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Motion sensors in mathematics teaching: learning tools for understanding general math concepts?

Summary: Incorporating technology tools into the mathematics classroom adds a new dimension to the teaching of mathematics concepts and establishes a whole new approach to mathematics learning. In particular, gathering data in a hands-on and real-time method helps classrooms coming alive. The focus of this paper is on bringing forward important mathematics concepts such as functions and rate of change with the motion detector. Findings from the author's studies suggest that the motion detector can be introduced from a very early age and used to enliven classes at any level. Using real-world data to present the main functions invites an experimental approach to mathematics and encourages students to engage actively in their learning. By emphasizing learning experiences with computer-based motion detectors and aiming to involve students in mathematical representations of real-world phenomena, six learning activities, which were developed in previous research studies, will be presented. Students use motion sensors to collect physical data that are graphed in real time and then manipulate and analyse them. Because data are presented in an immediately understandable graphical form, students are allowed to take an active role in their learning by constructing mathematical knowledge from observation of the physical world. By utilizing a predict-observe-explain format, students learn about slope, determining slope and distance vs. time graphs through motion-filled activities. Furthermore, exploring the meaning of slope, viewed as the rate of change, students acquire competencies for reading, understanding and interpreting kinematics graphs involving a multitude of mathematical representations. Consequently, the students are empowered to efficiently move among tabular, graphical and symbolic representation to analyse patterns and discover the relationships between different representations of motion. In fact, there is a need for further research to explore how mathematics teachers can integrate motion sensors into their classrooms.