Bringing relevant physics education research to high school physics teachers

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Physics Teaching Web Advisory

- Providing web-based in-service teacher assistance through a new type of digital video library and intelligent system
- Providing virtual access to master teachers
- Combining CMU[1] digital library technology and KSU physics education expertise
- Supporting physics teachers on-line both in the content and pedagogy

1-Carnegie Mellon University

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Pathway: an intelligent resource for assisting physics teachers

- Until now computer technology has been applied to many areas of physics.
- Pathway applies artificial intelligence tools in physics education, which is building computer systems that process natural language in a meaningful sense.

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The Retrieval & Presentation of Information in Pathway

- Synthetic Interviews
  - Retrieval occurs when a teacher submits a question
  - Presented as recorded video from master teacher
- Reference to research and other educational resources
  - Presented as text
  - Related to teacher's question
- Digital Video Library
  - Retrieved from database
  - Presented in several formats

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Natural Language Processing in Pathway's Synthetic Interview

- Artificial intelligent tool
- Words & order of words are important
- Deduces meaning and capable matches the input to an appropriate response
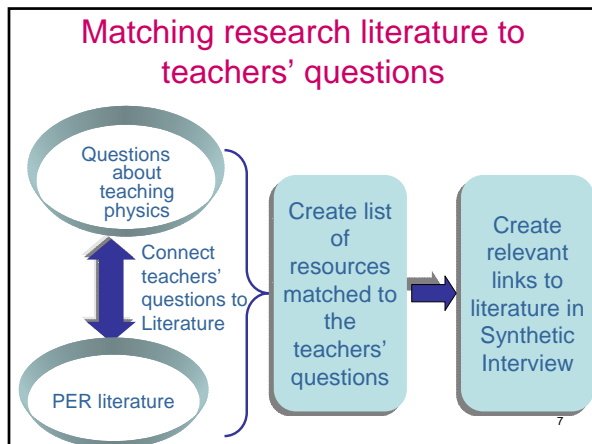- Continuously changing based on input questions

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Example Synthetic Interview

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Matching research literature to teachers' questions

Questions about teaching physics

Connect teachers' questions to Literature

PER literature

Create list of resources matched to the teachers' questions

Create relevant links to literature in Synthetic Interview

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Example of a question with research connection

How can I use computers to teach graphs?

Impact of Video Motion Analysis on Kinematics Graphs Interpretation Skills, Beichner, *AJP (*1996*)*

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Automation in Pathway

➢ Physics Education Master Database is updated frequently
➢ Searching master files with appropriate keyword
➢ Define a keyword to link items located in Master files and the database to questions

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Future work from educational view

➢ **Goal**
  ❑ **Increase the use of PER by practicing teachers**
➢ **Method**
  ❑ **Add pedagogical content to Synthetic Interviews**
  ❑ **Link new responses to PER literature**
  ❑ **Obtain feedback from users**
  ❑ **Revise as needed**

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Future work from technological view

➢ **Goal**
  ❑ **Automate connections between responses and PER reference database**
➢ **Method**
  ❑ **Improve codifying of questions**
  ❑ **Enhance "intelligence" of the system**
  ❑ **Obtain feedback from users**
  ❑ **Revise as needed**

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Thank You

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