Assessment for Learning in Informatics education: The CAIR framework and a STEAM-based application

Maria GUTU

Technical University of Moldova, Chisinau, Republic of Moldova

maria.gutu.md@gmail.com

Abstract: *Competency-based Informatics education requires assessment practices that support iterative learning, problem-solving, and learner self-regulation; however, assessment often remains predominantly summative and weakly integrated with instruction. This paper presents a CAIR-oriented approach to operationalising Assessment for Learning in upper secondary Informatics education. Rather than introducing additional assessment instruments, the CAIR framework embeds formative assessment directly into instructional design by aligning learning tasks, feedback, and reflection with Informatics-specific competencies. Using a design-based, illustrative perspective, the study examines an authentic project-based learning scenario involving C/C++ programming and microcontroller-controlled smart systems. A parking system with a servo-controlled barrier is analysed to demonstrate how assessment evidence emerges through iterative cycles of design, testing, debugging, and reflection. The analysis highlights CAIR's capacity to support coherent alignment among competencies, learning activities, and formative assessment while remaining adaptable to practical classroom constraints.*

Keywords: Assessment for Learning, Informatics education, Competency-based assessment, CAIR framework, Project-based learning.

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