

THEORETICAL AND METHODOLOGICAL BASIS OF DEVELOPING ANALYTICAL AND MATHEMATICAL THINKING ON THE BASE OF A DIALECTIC APPROACH IN EDUCATION

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Abstract

The article analyzes the pedagogical necessity of developing analytical thinking based on a dialectical approach in educational institutions, the current state of developing thinking in today's higher education institutions, and the possibilities and solutions for eliminating shortcomings. The article also discusses the theoretical and methodological aspects of pedagogical practice aimed at developing analytical thinking.

Keywords: Education and training, innovation, technology, methodological requirements, thinking, debate, analytics.

Introduction

Thinking as a scientific problem has long been studied not only by philosophers, but also by psychologists. According to the philosopher René Descartes, thinking is a sign of a person's existence in this world. "I think, therefore I exist," he wrote. According to psychologists, thinking usually begins with a problem, a question, a misunderstanding, or an effort to resolve conflicts. In other words, thinking comes into action in such situations. In a problematic situation, it is activated when the desire for knowledge increases. For this reason, scientists study thinking as thought in action. Action itself is a living form of thought. This movement is manifested in the form of a desire to move from individuality to generality, and from generality to individuality.

Literature Review

Psychologist AV Petrovsky: "Thinking is a psychic and socio-causal process closely related to speech, consisting of searching for and discovering important news... thinking is the process of directly summarizing and reflecting reality in the analysis and synthesis" [1] Ghaziev emphasized that thinking has become the object of research not only in psychology, but also in logic, philosophy, and even cybernetics, and only in the framework of these sciences, thinking is researched from aspects related to scientific problems [2]. According to the scientist, thinking occurs in harmony with other mental processes, such as memory, attention, imagination, perception, which are closely related to each other. Psychologists divide thinking operations



into such types as analysis and synthesis, comparison, abstraction, generalization, concretization, classification, systematization.

According to research scientist M. Mirgosimova, "analytical thinking is prioritized by aspects such as including features of logical thinking, the speed of thinking, requiring an approach to the problem from different aspects, comprehensiveness, and finding a reasonable solution to the problem. The owner of such thinking will have the ability to understand the true nature of the issue, understand its causes and consequences, and come to the necessary decision. Analytical thinking makes it possible to find new information, study it, organize it, compare it, evaluate it, think logically, rely on evidence, look critically at existing information, and come to the right conclusion based on the information obtained. Therefore, the current level of development requires the owner of any profession to plan his activities by simulating, comparing, dividing, summarizing, systematizing, modeling, classifying, targeting. The determination of the listed qualities serves as the basis for the formation of a comprehensive information culture and a modern, humanistic worldview in students. It is known that analytical thinking, like other intellectual qualities in a person, cannot be formed by itself. It emerges due to systematic mental activities. Analytical thinking in higher literary education should begin with analytical reading. Therefore, in higher literary education, a didactic event focused on teaching students analytical reading should be considered"⁹. Therefore, analytical thinking can be interpreted as high analytical thinking. At the same time, analyzing and synthesizing information, approaching it with deep observation, critical analysis and logical discussion are also the basis of analytical thinking. Therefore, special emphasis on the development of analytical thinking of future personnel, whether they are historians, biologists, or chemists, linguists, or mathematicians, or physicists, is one of the modern students of higher education. Today, advanced higher education institutions pay particular attention to the development of critical and analytical evaluation and analytical thinking of future specialists in their teaching methodology.

Research methodology and empirical analysis

Analytical thinking is one of the types of thinking that stands out for its effectiveness in increasing a person's erudition and intelligence. With the help of analytical thinking, it is possible to approach the studied object from different sides, to check its internal and external relations in a comprehensive way, and to come to a conclusion. People with such thinking capacity were called analysts in ancient Greece.

Explained as the art of proof [3]. The term "analytics" was used for the first time by Aristotle as the name given to the technique of logical analysis in "Philosophy. Encyclopedic dictionary". His work "Analytics" focuses on two aspects related to this way of thinking: first dividing an object with a complex whole into simple parts and increasing the complexity of thinking during their examination.

The German philosopher Immanuel Kant called analytics a human ability to understand, and in his work "Critique of Pure Consciousness" he was the first to propose dividing the process of cognition into two stages, such as analytical and synthetic thinking [4]. G. Frege, the symbolic father of analytical philosophy, states that in analytical philosophy, language is not



only a means of conducting scientific research and expressing its results, but also a subject of philosophical analysis. Analytical philosophy differs from other philosophical styles in that it expresses its ideas not through a general text, but through a separate sentence. The philosopher-analyst pays serious attention to the logical connection and accuracy of the thought and the sentences in it. Therefore, developing the thinking potential of young people, raising them to be independent thinkers, developing their speech, and teaching the language is always an urgent issue. Particular attention should be paid to these issues in the upbringing of children and in the family. Through the formation of analytical thinking, a number of spiritual qualities are formed. First of all, the child learns to verbalize his opinions in the process of reading and analyzing works of art to develop his speech. By analyzing and synthesizing the events, life conflicts and problems described in the work, the skills and abilities to separate the important from the unimportant are formed and gradually develop. By thinking about specific issues, they learn to observe cause and effect and find the right solution. In the process of reacting to images in works of art, they learn to express their attitude to people.

They develop the ability to find the right solution in complicated situations by finding the reasons that caused the problem, looking for a solution to the problem. Listening to children's opinions in the family, discussing their unique approaches, arguing in certain places or filling in their thoughts, teaching to find the most correct and most reasonable of various solutions and approaches is the way to analytical thinking. is considered

At the educational stages, guiding young people to analytical activities based on a dialectical approach and developing logical, critical and analytical thinking skills in the development of these activities constitute the dynamic foundations of their development as individuals. Analytical thinking is distinguished by deep, comprehensive logical thinking on any issue, as well as proven conclusion. Therefore, it is important to teach young people to have a unique approach to analytical activities, to clearly, logically and expressively state and justify their views. Each person's level of thinking also allows analytical thinking to emerge as a result of diversity of knowledge. Therefore, since the middle of the 20th century, special attention has been paid to the development of analytical thinking in the pedagogical practice of Western countries.

Regardless of what the modern way of thinking is called, it should be open to constructive ideas, realize the real goals of ideologies based on destructive ideas, and help people to distinguish white from white and black from black. The modern way of thinking is not only opposed to methods that do not take into account all aspects and connections of phenomena, but also to methods that mechanically combine various connections and relationships without distinguishing important features and decisive factors. The same approach is the main condition for the success of human knowledge and practical activity.



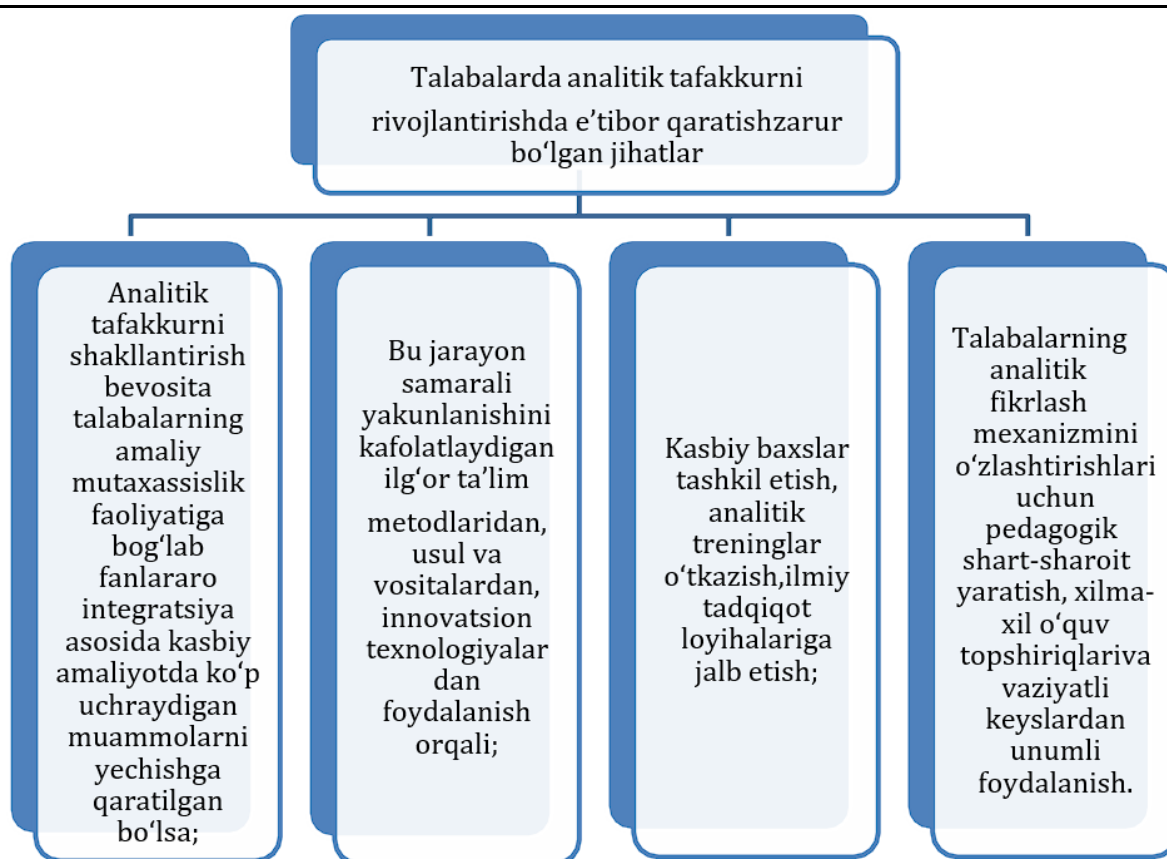


Figure 1. Points to focus on in developing students' analytical thinking [5]

Analytical thinking was opposed only to the question of setting limits to what could be said. In a logically structured language, metaphysical statements cannot be formed, because there must be nothing in it that leads to error. The essence of the problem is that the changes being made should be very easy to understand, and the previously obtained information should be unknown. That is, the analytical way of thinking tends to explain logical paradoxes by excluding statements.

In the development of analytical thinking, conscious critical thinking, not blindly, dogmatically, is of great importance. First of all, it should be noted that analytical thinking is the highest example of the development of critical thinking. Therefore, if we pay attention to the existence of conflicts between different views, approaches, and concepts in the development of this analytical thinking, developing critical thinking in a student is not a difficult problem.

To develop analytical thinking, we must first determine what this thinking is. In fact, original analytical thinking must contain elements of skepticism. For example, "The skepticism founded by Pyrrhon was of inestimable importance for the development of critical thinking. However, the formation of critical thinking is very important not only for the student, but also for the daily life of any person. After all, no one can turn a person with a critical thinking into his "puppet" and he makes less mistakes in his life than others. But there is also great confusion about what critical thinking is. The worst of these confusions is that a person only looks outwards and fails to see his own mistakes and shortcomings. In order to avoid such

shortcomings and to prevent the student from becoming a "sophist" (demagogue, sophist) in a negative sense, it is necessary to prepare to identify the main features of critical thinking [6]. Critical thinking is thinking that is directed to analytical study of certain information, not to find errors and flaws in the opinion of others. Accordingly, critical thinking within the framework of a true, high culture includes the following aspects:

- openness to new thoughts and ideas that challenge one's own;
- to avoid making mistakes in one's thoughts and views, to try to eliminate them;
- he strives to distinguish between different opinions, right and wrong, without bias, that is, objectively;
- not to express a critical opinion on an issue that he could not understand, to admit that he does not understand;
- distinguish between justified and unjustified errors in thought, etc. Of course, if a person has a strong interest in knowledge, then the culture of critical thinking is intuitively well formed. However, vices such as arrogance and a tendency to show off one's own personality, pre-formed in the student's character, are a great obstacle to the formation of the original critical thinking, which is very necessary for the development of analytical thinking.

Analytical thinking, which is required to be developed in future specialists, is a complex way of thinking, the formation of which goes through various stages, starting from passive reception of information to independently coming to the solution of certain problems. Critical thinking is strongly developed in students in the true sense. So, in order for us to educate our students as specialists with high analytical thinking, we must first of all create conditions for awakening and development of critical thinking skills in them. In this case, the critical spirit and way of thinking in the pedagogue's lectures serve as the most important and necessary conditions, ground, and basis.

Today's education aims to develop the following in future personnel by emphasizing analytical thinking [8]:

Leadership of the mind is the ability to present not one, but several solutions to problems that most people do not have time to think about in a given time, and to be able to justify the specific negative and positive aspects of each of them.

Flexibility of thinking to understand that the accepted and traditionally existing template directions and principles that are considered to be correct in society are no longer suitable for modern development, to perceive new directions and measures, to be able to think about them and to be able to form, rebuild one's activity and mobilize one's self in new ways of problem solving.

Prognosis, prediction and being able to do is the thinking of understanding the nature of future changes in the development of one's field, the reasons for their origin, and the periods of their occurrence through mental analysis. For example, increases and decreases in labor



productivity, changes in business conditions or markets and the impact of these changes on the industry, increases and decreases in prices, etc.

Results

Analytical thinking is prioritized by aspects such as including the features of logical thinking, the speed of thinking, the need to approach the problem from different aspects, comprehensiveness, and finding a reasonable solution to the problem. The owner of such thinking will also have the ability to understand the true nature of the issue, understand its causes and consequences, and come to the necessary decision. Analytical thinking makes it possible to find new information, study it, organize it, compare it, evaluate it, think logically, rely on evidence, look critically at existing information, and come to the right conclusion based on the information obtained. Therefore, the current level of development requires the owner of any profession to plan his activities by simulating, comparing, dividing, summarizing, systematizing, modeling, classifying, targeting. The determination of the listed qualities serves as the basis for the formation of a holistic information culture and a modern, humanistic worldview among students of higher education [9].

So, in which direction will the formation and development of analytical thinking in young people be effective?

1. If the formation of analytical thinking is directly related to the students' practical professional activities, it is aimed at solving common problems in professional practice on the basis of interdisciplinary integration;
2. Through the use of advanced educational methods, methods and tools, innovative technologies that guarantee the effective completion of this process;
3. Organizing professional debates, conducting analytical trainings, involvement in scientific research projects;
4. Creating pedagogical conditions for students to master the mechanism of analytical thinking, effective use of various educational tasks and situational cases.

Students will have the opportunity to evaluate their abilities, to analyze their achievements, and to increase their level of competence in science based on the development of their analytical activities. This creates conditions for predicting educational outcomes. We recommend giving priority to the following practical components in preparing students for analytical activities: valuable motivational, reflexive-evaluative, activity-related, cognitive components.

The value-motivational component envisages the formation of students' ability to clearly define tasks, effectively use collected materials and information. The reflexive-evaluative component affects the development of emotional-intelligence and evaluation-axiological skills in students. The activity-oriented component changes from simple to scientific views by systematizing and summarizing information, finding their unique aspects and proving their views. refers to the formation of operational abilities before the creation of a concept. The cognitive component includes the formation of abilities to make vital, scientific, philosophical conclusions, intellectual development, and practical skills.



Conclusion and Discussion

Formation of skills and competence of analytical approach to world events and interpersonal relations from a professional and scientific point of view in future specialists will have a positive effect not only on the rise of the scientific status of each higher educational institution, but also on the development of society. There are different ways of thinking, and each of them tries to replace a universal way of thinking that can reveal the truth. However, "many of them were rejected to a certain extent because they could not meet the requirements of the new era in the process of historical development. Sophistic, eclectic, metaphysical, mechanistic, metaphysical and other ways of thinking are among them. Although they are still used sporadically today, they cannot be the dominant mode of modern thinking. Likewise, the dialectical and synergistic methods that attract the attention of many people today are unlikely to remain the absolute, only way of human thinking. They also occupy a special place among other important methods in the "pillapoya" of universal thinking. Humanity has learned to use each of these methods in the right field and when necessary, and in practice it continues to operate based on this experience.

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