Lesson Analysis

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LT 712

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Lesson Description

The lesson analysis that I am going to detail revolves around my initial experiences of incorporating Vernier Logger Pro software into the physics classroom. The lesson objective was for the students to apply the concept of The Law of Conservation of Momentum in solving for the unknown mass of a laboratory cart using their laptops and motion sensors. Prior to the lab we introduced the physics concept and applied the necessary mathematics to solve routine problems. The lab write-up was obtained from Vernier's laboratory physics manual.

Instructional Theory / Assumptions

It was my hope that the lesson would take on the characteristics of the constructivist's instructional philosophy. According to Bruner, learning is an active process in which learners construct new ideas or concepts based upon their current/ past knowledge... The learner selects and transforms information, constructs hypotheses, and makes decisions, relying on a cognitive structure to do so (Bertrand, 2003). The lab required the students to make early predictions based on their previous knowledge and then allowed them to test those predictions while physically manipulating different variables throughout the experiment. It was my assumption that using the computer would speed up the student's ability to gather accurate data, freeing up more time for the students to run more trials and construct their own meanings by drawing from a larger set of experiences when compared to the traditional way I used to present the lab. I also felt that this lesson built on the five components of powerful problem-solving strategies proposed by J.M. Carrol (Bertrand, 2003):

1. People learn by doing; they try to act in order to understand.

2. People learn by thinking and reasoning; they generate and test hypotheses in order to understand.

3. People seek to work in a meaningful context and toward meaningful goals.

4. People rely on their prior knowledge when they try to manage and assimilate new experience.

5. People use error diagnosis and recovery episodes as a means of exploring the boundaries of what they know.

Teacher & Student Roles

I choose this lab early in the summer of 2005 while I was attending a Vernier workshop. As participants in the workshop, we preformed the momentum activity just as we would present it to our students back in our classrooms. It was an exciting learning experience for me and I felt that it fit well into the curriculum. The students were involved with the implementation. They were grouped up and then required to put together all the necessary track, carts, and then interface their computers with the sensors. The students were evaluated as a group based on the completion of the lab which required them to make predictions, collect data, analyze data, and answer conceptual questions.

Role of Technology

The computer and sensors where suppose to be a tool to allow students to gain a deeper understanding of the Law of Conservation of Momentum. Instead, from the student's perspective and the implementation phase the technology became the objective. The students became so engaged in building, setting up, connecting the computer, and viewing the graphics they lost sight of the purpose.

Improvements

Since first doing this activity I have had time to reflect and change two aspects of the lab. Early on in the year I set aside a class period for the students to build, interface, and investigate with all of the probes and sensors. I have written up a few lower level science and math activities that allow the students to focus more on the technology than the science concepts. During this "play" time I encourage them to think about how we could apply these technologies to activities in the future. If technologies are used to foster meaningful learning then they should be used as engagers and facilitators of thinking (Jonassen, 2008). Within the first year of starting this process I had students helping me design the labs. One student proposed having students wearing roller blades in the gym as opposed to using carts on a track. We threw out the canned lab provided in the manual and design a new write-up together. The new activity is easy to follow and uses the students as participants while still utilizing the motion sensors and laptops. Most of my labs today are inquiry based and designed with input from the students focusing on what interests them. It is apparent to me that when student are involved with the design and direction of their activities they buy into the learning process more.

References

Bertrand, Y. (2003). *Contemporary Theories and Practice in Education*. (2nd Edition). Atwood Publishing: Madison, WI.

Jonassen, D. Howland, J. Marra, R. Crismond, D. (2008). *Meaningful Learning with Technology.* (3rd Edition). Merrill Prentice Hall: Columbus, OH.