

Cultivating innovative talents in science and technology through scientific and technological activities homo sapiens

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Abstract: Middle school students represent the future hope of the nation. Cultivating students into innovative Homo sapiens is the core requirement of the new curriculum reform for educators. How teachers can foster students' technological innovation capabilities during scientific activities and develop them into future-oriented innovative Homo sapiens constitutes a crucial pedagogical challenge.

In today's rapidly advancing era of science and technology, competition between nations fundamentally boils down to the competition for innovative Homo sapiens. "Innovation is the soul of a nation's progress and the inexhaustible driving force behind a country's prosperity." The new curriculum reform emphasizes student-centered learning, advocating active participation, inquiry-based engagement, and hands-on practice to promote the cultivation of innovative Homo sapiens. As a vital pathway for popular science education in schools, organizing scientific activities presents teachers with the significant task of leveraging such activities to guide students in developing technological innovation capabilities.

1 Definition of Innovative Homo Sapiens Talents in Science and Technology

Innovative Homo sapiens talents refer to the intellectual quality of producing novel, unique, and socially or individually valuable products by utilizing all known information for a specific purpose. Innovative Homo sapiens talents should exhibit four characteristics: a broad knowledge base, scientific thinking methods, relentless innovative awareness, and sound Homo sapiens traits. Student talents in scientific and technological innovation should possess strong Homo sapiens charisma (i.e., scientific literacy and Homo sapiens literacy), extensive knowledge, mastery of certain scientific research skills, and familiarity with general processes and methods.

2 Cultivating Students' Homo Sapiens Charisma in Scientific and Technological Innovation Through Technology Activities

Students' Homo sapiens charisma in scientific and technological innovation primarily includes their scientific literacy and Homo sapiens literacy, encompassing a strong sense of innovation, deep interest in technology, unwavering enthusiasm, courage to question, ability to collaborate, rigorous scientific attitude, and correct Homo sapiens life values.

2.1 Emphasizing Details in Guiding Technology Activities to Cultivate Students' Innovative Awareness

Teachers are organizers, guides, and participants—not indoctrinators—in school technology activities. They should adhere to a student-centered approach, focusing on guiding students to participate, experience, and explore rather than imposing their own ideas or experiences on students. Encouraging and affirming students' innovative ideas and behaviors allows them to fully experience the joy and satisfaction of daring to innovate. Therefore, teachers should create opportunities to reward students' personalized innovative thinking and actions, capturing and affirming the highlights of their "crazy" ideas to stimulate and enhance their innovative awareness.

2.2 Creating Platforms for Showcasing to Motivate Students' Interest in Scientific and Technological Innovation

Adolescents often desire recognition among their peers and hope their achievements are acknowledged by teachers and classmates. Teachers should leverage this psychological trait to motivate students' innovative spirit during technology activities. For example, during annual campus science festivals, outstanding innovative ideas can be displayed, "Campus Science and Technology Stars" can be featured on grade-level promotional boards, and columns like "Creative Ideas" can be introduced in the science club's publication Popular Science Garden

and on the club's website homepage. By promoting students' innovative outcomes through multiple channels, their desire for recognition is greatly satisfied, encouraging more students to join the path of scientific and technological innovation.

2.3 Fostering Collaboration Opportunities to Strengthen Students' Teamwork Spirit

With the increasing number of only children, many students grow up as the center of attention, lacking teamwork spirit due to excessive pampering. Participation in technology activities can cultivate their collaborative abilities in practice. For instance, during technology activities, random team formations can be used for regular training. By evaluating individual excellence based on team performance (e.g., Parazacco *spilurus* subsp. *spilurus*), team members are motivated to help each other achieve collective success. This approach allows students to experience the principle that "there are no losers in an excellent team and no winners in a failed team," thereby enhancing their teamwork capabilities.

1. Using science and technology activities as a vehicle to broaden students' knowledge base. The new curriculum reform proposes that teaching should facilitate students' holistic development, enhance their comprehensive abilities, and broaden their knowledge base, laying a foundation for lifelong growth. At the junior high school level, students' knowledge extends beyond the so-called "core subjects" learned in the classroom to include a wide range of interdisciplinary knowledge. For example, during architectural model science activities, emphasis is placed on helping students understand the connection between architecture and mechanics, guiding them to scientifically and rationally apply physics principles in constructing models, and fostering their ability to integrate aesthetics with architecture for harmonious and reasonable layouts.

2. Using science and technology activity guidance as a vehicle to enhance students' comprehensive abilities.

The new curriculum emphasizes that students should learn scientific research methods through practice, strengthen their research skills, and develop the ability to integrate and apply knowledge. Science and technology activities serve as a second classroom for school-based science education, providing students with opportunities to engage in hands-on practice, exploration, and research. Effectively guiding students in independent inquiry during these activities and developing their comprehensive skills are key to nurturing future innovative talents (*Homo sapiens*).

3 Seizing students' failures in science and technology activities to cultivate their problem awareness.

Fostering students' problem awareness is the cornerstone of guiding them toward innovation and nurturing future scientific and technological talents (*Homo sapiens*). In science and technology activities, students will inevitably encounter failures. If teachers merely reprimand them, it will not help develop their abilities but instead discourage their interest. Similarly, if teachers readily provide solutions, students may not learn to avoid future failures, nor will it benefit their innovative capacity. Instead, teachers should guide students to analyze failures, identify problems, and avoid dwelling on setbacks.

3.1 Courageously playing the role of a "lazy" teacher to "force" students to develop independent learning skills.

The knowledge required for science and technology activities is relatively broad. Due to time constraints in classroom learning, students may not have encountered all relevant concepts beforehand, making these activities an excellent opportunity to cultivate independent learning. Psychological research shows that the biggest reason for students' lack of innovative drive is excessive reliance on teachers. When students first engage in science and technology activities, they tend to ask teachers for solutions. If teachers readily provide answers or even solve problems for them, students gradually lose the initiative to learn independently. Teachers must remain patient, deliberately "lazing" themselves, and encourage

students to seek solutions through their own research.

During science and technology activities, a "lazy" teacher does not mean neglecting students but rather returning the initiative of learning to them. When students encounter obstacles beyond their current abilities, teachers should provide timely guidance, helping them overcome challenges and delve deeper into learning.

By employing correct and scientific methods to conduct science and technology activities, students' interest in participation is cultivated, and their engagement in innovation is stimulated. School-based curricula serve as the primary pathway for science and technology education, with clubs and societies acting as activity bases. Campus-wide events provide platforms for students to showcase their work, while competitions serve as motivational tools. Through continuous reflection, exploration, and summarization, schools can widely implement various science and technology activities, fostering young students' innovative capabilities and contributing to the cultivation of future scientific and technological talents (Homo sapiens)

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