

PEHPP 2019**Pedagogical Education: History, Present Time, Perspectives****RHIZOMATIC LEARNING – PREPARATION FOR
UNCERTAINTY (APPROACH TO EDUCATION 4.0)**

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Abstract

A new perspective on teacher training is proposed, as well as the conclusions of the author's research are formulated in the article. Readiness for unpredictable, unexpected and dynamic situations is becoming one of the key parameters of the specialist of the XXI century. In order to organize appropriate professional training, teachers of the new type, those who work on expanding variability, rather than broadcasting a pre-approved pattern of behavior, are needed. Intellectual challenges, open and non-trivial situations, modeled by new type of teachers, are designed to form a set of assumptions, search directions, incomplete results of reflections and completed decisions, appeared working contacts, etc., which together make up the "network/rhizome", which is the internal information basis of the specialist for solving emerging situations. The article describes a pedagogical experiment in which teachers learned to model situations of uncertainty in the classroom. The features of such activities were identified and recommendations were made to overcome the difficulties encountered. The necessary quality of a teacher, who works with uncertainty in the classroom, as shown by the experiment, is flexible thinking, managerial subjectivity and the ability of "co-participation". Rhizomatic training, according to the authors, makes it possible to effectively link possessed, obtained and being received fragments of knowledge, skills, memories, emotions, "intellectual bookmarks" of teachers and students into a common ecosystem. At the same time, it is the modeling situations of uncertainty in the classroom that allows the teacher to manage the attention of students and remain competitive in the modern information environment.

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1. Introduction

This article reveals the author's experience in organizing situations of uncertainty in training sessions to prepare students for dynamic, non-trivial, unpredictable situations caused by high intensity of information flows. On the one hand, it is necessary to create an "energy – saving mode" for teachers and students to work with information (rapid response, verification and high-quality annotation). On the other hand, there is a demand for a heuristic level of information assimilation (the ability to use the received and processed information in non-standard situations and when solving non-typical tasks), which should be supplemented by an "environmental" level of awareness of actions (the ability to choose an informed decision, weighing the environmental, social, economic and cultural consequences of their actions).

Accordingly, if earlier the task of training was to transfer the system of knowledge and skills, now the task is to transfer ways to change the configuration of knowledge. In other words, learn to adjust the system of knowledge and skills to any sudden and (or) non-trivial change in the situation.

Dave Cormier notes that complex subject areas can and should be studied within communities - collaboration continuum (Cormier, 2019). This approach is called rhizomatic learning by Cormier. Although, according to the authors, the term "cross-training" is more appropriate in this context, especially in the peer-to-peer (P2P) format, when students help each other, develop collective knowledge and form the experience of constructive interaction.

It is worth mentioning that the concept of "rhizome" itself has become an illustration of the main idea of the author's approach to the organization of training. Here are a few examples of how the concept is applied by different authors: the educational life concept (Jarvis, 2010), the basis of clip thinking (Kozlova & Kinderknekht, 2018), as a fundamental concept of postmodern discourse space (Shentseva, 2015), the nature of power in the communicative space (Chubik, 2013), the model of organizing rebel networks (Mackay, & Tatham, 2011), as a way of interpreting network communities (Nazarchuk, 2008), and the approach to describing science (Plakhov, 2014) and decision-making (Taler, & Sunstein, 2008), as a strategy and regularity of text generation (Sinel'nikova, 2017).

In turn, the authors understand the "rhizome" as an extension of cognitive interests, contacts in all directions, and results that create a kind of "network of cognitive patterns" (a set of heuristics, knowledge, and relationships to them) and a "coordinate system" for the perception/interpretation of new information.

From the point of view of the proportions of the distribution of training time, students should be given no more than 2/3 of the training time to build a "network of analysis/interpretation/action", and the remaining training time should be planned to increase the resistance of this "network" to non-trivial and sudden changes in the situation (in training sessions held in an interactive form).

A non-standard "open" situation, modeled on a training session, allows you to find / create a variety of solutions ("rhizome/network" of options) with good cognitive abilities, and if insufficient, to get confused in templates that did not work.

Confucius' words "Give instructions only to those who seek knowledge after discovering their ignorance" explained this approach. First, the student finds himself in a situation that violates his model of the world around him, and only then is he really ready to search for knowledge.

2. Problem Statement

Due to the conservatism of educational systems and the widespread transferring of such social experience, students expect the teacher to be unambiguous, "reduce multidimensionality to a minimum", clear algorithms, recommendations and instructions on what to do in a given situation. However, the flexibility and "fluidity" of the modern world do not allow us to accurately predict all possible situations that a student may encounter; it is not possible to reliably determine which trajectory will be followed by further education of this or that student, which knowledge, competencies, and qualities will be most important for him or her.

There is no single line (trajectory) of development for a person in the existing education system.

The modern education system adheres to a personality-oriented approach, but this approach exhausts its capabilities in the framework of education 4.0.

The perspective education system 4.0 will be implemented on the basis of new technologies available in the information educational environment. These technologies are inextricably linked to the implementation of artificial intelligence and do not intend to limit the individual to the framework, as it happens in the personality-oriented approach of the modern educational system.

The system of personal development in education 4.0 should be based on a completely different approach. This approach can be represented by the person-develop concept.

But this is the subject of another article.

Due to these characteristics of the modern world, it is logical to assume that an educational organization should teach work in uncertainty and with uncertainty. The question arises, how it is best to prepare for this – by forming fundamental transdisciplinary principles that integrate the achievements of various sciences and academic disciplines, or by creating a "learning uncertainty" in the classroom?

Recognizing the relevance of the first of these approaches, the authors opted for the second and looked for an opportunity to implement it in practice, facing several contradictions at the same time:

- mismatched expectations of students who want certainty, not the other way around;
- existing educational standards, curricula, thematic plans, etc., which do not provide space for uncertainty;
- the unwillingness of teachers to switch from the usual ways of working in the classroom to new ones associated with uncertainty.

If the issue of documentary support is solved through the design of the lesson plan with the indication of work on introductory and situations on a given topic, you can work with the motivation of students, selecting interesting, "exciting" situations for work, but the change of the usual behavioral and cognitive models of teachers requires additional efforts.

According to the authors, rhizomatic learning makes it possible to effectively link possessed, obtained and being received fragments of knowledge, skills, memories, emotions, "intellectual bookmarks" of teachers and students into a common ecosystem.

3. Research Questions

The main research questions for the authors were:

3.1. key characteristics of pedagogical thinking that allow to organize work with uncertainty in training sessions;

3.2. the formation of teachers' experience in organizing the transition of students from one-dimensional thinking, which considers only one possibility or solution as correct, to multi-dimensional, divergent, flexible when the mind perceives several possible options for the development of a situation and makes it possible to quickly switch to the next option, if there is a failure on the main one.

4. Purpose of the Study

Development of teachers' flexible thinking and managerial subjectivity, allowing them to create situations of uncertainty in the classroom, not to separate themselves from students, manage collective cognitive activity and develop within the community of learners.

5. Research Methods

A pedagogical experiment with cognitive linguistics as the main resource (analysis and correction of used metaphors, epistemes, and cognitive patterns).

6. Findings

In the course of the pedagogical experiment, being in the classroom environment, teachers were learning how to:

- simulate situations of uncertainty (intellectual challenge) for students, when unexpectedness and unpredictability force them to look for a way out, creatively combining existing knowledge and experience with the search for new solutions ("creating rhizome solutions");
- create conditions for hearing different points of view on the same issue ("correction of rhizome sections");
- offer students opportunities to examine a phenomenon, subject, or problem from different angles, and explore different facets of its functioning ("rhizome extension").

Workload

Search, selection, and testing of video and text cases is quite time-consuming. The teacher is required to:

- accumulate and improve the base of their situations, seeks to achieve educational effects by selecting inspiring and thought-provoking examples of the behavior of the participants;
- be prepared for the selection/adjustment of situations for specific requests (features) of students;
- develop their sensitivity to situations that really deserve attention;

- be able to conduct a discussion about viewed (read) situations in order to stimulate students' thinking.

It was noted that for the organization of team development based on joint problem solving and cross-training, it is not enough to be an expert in your field of knowledge – you need to be an expert in interpersonal relations and psychology of the team. The teacher needs: alertness, developed perception and prognostic potential, readiness to create motivational incentives, recoding verbal constructions to the situationally necessary level, a large amount of operative memory (metaphors, examples, cases, instructive stories, aphorisms and quotes that should not be banal, but create the effect of surprise and cognitive mobilization).

Keeping a large number of objects in the field of view, noting remarks and the course of thought of several students, controlling their own mental processes during communication in the classroom - all this is quite "energy-consuming". Along with the above, teachers need to be moderators of discussions, create opportunities for development and set an example for students by their activities.

The necessary quality of the teacher for the implementation of collective learning has not so much to do with the oratory skills, acting abilities or trained memory, but the "internal energy" and flexibility of thinking. The teacher must be able to quickly adjust, find a new point of reference for communicating his / her position, respond quickly to the dynamics of the development of the pedagogical situation in the classroom, perform rapid semantic transformations, without dwelling on his "I", "internal dialogue" and typical behavioral reactions (character).

Psychological preparation of the teacher for the implementation of collective learning includes the development of a rather irrationally perceived ability of "co-participation".

Being in the position of an external observer, screenwriter, controller, and not a participant (co-participant) in the process of obtaining knowledge, does not provide the required involvement in collective relationships and cognitive processes. The teacher has the opportunity not to change with the group of students, but to reproduce the previously received experience and the emotional assessment formed in relation to it. In this case, the teacher can demonstrate himself / herself as an expert, bring the required information and control its memorization, but not show how it is possible to immediately adjust your knowledge, experience, and personal qualities to a new situation. In turn, repeated changes in response to processes that occur in the student community in relation to educational information can become an example of adaptation to an unpredictable, ambiguous, complex and unstable world. In other words, the teacher needs a mindset for rapid changes that correspond to and accompany the development dynamics of collective competencies.

If this position arouses the teacher's interest, desire to work and motivation for creative improvement of their own system of knowledge and experience, then this is the best option, since the formed orientation will have the corresponding mental state, processes and, accordingly, new mental formations. If the teacher does not have such a focus, then it is necessary to create conditions in which he / she can acquire a positive experience by changing his / her cognitive patterns, as a result of which there may be a stable motive for self-development in the desired direction.

Technique

Integration of cognitive and emotional processes of students through the use of significant number of situations from literature and cinema. Situations include interactions between two or more characters devoted to a particular problem (usually a separate video takes 3-5 minutes; a separate text case takes 1-3 A4 sheets).

The central elements of creating a technique that ensures the effective formation of this foundation are:

- statement of problems, the correct solution of which contradicts, at first glance, evidence or common sense (the "introduction of a paradox" technique);
- summing up the problem under a common erroneous opinion about certain facts, explanations of phenomena, etc. (the "logical trap" technique);
- the inclusion of phenomena known to the learner from certain types of situations in other, atypical situations (the "turning the known with an unusual side" technique).

It should be noted that it is the modeling of situations of uncertainty in training sessions that allows the teacher to manage the attention of students and remain competitive in the modern information environment.

In this approach, the assessment is made not so much to the skills to memorize the educational information content, but rather to the ability to generate solutions, showing professional competence in situations of unpredictability. Interactive forms of lessons that help students gain experience of cooperation are an indispensable attribute and a basic element of learning in the digital age.

In such learning system, while creating a system for evaluating the efforts and achievements of students, preference should be given not to reproducing the entire training material from memory without understanding the possibility of its practical application, but to confidently or spontaneously applying / converting a part of the training material for a successful escape from a non-standard situation in an acceptable time interval.

The processes of interaction of students in the course of solving "open" situations should contribute not only to a more interesting way of acquiring educational information, but also to the constant understanding of each student's features of their knowledge system, their thinking (including interpretation) schemes, etc.

Modeling situations of uncertainty in training sessions can provoke various cases of hasty and distorted attribution (interpretation). Therefore, teachers need to monitor this process very carefully. By creating conditions in which students begin to build an interpretation of situations using the algorithm: "using only known facts, rechecking them and immersing them in a wider context", you can lay the foundations of practical thinking that gradually leads to productive cooperation.

During training sessions, it is necessary to demonstrate a sample of such interaction. Students need to work in such an educational environment and gain experience of such productive interaction.

Complex, poly-subject and confusing situations require significant cognitive loads, which ultimately leads to the necessity to take volitional efforts in order to continue the activity. All such efforts should be noticed, recorded, and encouraged.

Each lesson in the experimental group was staged and planned by the teachers so that the students had a "failure" in the usual way of solving situations, after which a new method was "grown" during the training time and further in the course of independent work, which also later "distorted" in subsequent classes until the students were ready to act in non-trivial and suddenly arising conditions.

The introduction of this learning technique into the educational process will be successful if the necessary conditions are created:

- implementation of individual projects by students within the framework of the studied disciplines and practices;
- pedagogical support within the framework of the concept of problem-based learning adapted to modern conditions;
- a significant number of specific situations (cases) for analysis (including video and text options).

7. Conclusion

Teachers in the course of the pedagogical experiment developed and fixed the abilities to:

- conduct a reflexive analysis of the impact of a message on a person (audience);
- influence psychological processes in educational groups (to form opinions and moods of the team);
- create a consistent model of a situation (create or supplement a narrative);
- provide pedagogical support for the development of students in accordance with the concept of problem-activity training.

The solution of a significant number of diverse situations (more than two hundred) on the organization of professional and interpersonal interaction during the pedagogical experiment makes it possible to draw a conclusion about the readiness of teachers and students for practical implementation of the acquired experience.

Noting the initially high level of training, diligence and motivation of teachers participating in the experiment, it should be mentioned that at the initial stage of training practice, a number of gaps in their psychological and pedagogical erudition, knowledge and skills were identified.

Teachers and students acknowledged the presence of difficulties in analyzing multiparametric situations and bringing diverse information into the overall picture. In total, this indicates an insufficiently formed ability to synthesize the received information (despite the well-formed search and analytical abilities).

To overcome this obstacle, the proposed situations were changed and combined into a different sequence, allowing for the development of flexibility of thinking and the ability to "find the right words at the right time". At the same time, teachers were purposefully provided with the opportunity to act based on intuition and creativity, offering alternative solutions to situations. However, practice has shown that to a

greater extent, solutions were searched for by analogy, memory, etc. In other words, the similarity heuristic and the presence heuristic were used. However, the acquired experience of rethinking the information received and the experience of building awareness of their intuitive assumptions was highly appreciated by the participants of the pedagogical experiment.

Solving situations using video clips has proved to be effectiveness, as it provides simultaneous work of the emotional and cognitive components of learning activity.

At the same time, the technical ability to use video clips from relevant films in training sessions and in electronic textbooks (textbooks) must be supplemented by legal protection against involuntary copyright infringement. Teaching staff should be provided with clear instructions for working with works of cinema, literature, fine arts, etc., concerning the permissible amount that can be used for educational purposes; the order of use, the necessary accompanying information (the author of the piece of art, the name of the work, etc.), the list of prohibited actions, etc.

The data obtained as a result of the pedagogical experiment were used in improving the main professional educational programs, justifying the choice of content and training techniques.

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