

## **Elective 9: Exploring Physics Education Research**

**Identify one new technique, tool, or assessment that you plan to implement with your students when teaching about forces and motion.**

Among the many research-based teaching resources available on [physport.org](http://physport.org), the [Diagnoser Tools](#) resource appears to be the most age-appropriate resource that aligns with Middle School National Science Education Standards and also provides teachers with a wide range of diagnostic supports for teaching and learning physical topics such as forces and motion.

**Describe why the inclusion of this new technique, tool, or assessment is important, and what you and your students might gain from it.**

The “Diagnoser Tools” resource is an internet-based learning and assessment tool designed to assist teachers with their classroom instruction. It provides teachers and students with correct and incorrect concepts and ideas the students may have regarding physical situations. The “Diagnoser” delivers sets of questions that can be used as formative assessments to inform learning and instruction rather than assigning scores. Specifically, it diagnoses misconceptions that underlie the wrong answers of students. Students receive feedback on their thinking as they work through their assignment and teachers can access reports on students’ thinking related to the assigned content to inform subsequent instruction on the topic.

**Create a short learning plan that includes: (1) Goal for using the new resource, (2) next steps for implementing it, and (3) a community, website, or colleague who can provide more support and information if you need it.**

As a Pre-Engineering teacher my plan is to integrate some of the instructional tools provided by the “Diagnoser Tool” resource into my CO2 Dragster unit as a means to purposefully incorporate the teaching and learning of physical principles related to force and motion. I intend to modify my student learning goals to include those listed in the “Forces to Explain Motion” lesson included in the “Diagnoser Tools” resource. Specifically, I want my students to recognize that pushing and pulling forces can change the motion of an object. During the engagement portion of my lesson I will utilize the elicitation questions found in the “Effects of Pushes and Pulls” sub-section to open up some ideas from the class. The students will answer the questions independently and then share their ideas with another student before conducting a class discussion. After identifying the students’ initial facets of understanding (facet cluster provided in resource) with the elicitation questions, I would choose or adapt one of the provided developmental lessons (Lesson 1: Simple Motion Investigations of Effects of Mass and Force. and/or Lesson 2: Exploring Friction.) that will challenge the problematic facets and build on strengths in the students’ thinking toward the learning goals. Shortly after the main ideas have been developed but before the students begin the CO2 car project, a “Diagnoser Set” of questions (generated by a computer program) would be given to the students to elicit different facets of student thinking. This program provides feedback to the students to assist them in monitoring their own learning. After they have completed a set of questions I would be able to view the facets diagnosed for each question for each student. The results of this assessment would inform my subsequent instruction on the topic. The “Diagnoser Tool” also provides prescriptive activities that can be assigned to individual students or to the whole class if specific problematic ideas identified by the “Diagnoser Set” still need to be addressed. Lastly, if additional support or information is needed to aid me or my students in the teaching and learning of the relationships between force and motion I can call on my fellow science teacher colleagues or utilize the [Physics Classroom](#) website for additional resources.