EFFECTIVENESS OF USING VIDEO ANALYSIS SOFTWARE IN INTRODUCTORY PHYSICS

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With the rapid development of science and technology, various IT-based teaching materials and effective teaching methods have been developed. One such method is to analyze physical phenomena by capturing video of experiments and analyzing the video. The authors have developed teaching materials to analyze various physical phenomena that are difficult to realize with conventional experimental methods using moving images. For example, the authors have developed teaching materials in which the collision of two objects is filmed from above and analyzed to learn about the law of conservation of momentum. Video analysis is considered useful in that it enables learners to understand physical phenomena by connecting the phenomena to graphs and equations while actually operating the video. In addition, it is also considered to promote exploration activities by allowing learners to take videos of physical phenomena of interest to them and analyze them.

The teaching materials we have developed have been used in university classes and teacher training, but they were intended for a relatively small group of about 30 students, and were mainly used in situations where learners could immediately respond to any inadequacies in operation or content. On the other hand, with the trend to online learning due to COVID-19 starting in 2020, there are more and more opportunities for university students to take online classes, using computers at home or other locations, and the introduction of Computer-Based-Test as a new way of testing has been seriously considered in recent years. Under these circumstances, even if learners are stumped by operational problems, teachers are often unable to provide immediate support. It is also necessary to examine the extent to which the use of video analysis software is useful for understanding the content.

Therefore, the purpose of the study that we are presenting, is to examine the effectiveness and challenges of a motion analysis assignment outside of class, for approximately 480 students taking calculus-based introductory physics in their first year of university, for two years in 2021 and 2022. After viewing the video analysis shown by the professor several times during the class, the students installed the video analysis software themselves and worked on the video analysis task.

In 2021, 53% of the students reported that understanding the concepts just by watching the video analysis was *very helpful* and *helpful* on a 5-point Likert scale, while 63% reported that understanding the concepts was *very helpful* and *helpful* when they tried to do the video analysis on their own. The results will be presented along with the 2022 results.

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