characterizes our ability to think. After all, people do not have the fullness of knowledge and do not utter the truth in every phrase. We are often mistaken, we often lie, we often think that we are drawing the right conclusions and are mistaken in this. The judgment seems to us true because it is plausible, but in fact it turns out to be false.

Why is it so? First of all, it stems from the incompleteness of knowledge. We may not know all the necessary set of facts (although we are convinced that we do), but we draw conclusions that look plausible. Such reasoning is called nonmonotonic. Secondly, the reason may be that conclusions are drawn from a set of disparate data, between which arbitrary connections have been found.

At present, methods of plausible reasoning such as analogy, induction, deduction and abduction are known [3, 4, 5].

What is the difference between deduction, induction and abduction?

Deduction is a way of reasoning from general to particular thinking, which helps to come to a logical conclusion, which is the main method of logical proof. Deduction begins with an axiom or hypothesis, which is a general statement, and ends with a consequence from the premises.

To build a deductive chain, three components are needed: a general judgment (A), observation (B) and a logical conclusion (C). The formula of deductive reasoning looks like this: $A \rightarrow B \rightarrow C$ (we know A, then if B, then we get C). It's simple: starting from a general statement that is true, move on to a particular conclusion.

Example. All cars have wheels. A jeep is a car, so a jeep has wheels.

Induction is a method of obtaining a logical conclusion by moving from the particular to the general, i.e. induction is the opposite of deduction: $C \rightarrow B \rightarrow A$. In this method, not only the laws of logic work, but also mathematical, psychological and factual representations.

Example. Ayman loves ice cream (private judgment C). Ayman is a child (observation B), so all children like ice cream (general conclusion, A).

Induction, in contrast to deduction, in which the error is excluded, does not always lead to a true conclusion, and it is not correct to conclude that all teenagers are lazy and politicians are bribe-takers. These are typical examples when they start measuring everyone “one size fits all”.

Abduction is a cognitive procedure that helps to find plausible hypotheses, the formula of which looks like this: A-C-B. That is, abduction begins with a general judgment, as does deduction, and through the observed fact, the cause is revealed.

Example. All children love ice cream (general proposition A). Asan likes ice cream (private judgment C), so Asan is a child (conclusion B).

In abduction, before the conclusion, it is always necessary to mentally pose the question “Why?” This helps not to get confused when using this method of obtaining a hypothesis.

For example, all people have heads. Why does Sabyr have heads? Because he is a human.

Abduction, like induction, does not have absolute truth. The conclusions reached through this system of hypotheses are probable and valid, but they can be completely wrong. The main difference between abduction and induction is that abduction is not an infallible method of finding truth in science, but an algorithm that helps to find hypotheses that can explain a particular fact, while induction is a method of testing hypotheses.

Despite the fact that abduction as a logical method does not guarantee that the chain of reasoning will lead to a true conclusion, it is a fact that it will facilitate its search. It will expand the horizons of a person's consciousness, help to look at the situation from different angles and get information that was not previously known, open up the unknown sides of the familiar. This is a significant advantage of abduction over deduction and induction.

Based on these judgments, Peirce identified several requirements for explanatory hypotheses [5]:

- hypotheses should explain not only empirically observed facts, but also those that were tested and observed indirectly.

- hypotheses should contain a certain question, which the research finds the answer to.

The hypothesis must be testable and not limited to confirming what has become known in the process of observation.

Among the works devoted to plausible reasoning, a special place is occupied by the works [6]:

Paul's purpose in writing the above book was to teach students the art of guessing new results in mathematics, for which he uses concepts such as induction and analogy as possible sources of plausible reasoning. The first volume of the book is devoted to a detailed discussion of these ideas, with several examples taken from various branches of mathematics.

He urges all interested math students this way: "Of course, let's learn to prove, but also let's learn to guess." Halmos P.R., reviewing the book, summarized the central thesis of the book in the following way: "... a good guess is as important as a good proof" [7].

Allan Collins, a recognized authority on intelligent learning systems and plausible reasoning, while presenting the basic logic of plausible reasoning, identified some of the important problems associated with formulating plausible reasoning [8]:

1. Representing the degree of conviction. This is the problem of representing differences in the strength of beliefs, denoted by the phrases "completely sure" and "could have guessed."

2. Evaluation of the strength of arguments. We need a computational scheme to calculate and compare different levels and strengths of persuasion.

3. Applying rules of a general but not universal nature. Standard logic justifies the use of universally quantified rules; rules that are always true without exception. Most common sense inference is based on the application of default rules, which generally hold, but not always.

4. Avoiding listing all the conditions of a rule. It often happens that a plausible common-sense rule, upon close examination, has an almost unlimited number of possible types of exceptions. The problem of considering all these potential exceptions is known as the qualification problem.

5. Conclusion from the lack of information. It is often reasonable to infer that statement A is false from the fact that no one knows whether A is true, or from the fact that the problem statement does not state that it is true.

6. Limiting the amount of output. Many intuitively attractive sets of axioms have the property that the first few inferences all seem reasonable and contain reasonable conclusions, but as the conclusions get further and further away from the original axioms, the conclusions seem less and less reasonable, and eventually they turn into pure nonsense.

7. Conclusion using vague concepts. Conclusions that involve reasoning close to the boundaries of a vague concept are often uncertain.

8. Search for expected utility. It is a problem of choosing between actions whose consequences are uncertain. In such a case, the choice can be made on the basis of the likelihood of different outcomes with their desirability.

9. Conclusion of the explanation. Proponents of common sense try to explain the reasons behind their observations. If I notice that it is wet outside, I conclude that it was raining. If I notice that the pavement is not wet, I may instead decide that the wipers have been here.

10. Conclusion based on the scheme. Many useful common sense concepts correspond to large systems of relationships that are created in many separate instances in the world. Such concepts are called schemas or frames.

11. Derivation of a general rule from examples. People are always looking for general rules that encapsulate their observations.

3. RESULTS

As noted in the introduction, the subject of our research is the technology of organizing the process of forming the competence of plausible reasoning, the collective constructive teaching of students to solve open problems of problem-cognitive topics.

In the proposed article, technology is traditionally understood as a set of tools and methods for achieving the desired result of solving open problems, which can be generally represented as a construction of the form

$$A(x) = \text{demand} \qquad (1)$$

where A(x) is a certain task situation, presented in the form of a text that connects the sets x to each other and is understandable to a person. Demand is some question related to a task situation, which may be familiar to a person or unexpected, unfamiliar. In the case when a person is familiar with the issue, then the solution of problem (1) is not difficult, he knows what to do.

The problem arises when the question is unexpected or unfamiliar. A person does not know what to do, how to answer him, what the answer will be. His inner world is excited; he loses his peace, falls into an unstable state. The person feels uneasy or even vague fear.

The need to bring one's excited inner world into calm, steady state is the force that motivates, pushes a person to answer the question. And he proceeds to action, which can be represented as the following chain of steps.

Open task → understanding of the task → closed mini tasks → planning for solving the mini task → implementation of the plan → implementation result → demand for solving the mini task → goal of solving the open task.

In the proposed work, the term "understanding" is defined as follows: human (*H)* understands a task (*T)* if he has the conceptual and procedural knowledge (*K)* necessary to solve (*T)* and is able to relate them to demand.

It can be seen from the above definition that understanding is a ternary relation connecting H, T and K, and that both conceptual and procedural knowledge can be considered as objects of understanding, which is a device of the inner world of a person - a meta-procedure: a system of text processing procedures called task text processor (TTP).

The work of TTP consists of several stages that can be performed sequentially or combined in time [9, 10].

The first stage of the handler's work is called lexical processing, and the algorithm that implements it is called lexical processor (LP). Lexical processing is understood as the transformation of text in the context of a word form, the text between two adjacent spaces (in this case, punctuation marks are not considered word forms). The function of the LP of the text is the identification of the word form and the assignment to the word form of complex object information (COI) that characterizes it. COI consists in the general case of a sequence of OI-lines, that is, pairs: the basis of the word form (object) - object information (OI)), which are object operations. A short operating guide (SOG) is also used.

The input of the lexical processor is a sequence of characters of the input language - a special language (environment model), which is a subset of the natural language (model of the external world). LP singles out the simplest constructions in this sequence, which is called lexical units. LP transforms the source text, replacing lexical units with their internal representation - lexemes. A lexeme may include information about the class of the lexical item and its meaning.

In addition, for some classes of lexical units, the LP builds tables, for example, a table of identifiers, constants, which are used at subsequent stages of processing.

LP algorithm

1. Select a word form in the text;
2. Select the affix from the SOG;
3. Determine the length of the letters of the selected affix;
4. From the end of the word form, select letters in an amount equal to the length of the selected affix;
5. Identify the selected letters through the selected affix;
6. In case of unsuccessful identification, go to step 10;
7. In case of successful identification, enter the affix in the OI-line;
8. Remove selected letters from the composition of the word form;
9. If not all affixes are used, then go to step 2;
10. If all affixes are used, then the rest of the word form,
11. Processing as necessary, enter as a root in the OI-line.
12. Items 1-11 are performed until all word forms are processed.

The second stage of the handler's work is the syntactic (event) processing, and the algorithm corresponding to it is the syntactic processor (SP). A sequence of tokens is fed to the input of the SP, which is converted into an intermediate code, which is a sequence of completed actions, that is, events.

SP algorithm

1. Present the text as a single chain.
2. Starting from the beginning of the chain, select the first word form with the ending of the parental case.
3. Determine if the selected word form has a possessive postfix.
4. If “yes”, then go to step 10.
5. If “no”, then determine whether there is a sign “.” before the selected word form.
6. If “no”, then put “.” in front of the chosen word form.
7. If the first letter of the selected word form is capital, then replace it with capital.
8. Before the point in the sequence, add the root of the selected word form. (This root is an independent, system-forming word).
9. Choose the next word form with the ending of the genitive case.
10. Go to point 3.
11. Follow steps 3-10 until all word forms with the genitive ending have been selected.
12. Make a chain of the selected sentences (Let's call the selected sentences the sentences of the first level).
13. Select the first offer of the first level.
14. Determine if there is a reflexive or passive voice postfix in the word form before the backbone word.

15. If “no”, then transfer the independent word to the beginning of the sentence, adding the ending of the genitive case to the end, making appropriate adjustments in the members of the sentence.

16. Before the sentence in the text, add the sentence “Constructed <object name>”, where the name is transferred to the beginning in the previous paragraph of the algorithm.

17. If “yes”, then rearrange the system-forming and preceding words.

18. Select the next sentence in the chain.

19. Follow steps 14-17 until all offers in the chain have been selected.

The third stage of the processor's work is the predictive processing, and the corresponding algorithm is the predictive processor (PP). A sequence of events is fed to the input of the PP, which is transformed into the space of elementary predicates. Each predicate includes a description of the operation to be performed, indicating the operands used, that is, elementary knowledge. Thus, the result of the work of PP is the transformation of the sequence of events into the space of elementary knowledge.

PP algorithm

1. Select the first sentence of the object-level event sequence.
2. Select the algorithm of the action described in this event
3. Transform the action in the steps of the algorithm into an event by replacing “y” with a possessive postfix and with the end of the past tense verb.
4. Select the first event in the sequence.
5. Select the algorithm of the action described in this event
6. Transform the action in the steps of the algorithm into an event by replacing “y” with a possessive postfix and with the end of the past tense verb.
7. Select the first event in the sequence.
8. Using the grammar of constructing elementary constructions, measure the selected event.
9. Select the next event.
10. If possible, then go to step 8.
11. If this is not possible, then select the next event in the action algorithm.
12. If possible, then go to step 5.
13. If this is not possible, then select the next sentence in the object-level event sequence.
14. If possible, then go to step 2.
15. Finish processing.

The fourth stage of the handler's work is processing the demand in a similar way.

The fifth stage of the processor's work is the construction of the connection between the initial data and the demand. The algorithm that implements this stage is called a connection constructor (CC).

As is known, the connection can be defined in the direction of TS→H, or H→TS, where TS is a task situation. However, the first or second method alone is not effective. Therefore, the integrated method H→TS (vortex) is often used. As already mentioned, the stage at which this happens is called the connection constructor (CC).

For this, the results of the text and demand software are used. Sequences TS→H and H→TS are created.

CC algorithm.

1. From the software of the text, find the expression A1=B1, where B1 is equal to the first initial data (3C=s).

2. Fix A1.

3. Insert the found expression into TS→H.

4. 4. From the CC query, find the expression A2=B2, where A2 is equal to the target.5. Fix B2.

6. Insert the found expression into H→TS.

7. Put B1= A1.

8. Put A2 = B2.

9. If B1 ≠ B2 and A1 ≠ A2 then go to step 1.

10. Combine the sequences TS→H and H→TS.

11. Finish the execution of the algorithm.

Note: If elements are completed in the PP of the text (PP of the demand), then the following equalities are to be found in the PP of the request (PP of the text).

Generalized algorithm for solving the problem (GASP). It is clear that the above algorithms will not work by themselves. A control tool is needed, which is called GASP with its own method.

GASP algorithm

1. Processing of the task text.

2. Translation of the result of the OST step into an algorithmic language.

3. Algorithm testing.

4. If a case of source data incompatibility is found, determine the areas of their compatibility.

5. If the generalized nature of the initial data is found, linearize the data structure.

6. Completion of the decision.

It is clear that after the completion of the work created on the basis of GASP, a plan for solving the problem is created. After it is converted into an algorithm, the same thing - a plan - turns into reasoning. Since the response to demand depends on the inner world of a person, then when solving the problem by different subjects, the connection and the algorithm will not be the same, that is, the reasoning will have a plausible character.

4. DISCUSSION

The developed technology for organizing the process of forming a plausible reasoning was tested in the 2022-2023 academic year in the process of teaching the discipline "Methods of scientific research and academic writing" in the preparation of future mathematics teachers of the South Kazakhstan State Pedagogical University.

All concepts and methods of scientific research were introduced in the process of solving open problems related to a certain episteme, the concept and essence of which are defined in [11,12,13,14,15]. The basic principle of teaching was "Don't come to class to learn, but come to teach others".

Constructive learning of episteme, the main provisions of which are considered in the works [16, 17, 18, 19], was realized according to the stages and paths given in Table 3, corresponding to the theory of the formation of mental actions by P.Ya. Galperin. At the same time, the above algorithms of TTP were used as an indicative basis for the action to solve open problems.

Table 3: Stages and Ways of Implementing The Learning Process

№	Stages of internalization	Ways of implementation
1	Determining the foundations of action motivation.	Setting open tasks, problems for students and involving them in solving open problems.
2	Bringing an open problem into a set of closed mini-problems (hypotheses)	Definition of all areas of specific manifestations of open tasks; compiling mini-tasks for all specific areas (determining the condition and goal).
3	Performing an action in a materialized view.	Drawing up an algorithm for solving mimni-problems; solving mini-problems according to the compiled algorithm.
4	Speaking out loud so that the oriented stems of the action are translated into words.	Involving students in interaction when organizing classes in the form of a shift pair (coaching and monitoring) or a shift subgroup (mini-teaching).
5	Independent performance of internal speech activity, even without a whisper.	The use by students of the results of coaching, monitoring and microteaching for the mental execution of the algorithm.
6	The transition of a materialized action into internal speech (mental) activity.	Mental solution of an open problem.

The first three stages of the learning process were organized as individual work using an indicative framework. The fourth stage is in the forms of coaching and mentoring, micro-training in which:

-open tasks were compiled by the students themselves;

-joint reflection on existing learning practices, exchange of ideas and successful development of achievement;

connected the experience of active learning with technology, plan effectively, be able to involve all students in learning activities, share experience in developing short-term plans with the group.

The fifth stage is in the form of writing an essay, creating presentations on the topics studied.

As the episteme subtopics progressed, the steps to implement the above algorithms became more compact and concise; tasks started to be solved quickly and without errors. The trainees began to understand each other better and interact productively. This circumstance indicated that the process of internalization was underway - the process of transferring the external content of episteme and algorithms for solving problems on these topics into the inner world of the student, that is, into a system of concepts and thoughts, and TTP into ability.

5. CONCLUSIONS

A technology for organizing the process of forming the competence of plausible reasoning has been developed, the idea of which is that collective constructive learning of problem-cognitive topics, integrating knowledge, individual, personality-oriented, system-activity, taxonomic, competence-based, mixed, acmeological approaches; design technologies, developing, enlarging didactic units, covers all academic disciplines, the main principles of the theory of formation of mental actions by P. Ya. Galperin in each of the future teachers of an intellectual polysubject with a developed ability of plausible reasoning.

Meta-competencies included in the developed technology are extremely important for any discipline, since their training is associated with solving problems of a different nature and open tasks, which, first of all, are important to see, identify, and study.

Based on the above statements about the usefulness and effectiveness of the developed technology, we came to the conclusion that if it is introduced into the educational process, real Teachers are formed who are able to consciously and responsibly solve life and professional tasks, maintain professional and spiritual relationships with others, explain other features of their actions.

This is a significant step in improving the efficiency of the pedagogical university.

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