

## The Hybrid Learning of Using the 3D Printing and Open Approach Processes as: the Case Study in Classroom of the “Motions on Inclined Plane”

### Abstract

The effort of this work is in order to exploit the utilization of the 3D printing process in physics classroom as active learning. However, only the 3D printing paradigm may not qualitatively sufficient, the Open approach paradigm has been also incorporated. Since the 3D printing process is just a method that making a physical object from the creative idea to a 3D digital model, typically by laying down many successive thin layers of a material. While the Open approach encourages by allows students can solve problems by their wisdom under supervision of teacher which behave like a trainer, facilitator, or mentor. In the classroom case study, the 3D printing procedure and the Open approach are applied at the same time for excite students to create idea and design of how to solve problem to find the appropriate solutions and products. This hybrid approach can make learners to develop various skills from their background knowledge which is incorporating newer one. The content in University Physics: “the motions on inclined plane” has been exploited as a problem’s instance. The simple random students’ group samples are 4th year students in bachelor of physics education program by 6 people. All have been tested both before and after 3D printing classroom problem-solving procedures. The result from the operations suggests that this learning process can boost students to be able to higher level learning by design and printing 3D objects. The rubric scoring method has been used to the assessment its efficiency from both pre- and post-test studies. It was shows that the student’s development is increase from an average level to be great. The problem-solving skills by 3D object design and the group working process are in a good level. Finally, the students’ satisfaction with the overall teaching and learning management is to be great.

Keywords: 3D Printing Classroom, Open Approach, Motions on Inclined Plane, Physics, Education

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