

# Physics Department Seminar

Apr. 18, Friday at 2 PM in Science Building Room 250

## Pedagogical Frameworks for Effective Physics Teaching

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Effective physics teaching requires more than subject mastery. It requires the ability to take complex content and make it into accessible learning experiences. This poster explores three key frameworks—Content Representations (CoRes), Pedagogical and Professional-experience Repertoires (PaP-eRs), and Pedagogical Content Knowledge (PCK). We outline the theoretical foundations of each framework, illustrate

their relevance to physics instruction, and discuss examples for developing a reflective and responsive teaching practice. By integrating CoRes and PaP-eRs within the broader construct of PCK, we provide a roadmap for physics educators to refine their practice and improve student understanding of challenging physics concepts. We also explore some case studies of how CoRes and PaP-eRs can be effective.

Content Area: Energy	Big Idea 1	Big Idea 2
What do you intend the students to learn about this idea?	Energy is conserved in a closed system	
Why is it important for students to know this?	Energy cannot be created or destroyed, only transformed or transferred	They can use it as a reliable rule to make predictions and explanations
What are the difficulties connected with teaching this idea?	Many students enter the classroom with intuitive but incorrect ideas about energy	Energy can't be seen or touched directly
What is your knowledge about students' thinking that influence your teaching of these ideas?	Plan for misconceptions, often students believe energy can be "used up"	Emphasize and clearly define the system
Specific ways of ascertaining students' understanding or confusion around this idea?	Elicit prior knowledge with diagnostic questions	Analyze real or stimulated phenomena