

Co-Creational Model for Blended Learning in a Flipped Classroom Environment Focusing on the Combination of Coding and Drone-Building

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Abstract : The outbreak of the COVID-19 pandemic has shown us that online education is so much more than just a cool feature for teachers – it is an essential part of modern teaching. In online math teaching, it is common to use tools to share screens, compute and calculate mathematical examples, while the students can watch the process. On the other hand, flipped classroom models are on the rise, with their focus on how students can gather knowledge by watching videos and on the teacher’s use of technological tools for information transfer. This paper proposes a co-educational teaching approach for coding and engineering subjects with the help of drone-building to spark interest in technology and create a platform for knowledge transfer. The project combines aspects from mathematics (matrices, vectors, shaders, trigonometry), physics (force, pressure and rotation) and coding (computational thinking, block-based programming, JavaScript and Python) and makes use of collaborative-shared 3D Modeling with clara.io, where students create mathematics knowhow. The instructor follows a problem-based learning approach and encourages their students to find solutions in their own time and in their own way, which will help them develop new skills intuitively and boost logically structured thinking. The collaborative aspect of working in groups will help the students develop communication skills as well as structural and computational thinking. Students are not just listeners as in traditional classroom settings, but play an active part in creating content together by compiling a Handbook of Knowledge (called “open book”) with examples and solutions. Before students start calculating, they have to write down all their ideas and working steps in full sentences so other students can easily follow their train of thought. Therefore, students will learn to formulate goals, solve problems, and create a ready-to use product with the help of “reverse engineering”, cross-referencing and creative thinking. The work on drones gives the students the opportunity to create a real-life application with a practical purpose, while going through all stages of product development.

Keywords : flipped classroom, co-creational education, coding, making, drones, co-education, ARCS-model, problem-based learning

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