

How Pathway Helps Teachers Bring PER Into Practice

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Goals

- To improve the quality of teaching physics by facilitating in-service and pre-service teacher training.
- To make the physics education research accessible to the teachers
- To tailor the research to the practical needs

Motivation for the study

- what can physics teachers learn from research in physics education?
- What is the impact of research on their work in the classrooms and laboratories?
- To get feedback about general beliefs and attitudes toward physics education and instructional strategies

Definition of the task

- The achievements of research were collected and associated to the relevant questions.
- The output is a collection of different kind of resources which were matched to teachers' questions.
- Links will be displayed as part of the results of Synthetic Interviews, when a teacher submits a question to Pathway.

Theoretical Framework for Synthetic Interviews

Backward Design (Wiggins and McTighe, 2000). This process has three steps;

- **What is worthy and requiring of understanding?**
- **What is evidence of understanding?**
- **What learning experiences and teaching promote understanding, interest and excellence?**

Identify desired results

What should the teacher know, understand and be able to do in the classroom?
What is most important for the new physics teacher?

Determine acceptable evidence

How will we know when the teacher has reached a desired level of ability? What will we accept as evidence of this level?

Plan the Synthetic Interview experience

What enabling knowledge and skills will the teachers need? What learning activities need to be shown or described? What related material from our partners should be included?

Research Area

- Focus on demonstrations, student activities (labs, group work, hands-on, minds-on activities, simulations, interactive video in teaching and etc)
- Concept area: Mechanical concepts and tools like vectors, coordinate systems, free body diagrams
- Collection research based products about different methods of assessment

Example of the Resources-Online Materials

Multimedia Educational Resources for Learning and Online Teaching
THE NATIONAL SCIENCE DIGITAL LIBRARY, Physical Science Resource Center (PSRC), Physics central

Innovative online educational materials
ILDS, Just in Time teaching, Simulations, Assessments

Computer Instructional Materials

- Phys-lets
- Simulations like Interactive physics,
- Physics interactive softwares like Free body
- Discovery-based laboratory curricula and real-time products

Other Resources

Audio video Products, video graphs, Quick Time movies,

Teaching and Learning Physics with Interactive Video
Physics and Automobile Collisions (Zollman 1984),

CDs; *Powerful Ideas in Physical Sciences*

Books, mostly the arts of the good demos; String and Sticky Tape Experiments (Edge 1987)

Journal Articles, RB, NB

Examples

*How should you relate inertia to real-life situations?
Measuring the moment of inertia of the human body by a rotating platform method*

W. Griffiths, J. Watkins, and D. Sharpe

The impact of video motion analysis on kinematics graph interpretation skills

Robert J. Beichner

Patterns observed

- Generally evidence supports the whole idea, but every material has its own strengths and weaknesses
- Computer-assisted instructional materials do not by any means represent all of the possible guidelines from the cognitive theories
- There is a potential for statistical analysis
What topics need special attention?

How Users will take benefit of the study?

- Many teachers have their self-described instructional strategies
- Potential to establish a standard evaluation scheme and to make this available to physicists and physics teachers
- How teachers can relate the research article to their question?

Assessment

- Recipe for assessing a special concepts student conceptual understanding of Newton's laws of motion
- Looking at assessment from cognitive psychology
- Looking at different kinds of problem solving
- Discussing different methods of assessment
- Using computer techniques in assessment

Future work and Conclusion

- This study is an overall look to all is available about interactive demonstrations for mechanical concepts and evaluation tools
- Gives insight about shortcomings
- It is an opportunity to evaluate the contemporary research by bringing it in to practice
- Let teachers know what research says about different kinds of assessment
- Support teachers with new ideas for demonstrations and let them to communicate better with students

Thank you