

Concept “SAC” and Its Psychological and Pedagogical Significance

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The study aimed to evaluate the effectiveness of an integrated teaching approach for developing students' knowledge of quantum biophysics and examine associations between academic performance and stress-related, emotional, and cognitive indicators of socio-adaptive functioning. Two methods were applied: a literature analysis to substantiate the socio-adaptive competence (SAC) framework and an experimental study involving 60 students to assess an integrated method combining quantum-biophysical content with psychodidactic learning activities. The theoretical analysis identified three SAC components—cognitive, emotional, and motivational—and clarified their interrelationships in the learning process. It also established psychodidactic principles and instructional approaches for integrating theoretical knowledge with practical skills. Students in the experimental group demonstrated higher achievement in quantum-biophysics tasks across different difficulty levels. Academic performance within this group was negatively associated with stress responses ($r = -0.31$ to -0.42) and positively associated with emotional stability ($r = 0.28$ – 0.38) and cognitive concentration ($r = 0.33$ – 0.41). These findings indicate relationships between academic achievement and psychological indicators but do not confirm direct physiological changes or causal improvements in SAC. The developed exercises targeted cognitive, emotional, and motivational components through problem-solving, reflection, goal-setting, and group interaction. The findings may support educators, curriculum developers, and researchers in designing learning environments that enhance socio-emotional competence and educational outcomes.

Keywords: material assimilation, critical thinking, internal mechanisms, adaptive learning strategies, self-regulation.

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