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Applying the QFT method in physics lessons: An example from gifted lyceum students

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Abstract

This study investigates the effectiveness of the Question Formulation Technique (QFT) in enhancing conceptual understanding among gifted 7th-grade students in lyceums through the topic of “The motion of objects in water” The QFT model, emphasizing inquiry-based learning, was applied using the real-life phenomenon of a fresh apple sinking and an old apple floating in water. This visual trigger (Q-focus) initiated a student-driven process of generating, classifying, and prioritizing open and closed questions. The intervention involved 32 students from The Modern Educational Complex Named in Honour of Heydar Aliyev, who participated in a structured QFT-based lesson. A pre-test/post-test design was used to assess conceptual gains before and after the lesson. The pre-test showed that only 73% of students could correctly identify the relationship between object density and buoyancy. After engaging in the QFT process, 82% of students demonstrated a clear understanding of Archimedes' principle and the effect of air content on object behavior in water. Paired sample t-test analysis revealed a statistically significant improvement in students' scores ($p < 0.01$), validating the impact of QFT on developing critical thinking and scientific reasoning skills. These findings highlight the potential of QFT as a powerful strategy for engaging talented students in lyceums by promoting deeper inquiry, metacognition, and collaborative learning in physics education.

Keywords: gifted students, lyceum, physics education, QFT, scientific thinking