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ALTERNATIVE APPROACHES IN DIGITAL ERA TO HANDLE UG PHYSICS (MECHANICS) LABORATORY: A CASE STUDY OF MOMENT OF INERTIA OF A FLYWHEEL EXPERIMENT

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With the invasion of Digital Era on all activities of life, alternative approaches are emerging to explore a single situation in a variety of ways offering new opportunities and insights about learning behavior of the student. It is expected that this is going to impact traditional laboratory practices in a variety of ways. The moot question is can these alternative explorations be used for enhancing learning experiences of the learners, make laboratory a more engaging place and tuning learners alternative conceptions with the conceptions of an expert. In this case study we present three ways to perform an experiment to calculate the moment of inertia of a flywheel in a typical undergraduate Mechanics (Physics) laboratory: (i) the traditional way using a stopwatch and a meter rod as basic measuring tools, (ii) by using a video analyser of a typical setup of the experiment and (iii) a modelling software available in a web-based virtual laboratory. The Physics education research strategies are applied to observe the pedagogical value of performing the same experiment in three ways together. To go ahead with this approach, implemented through pre-post test methodology, a concept inventory has been devised to identify the alternative conceptions around the moment of inertia, theorems of the moment of inertia and flywheel as a mechanical device to control rotational motion in a day to day life. An effort has been made to address the alternative conceptions during the performance of the same experiment in three distinct ways. Finally, a perception survey was also carried out to know about this multi-representational approach's (a) pedagogical effectiveness, (b) effect on laboratory climate, (c) expectations of students, (d) laboratory engagement and (e) instructor-student relationship.

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