

From Operating to Conceiving

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**Abstract:** A project based learning strategy is introduced in this paper. The design task of projects is about the mechanism of toys with multiple degrees of freedom. The first phase is operating. Each group of student is given an existing toy to play with. By observing the various mode of motion and analyzing its degrees of freedom, students are asked to describe the motion in professional graphs. The second phase is conceiving. Students are asked to design the mechanism, including drawing and calculating. The third phase is comparing, the toy is taken apart and the existing mechanism is compared with the students' design. The main point of this strategy is setting a context for conceiving by operating the existing toy. Starting from this point, design and redesign can be arranged in a professional engineering style.