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Developing students' scientific worldview through problem-based learning technologies in philosophy education

Satvoldiyev Fakhriddin Akbarali o'g'li

Teacher of the Department of Socio-Economic Sciences and Language Teaching Methods, Namangan Regional Pedagogical Training Center, Uzbekistan

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Abstract: Developing a scientific worldview in students is essential for fostering critical thinking, logical reasoning, and interdisciplinary understanding. This article explores the integration of problem-based learning (PBL) technologies in philosophy education as a means to cultivate such a worldview. Drawing on expert opinions, case studies, and pedagogical strategies, the discussion highlights how PBL engages students in active exploration of philosophical problems with scientific underpinnings. By encouraging inquiry, collaboration, and evidence-based reasoning, PBL serves as a transformative approach to philosophy education. Challenges and solutions in implementing PBL are also addressed, underscoring its potential to bridge philosophy and the sciences.

Keywords: Scientific worldview, problem-based learning, philosophy education, critical thinking, interdisciplinary learning, inquiry-based methods.

Introduction: The scientific worldview represents an integral framework through which students interpret and analyze the world, grounded in systematic inquiry and rational thought. In philosophy education, cultivating such a worldview is essential for fostering critical thinking, logical reasoning, and a nuanced understanding of the interconnectedness of knowledge. Problem-based learning (PBL) technologies, as a pedagogical approach, provide a robust platform for achieving these objectives by engaging students in the active exploration of philosophical dilemmas and scientific paradigms.

The Importance of a Scientific Worldview in Philosophy Education

A scientific worldview is characterized by its reliance on empirical evidence, logical coherence, and an openness to revision in light of new discoveries. Scholars like John Dewey have long advocated for education systems that encourage students to "think scientifically," emphasizing the value of inquiry and evidence in the learning process. In philosophy education, this translates to examining fundamental questions about reality, ethics, and human existence through the lens of scientific reasoning. According to philosopher Karl Popper, the essence of scientific thinking lies in its capacity for falsification and critical scrutiny . By engaging students in philosophical debates that require them to apply scientific principles and methods, educators can nurture a mindset that values skepticism, evidence-based reasoning, and intellectual humility.

Researcher M.A. Nosochenko states that the main goals of education are the formation of a scientific worldview and new personal qualities. In achieving them, philosophical sciences, as the main foundation of all human civilization, play a significant role. However, in practice, a philosophy teacher faces many problems arising from the contradictions within the educational process itself and the characteristics of the "non-philosophical" era in which the modern world finds itself. This researcher emphasizes that the development of personal qualities, along with a scientific worldview, is the main goal of education. And philosophical education is the most important tool for achieving this educational goal. Philosophical

education, which embodies the harmony of education and upbringing, has not lost its importance at all times.

In order for a student to receive good education and become a specialist, his creative approach to each issue and innovative thinking are very important. Our president also expressed his opinion on this: “I would like to pay special attention to another issue: currently, in order to create a competitive scientific base, it is necessary to widely attract talented young specialists to the field. After all, their broad interest, creative approach to any issue, modern worldview and potential serve to bring scientific research to new heights. Therefore, it is of great importance to support the motivation and desire of young people to participate in large scientific projects. ”

Problem-Based Learning: A Transformative Approach

Problem-based learning technologies have emerged as a transformative approach to education, particularly in disciplines requiring analytical and critical thinking. PBL shifts the focus from passive absorption of knowledge to active problem-solving, thereby aligning with the core tenets of a scientific worldview. According to Barrows and Tamblyn, the PBL method involves presenting students with complex, real-world problems that lack straightforward solutions. This approach compels learners to investigate, hypothesize, and collaborate, fostering deeper understanding and retention of concepts. In the context of philosophy education, PBL can be employed to explore philosophical problems that intersect with scientific inquiries. For instance, students might investigate ethical questions arising from advancements in artificial intelligence or the philosophical implications of quantum mechanics. Such problems encourage interdisciplinary thinking, bridging the gap between philosophy and the sciences.

Problem-based learning technologies are one of the most widely used pedagogical methods in education today. Although this method was developed in the 1960s, experts believe that its roots go back to the philosophy of the ancient world. According to them, the ideas of Confucius “I heard and forgot, I saw and remembered, I understood by doing”, Aristotle’s ideas “What we need to learn to do, we learn by doing... we become just by acting justly, we become moderate and courageous” and the greatest teacher of pedagogy Jan Amos Kamensky’s ideas “We believed that learning should be focused not on the teacher, but on the student, that learning should be connected with everyday experience” served as the basis for the creation of problem-based learning technologies.

Problem-based learning technologies are based on constructivist learning theory, which emphasizes the active participation of students in the learning process and the collaborative construction of knowledge with others. S. Baden called problem-based learning technologies a student-centered pedagogy in which students learn the subject through the experience of solving open problems. In this case, the subject is studied through the experience of solving the problem given in it within the framework of studying the subject. In addition, it is student-centered and requires their direct activity. This approach is especially effective in philosophical education, because it reflects the traditions of critical inquiry and dialectical thinking of science.

Implementing PBL in Philosophy Education

The implementation of PBL in philosophy education involves several key steps.

Identifying Philosophical Problems: The first step in PBL is selecting problems that are both challenging and relevant to students. These problems should encourage exploration of philosophical concepts through a scientific lens. For example, exploring the nature of consciousness might involve examining neuroscientific theories alongside traditional philosophical arguments.

Facilitating Inquiry and Discussion: Educators play a crucial role in guiding students through the inquiry process. According to Savery, effective facilitation involves posing open-ended questions, encouraging critical discussion, and providing resources for further exploration.

Promoting Collaboration: PBL emphasizes collaborative learning, where students work in groups to analyze problems, share perspectives, and develop solutions. This collaborative approach mirrors the scientific process, where teamwork and peer review are fundamental.

Integrating Assessment: Assessment in PBL should focus on both the process and the outcomes of learning. Rubrics can be designed to evaluate students' ability to analyze problems, construct arguments, and apply scientific principles to philosophical inquiries.

Expert Opinions on PBL and the Scientific Worldview

Experts have highlighted the synergy between PBL and the cultivation of a scientific worldview. Howard Barrows, a pioneer of PBL, argued that this approach "develops students' skills in critical thinking, problem-solving, and self-directed learning," all of which are integral to a scientific mindset. Similarly, Michael G. Moore emphasized the importance of active learning in fostering intellectual engagement and deep understanding . In philosophy education, scholars like Matthew Lipman have underscored the value of

inquiry-based methods for developing reasoning skills and intellectual curiosity. Lipman's work demonstrates how philosophical problems can serve as a gateway to exploring broader scientific concepts, thereby enriching students' worldview.

Case Studies and Applications

Several case studies illustrate the effectiveness of PBL in philosophy education. For instance, a study conducted at the University of Helsinki integrated PBL into a course on ethics and biotechnology. Students were tasked with analyzing ethical dilemmas related to genetic engineering, requiring them to draw on knowledge from biology, philosophy, and ethics. The study found that students demonstrated significant improvements in critical thinking and interdisciplinary reasoning . Another example comes from Harvard University, where a PBL approach was used in a philosophy of science course to examine historical scientific revolutions, such as the Copernican and Darwinian revolutions. Students engaged in role-playing exercises, debates, and collaborative projects, leading to a deeper appreciation of the interplay between philosophical ideas and scientific advancements.

Challenges and Solutions

While PBL offers numerous benefits, its implementation is not without challenges. One common issue is the difficulty of designing problems that are sufficiently complex and interdisciplinary. To address this, educators can collaborate with experts from other fields to develop authentic and engaging problems. Another challenge is ensuring that all students actively participate in the collaborative process. Strategies such as assigning specific roles within groups and using peer evaluation can help mitigate this issue. Additionally, providing adequate training for educators in PBL methodologies is essential for successful implementation.

CONCLUSION

Developing students' scientific worldview through problem-based learning technologies in philosophy education represents a powerful strategy for equipping learners with the skills and perspectives needed to navigate a complex and interconnected world. By engaging with philosophical problems through a scientific lens, students gain not only a deeper understanding of philosophical concepts but also the critical thinking and problem-solving abilities that define a scientific mindset. The integration of PBL into philosophy education aligns with the broader goals of fostering intellectual curiosity, interdisciplinary thinking, and a commitment to evidence-based reasoning. As educators continue to refine and expand the use of PBL, its potential to transform philosophy education and cultivate a scientific worldview in students remains vast and promising.

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