

PRINCIPLES OF DEVELOPING STUDENTS' CREATIVE RESEARCH AND PROFESSIONAL SKILLS THROUGH CRITICAL THINKING

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ABSTRACT

This article discusses the content of developing students' creative research and professional skills through critical thinking, the importance of innovative thinking technologies in teaching robotics, modeling, design, programming, critical thinking skills and the process of its formation.

KEYWORDS: *Research, Robotics, Professionalism, Critical Thinking, Logical Thinking, Data Collection, Disposition.*

INTRODUCTION

Wide use of the achievements of science and innovation activities in the world education system, consistent and stable development of all spheres of society and state life are becoming an important factor in building a worthy future of the country. In countries such as the USA, Russia, England, South Korea, Japan, training of competitive personnel with high technological training is considered as the main direction of development, innovations in education, including robotics, modeling, construction, programming, 3D-design and virtual engineering. theoretical studies are being conducted on teaching

The continuous education system formed in the Republic of Uzbekistan serves to ensure the effective organization of the process of training a competent person and a qualified specialist. Taking into account the special emphasis on the development of competencies and skills of STEAM subjects, critical thinking and independent search and analysis of information in non-school educational institutions operating within the framework of the continuous education system, the problems of training personnel that meet the requirements of the modern digital economy today is becoming one of the tasks of the day.

Currently, in the process of out-of-school education, education of a well-rounded person, the social order imposed on out-of-school education activities are not harmonized with advanced foreign experiences, and the need to update the content of education; programs and methodical materials aimed at the individual development of children through the widespread use of modern information and communication technologies, the development of students' vocational training is insufficiently provided; the fact that the knowledge and skills acquired by students are not in accordance with the level of skills and qualifications required in professional activity determines the relevance of the problem under investigation.

The need to teach students to think critically, to improve students' research and professional skills, even though innovative technologies for developing students' research and professional skills are not widely used. is being considered as a development tool.

What is meant by teaching students to think critically? What is critical thinking? Critical thinking means the ability to objectively analyze information and draw reasonable conclusions. This includes evaluating sources such as data, facts, observable phenomena, and research findings.

Critical thinking is the analysis of evidence to draw conclusions. There are several different definitions that involve rational, skeptical, and unbiased analysis or evaluation of evidence on complex topics and subjects. Critical thinking is thinking that enables the learner to be self-directed, self-educated, self-monitored, and self-developed. This strictly implies perfect conditions and their rational use. It requires effective communication and problem-solving skills, as well as overcoming local egocentrism and sociocentrism.

The sequence of critical thinking and the connection of critical thinking in the logical thinking of students can be reflected in the following diagram.

Activities conducted by students during class and extracurricular activities are often focused on research, in which the student's independent movement, the development of the student's logical thinking and critical thinking in the tasks given to him and finding their solutions. Education is always a problem. Today, in the modern world, several new professions have been created based on a one-sided approach to vocational training and education, such as IT specialist, robotics, mechatronics and engineering professions. In learning these professions and performing complex technological processes and operations, students' skills in programming, assembly, execution, operation or technological sequence are not enough, but research skills are also important. is gaining importance. For this, students are required to regularly develop critical thinking.

World experience shows that most researchers recognize critical thinking in addition to skills or abilities in the development of students' skills and abilities during education. This includes dispositions. The origin of this concept dates back to research conducted in 1985, which recognized that critical thinking skills are different from the ability to "do and get things done" and there is empirical evidence to support the concept of critical thinking skills, and the distinctions are actually specific to individual objects. found the proof of z. These thoughts are cast as various attitudes or habits. Facione defines states of critical thinking as "Attitudes towards or attitudes toward people, events, or situations that emerge continuously. Researchers have tried to identify similar sets of reasons and factors that give rise to critical thinking." For example, the types of abilities that involve the most frequent instances of critical thinking are:

- The ability to think openly;
- The ability to think fairly;
- The ability to tend to search for reasons;
- Ability to be curious;
- The ability to want to be informed;
- Ability to adapt;

Today, while several Western scholars have done extensive research on defining critical thinking, such as Facione, Ennis, Baylin, and others, most researchers consider critical thinking

to include "skills and judgments." agree with the opinion. In 1990, the American Philosophical Association (APA) formed a consensus group of critical thinking researchers tasked with defining critical thinking to aid future research efforts. Although most experts agree that dispositions are an important component, they argue against certain actions and consider them to be dispositions within the definition of critical thinking, some argue that these considerations simply play a laudable role and support these views. others also believe that it has a normative role.

There are several ways to teach students to think critically in the development of research and professional skills, among which the following can be taught in engineering circles:

Gathering Information: Many of our readers make completely wrong decisions because they think their opinion is right. The reason for making such mistakes is that they have little information or, on the contrary, do not seek to further strengthen their knowledge. Therefore, taking into account how quickly our time is developing, it is necessary to collect all available information and analyze it

Follow-up: Here's how curious the readers are. It's always because we don't pay attention to what's in front of us and we take it for granted. Moreover, it can be not only objects, but also our and others' behavior, various ironic situations and unusual structures of mechanisms. When we observe, our inner senses do not perceive for a while and our eyes do not react to what we see.

Working with literature: We need to learn logic in order to draw correct conclusions. It has its own rules, exceptions, and contradictions, but nevertheless, learning to notice inconsistencies in the statements of other students and reacting to them when the situation allows is a great way to prove our point in any discussion.

Rationalization: This refers to the application of the laws of mind: induction, deduction, and analogy. Using these tools, we can evaluate an argument and find its strengths and weaknesses.

Remembering: Regularly taking a step back from the details of the problem, recalling the entire process and focusing on what we learned and experienced.

Creativity: It helps us not only to understand the essence of creativity, but also to become more creative through exercises. Using methods such as TRIZ or STEAM, they help us approach problems in a systematic way.

Categorize and Sequence: Group and order items and ideas according to characteristics to learn how to analyze information. Use of mental capabilities.

Compare and contrast: Learning to identify how two or more objects, situations, or problems are similar or different. Make a list of pros and cons and then choose one.

Analyzing cause and effect: Interestingly, many students fail to distinguish between cause and effect. Therefore, our first step is the ability to determine cause and effect. Sometimes cause and effect may not be related - meaning we may have missed something.

Synthesis: Collecting and combining different information to arrive at an unexpected result.

Evaluation: Learning to find two or more solutions to a problem and evaluate which one is better.

Prediction: This is a complex process that does not bother the students. They take a few seconds to "analyze" and make decisions based on the future. Instead, gather scientific solutions through careful data collection and analysis. Of course, there are thousands of factors that we can take into account.

Priority: Learning to manage time, understanding why we spend our time and what it is spent on. Do not forget that the time spent on useless things can reduce the efficiency of the work.

CONCLUSION

This skill is usually summative and final. Learning that we need to know exactly what we understand, what experiences we have gained, what conclusions we have drawn, and how to summarize all this.

Most likely, students will not master these skills at the same time. However, we can generalize these to make better decisions and act more courageously. Each skill learned can significantly change the way students think.

There are many different ways of thinking, but none of them are as effective in solving problems as critical thinking. With its help, we can increase our emotional awareness and emotional level, as well as prevent cognitive distortions and egocentrism.

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