Science Education 201 Learning Commentarty #1 [redacted]

Although it was less than a year ago that I completed a Physics AP class in High School, I was surprised by how often my own ideas were challenged and changed by the basic ideas taught through this elementary curriculum. The hands on experimentation ~~made a~~ clarified my interpretation of many concepts. In Cycle 2 Activity 2, we worked to discover how an object would act with a constant strength force being continuously applied to it. The initial ideas section asked what I thought the motion of the cart would be like under those circumstances. With little understanding of the concepts involved, I answered that I thought the cart would move at a constant speed after the initial increase of speed. To support my reasoning I wrote, "This is because the same amount of force gets the cart going and once it is traveling at the same speed as the hand, it stays that way." As soon as we began the experiments I realized my initial thoughts were incorrect.

The first experiment asked each group member to simply try and continuously push the cart along the track with our finger using the same strength force. Each of us were surprised to discover that the cart seemed to try and roll away from our finger because it was actually increasing in speed as we were constantly applying a force to it. Immediately, we each felt we had to reevaluate our initial thoughts to determine why the cart acted in that way. While brainstorming possible scenarios, we threw out the idea that "the cart keeps gaining energy as you keep pushing it."

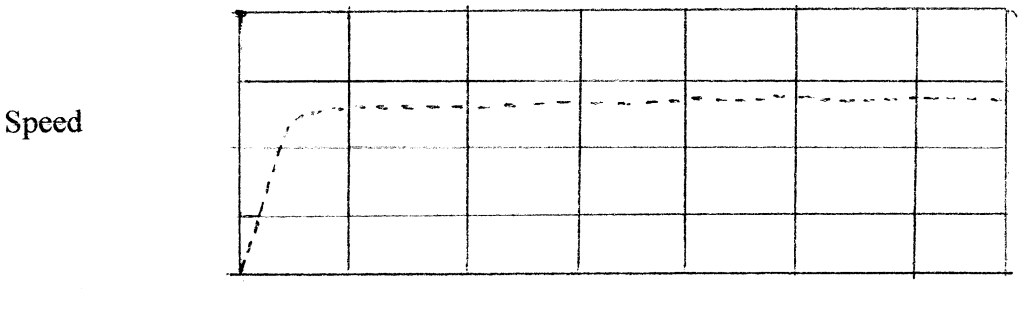
Next, we attached a fan to the cart. By doing this, we were allowed to record data while the fan applied a continuous, same strength force to the cart. In order to ensure that the fan was going to provide the cart with a continuous force, we held the cart still and felt the slight push of the cart with the fan attached to determine if the push seemed

constant. In addition to this, we carefully listened for variations in the noise made by the fan to be sure that the fan would be applying the same amount of force throughout the whole experiment. After taking these precautions, we still found that the graph that was recorded by the Motion Sensor data collector once again proved our initial theory wrong by showing the continuous increase in the carts speed as a constant force was applied to it through the slope of the line.

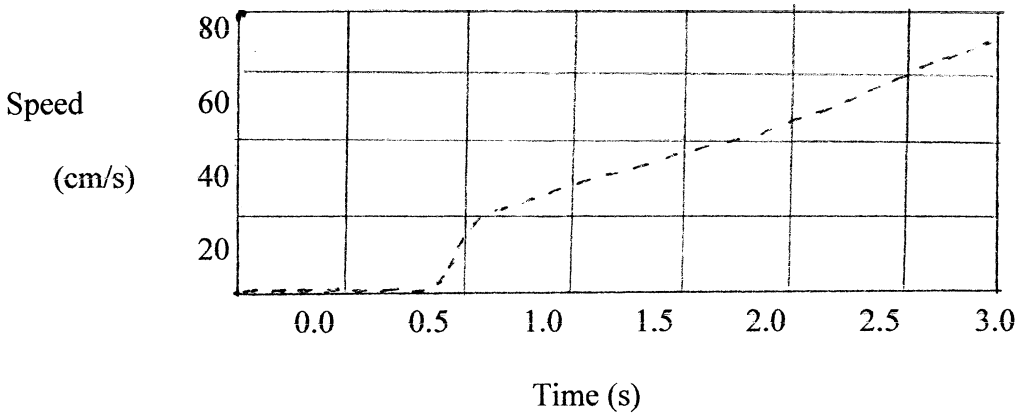
To further enforce the idea that a continuous force on an object will result in the objects continuous increase in speed, our group ran the I&M Simulator. Not to our surprise, the slope of the graph expressed an increase in the carts speed with the application of a continuous force. With the information that we had gathered from Cycle 1 and these new experiments, we were able to come to a group-wide conclusion that energy transfer was the reason the cart continuously increased in speed when a constant force was applied to it.

Cycle 1 dealt with the ideas involved with interaction and energy transfers. In this section, the PET notebook states, "When the objects in an interaction push or pull on each other and at least one of them changes its speed, this is evidence for a transfer of Mechanical Energy." To extend this idea taught in Cycle 1, Cycle 2 introduced different ways to apply a force (a push or a pull) to an object. When making our initial theory on the objects motion with a constant force applied, the idea of energy transfer seemed to allude us. After finally making the connection, it was easy to see that the cart continuously gained speed because the mechanical interaction. The interaction allowed stored chemical energy to be transferred by Mechanical Energy into the carts steadily increasing Motion Energy.

*Speed-time Graph Illustrating Initial Ideas*




*Speed-time Graph from Fan Experiment Data*




*Energy Diagram*

Mechanical Interaction