TEACHING THROUGH PROBLEM-BASED LEARNING TO INCREASE STUDENT ENGAGEMENT AND UNDERSTANDING

MARIAN UNIVERSITY | FACULTY CON 2017 | MAY 10, 2017

PRESENTED BY ERIKA WISE

"If I had an hour to solve a problem, I'd spend 55 minutes thinking about the problem and five minutes thinking about solutions."

-Albert Einstein

LEARNING ACTIVATION HANDOUT ON PROBLEM-BASED LEARNING

Know What do you know about PBL?	**Wonder** What do you wonder (or want to know more about PBL?
Understand What do you have a better understanding of in regards to PBL?	
Do What will you now be able to do or what are your next steps in regards to PBL?	

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Dr. Perry

Computer Science 101
Instructors

Dr. Anderson

Dr. Perry's Class

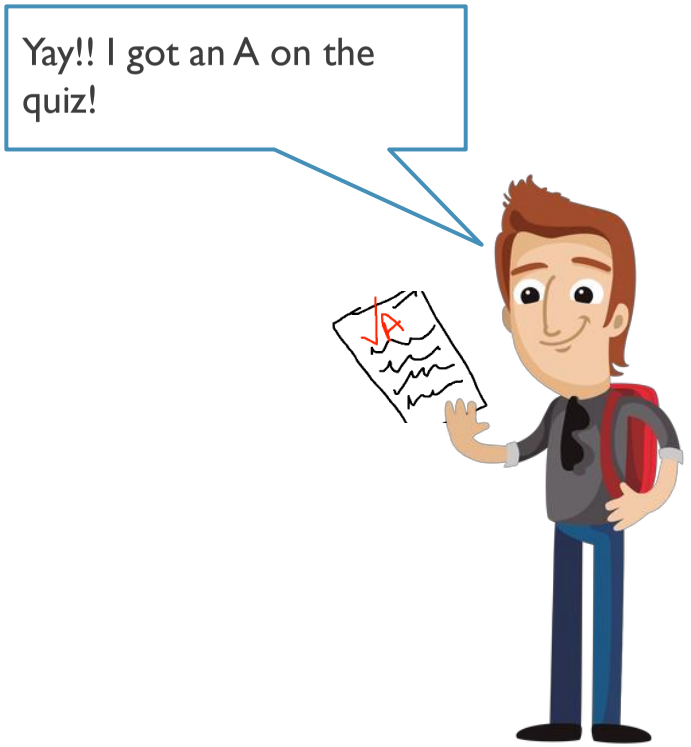
How to Replace a Hard Drive

Step 1: Gather the appropriate tools.
Step 2: Locate the battery.
Step 3: Remove the battery.
Step 3: Remove the cover of the laptop.
Step 4: Locate the hard drive.
Step 5: .....

Dr. Perry's Class

Dr. Perry's Class

Dr. Perry's Class



Rick, I heard you learned how to fix computers. I need some help.

Can you replace fix my laptop? I think the motherboard needs to be replaced.

Uhmmm... Sorry, Mr. Smith. I can't help you.


I have not learned how to do that yet.

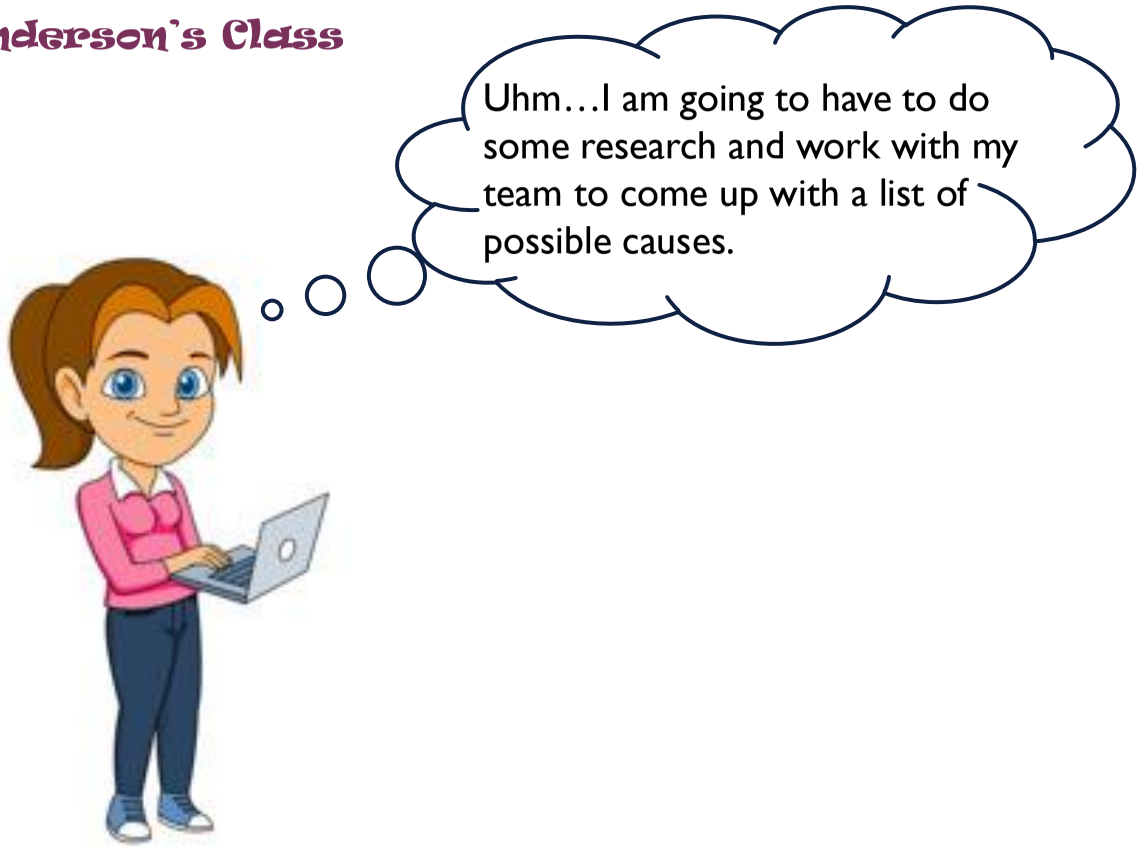
Dr. Anderson's Class

Dr. Anderson's Class

Let's think about these two questions.

1. What do we know?
2. What do we need to find out?

Dr. Anderson's Class



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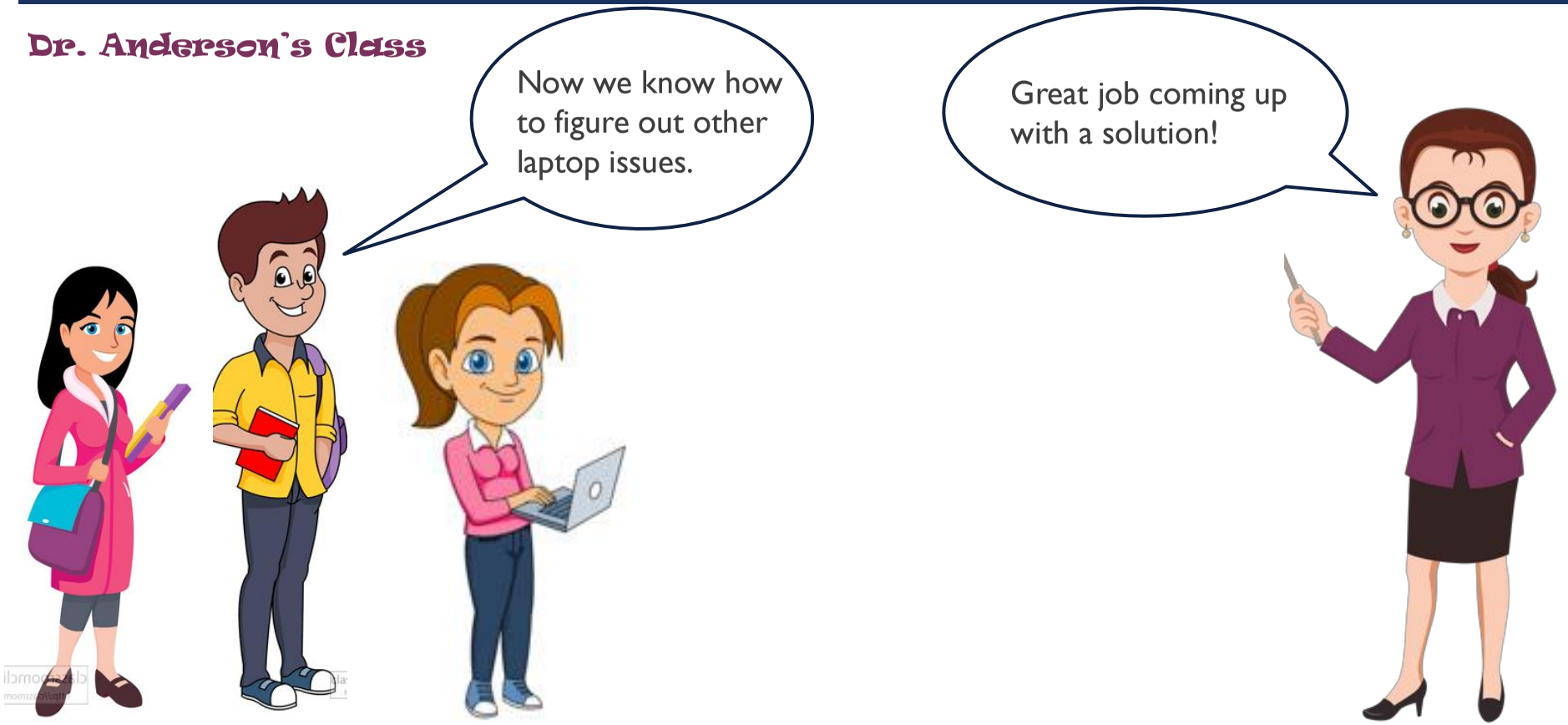
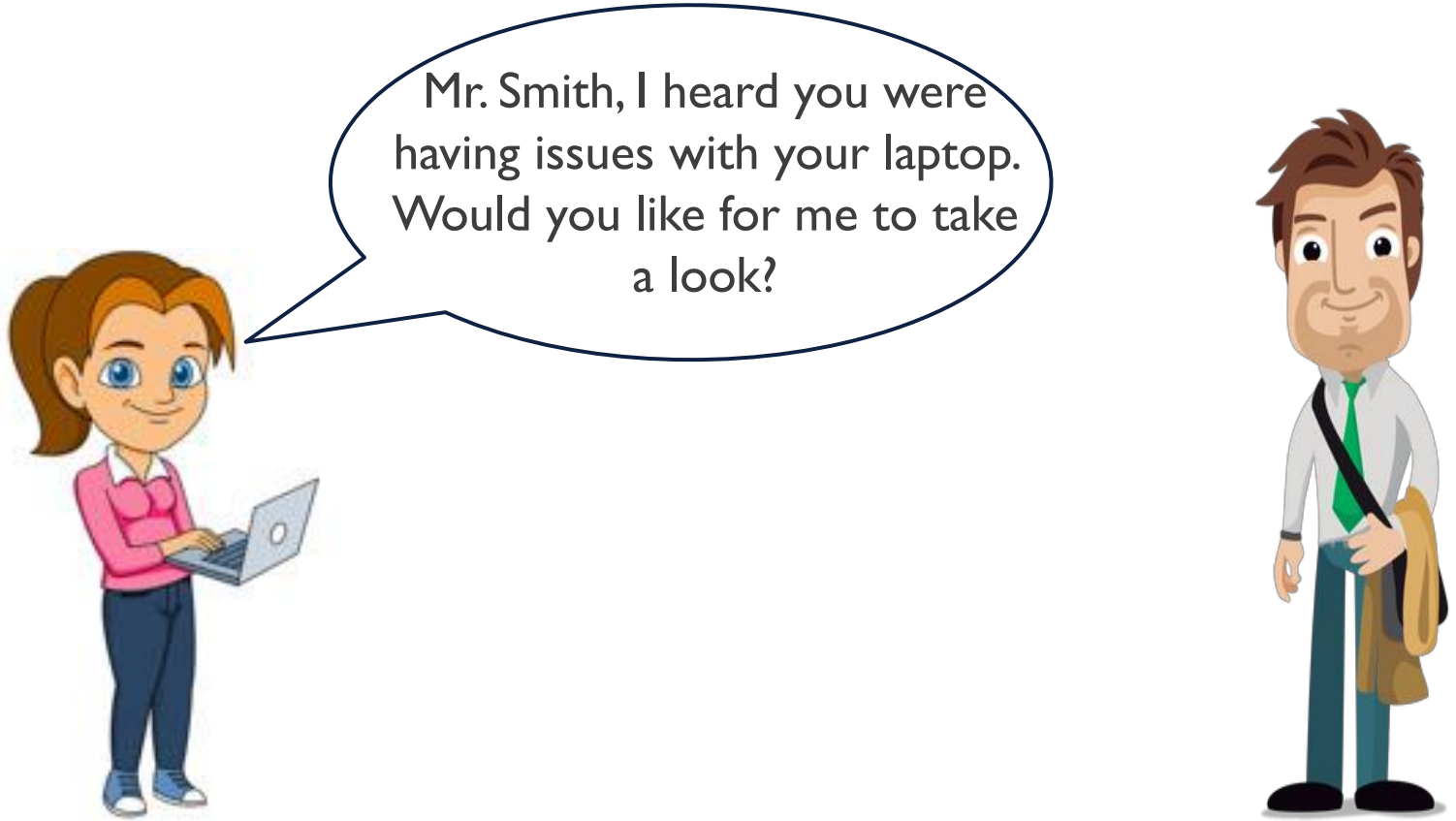



Mr. Smith, I heard you were having issues with your laptop. Would you like for me to take a look?

Told what we need to know

Memorize Information

Problem assigned to illustrate how to use knowledge

Problem assigned

Identify what we know and need to know

Learn and apply knowledge to solve context specific problem

Instructor-Centered
Traditional Instruction

VS.

Learner-Centered
Problem-based Learning

WHAT IS PROBLEM-BASED LEARNING?

- Inquiry-based instructional approach
- Introduced in professional training of medical students by Dr. Barrows in late 1960s
- Gaining traction in professional training of non-medical field and K-12 students
- Focus on investigation of real-world problems/scenarios
- PBL learners outperform traditional learners and retain knowledge and skills over a longer period of time

GOALS & PROCESSES OF PROBLEM-BASED LEARNING

- Learners are introduced to the problem first ***within the context of a complex real-world problem***.
- Learning is driven by ***ill-structured***, open-ended problems that have ***multiple possible solutions***
- Learners ***identify gaps in understanding*** to reach possible solutions
- Learners engaging in ***self-directed research*** as individuals and in small groups
- The instructor takes on the role of a ***facilitator*** to guide the learning process with ***scaffolds*** through the ***stages of the PBL cycle***
- Instructor becomes a ***resource*** rather than the giver of knowledge
- Learners have the opportunity to ***integrate*** theory with ***practice***

BENEFITS

- Provides a bridge between declarative, **the *what***; procedural, ***how to***; and conceptual knowledge, ***when and why***
- Support learning and sharpening metacognitive skills; ***problem-solving, communication, collaboration, self-directed learning, and critical reflection***
- ***Engages*** and ***motivates*** indifferent and uninterested learners
- Solutions and learning process are ***applicable*** and ***transferable*** to the real-world
- Results in ***deeper understanding***

CHALLENGES

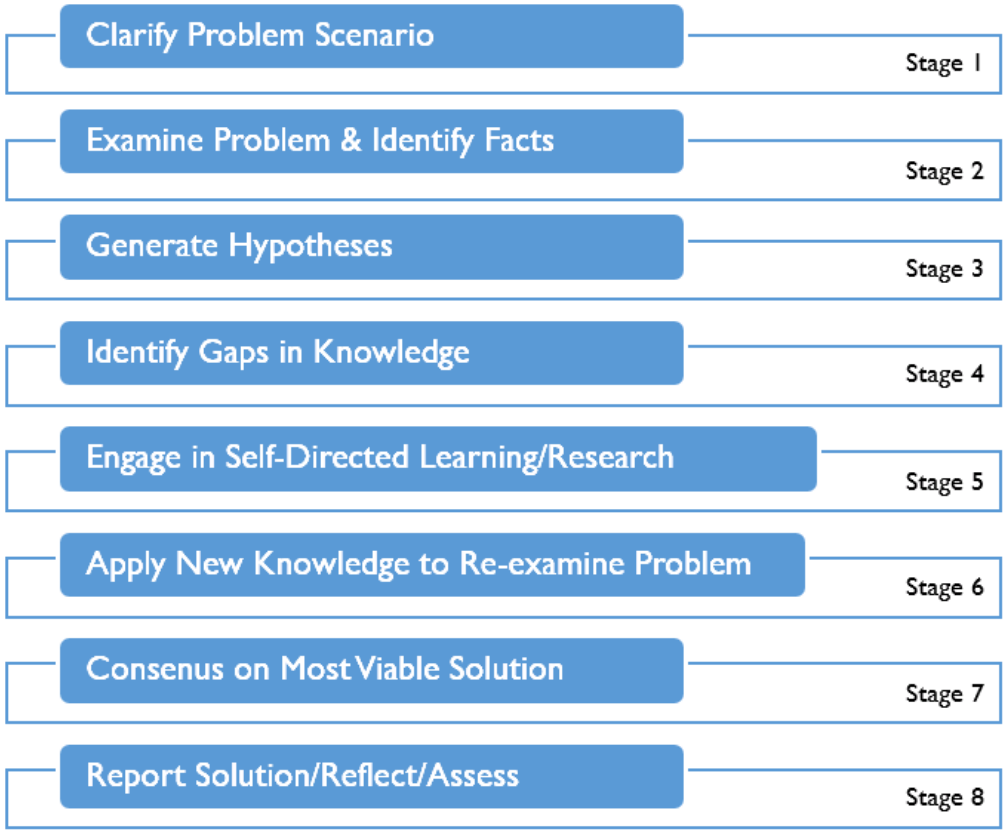
- Fidelity to PBL process and goals
- Implementation of facilitation strategies
- Acceptance of new roles, instructor and learners
- Overwhelming and frustrating
- Teaching good collaboration and managing group dynamics
- Assessments

All inquiry, problem-solving, hands-on, authentic learning instructional models are ***not*** considered problem-based learning.

PROBLEM-BASED LEARNING PROBLEMS

- Open-ended, ill-structured, and complex
- Provide opportunities to examine problem from multiple perspectives
- Authentic and context specific
- Opportunity for multiple viable solutions
- Typology of Problems
  - Decision-making
  - Diagnosis-solution
  - Design problems
  - Policy analysis
  - Dilemmas

PROBLEM-BASED LEARNING STAGES



PROBLEM-BASED VS. PROJECT-BASED & CASE-BASED LEARNING

Problem-Based Learning (PBL)	Project-Based Learning (PBL or PjBL)	Case-Based Learning (CBL)
Collaboration, self-directed learning, critical reflection, and metacognitive	Collaboration, self-directed learning, and creativity	Develop critical thinking and reasoning skills
Assess learning and provide feedback throughout the learning process; formative and summative assessment	Assess learning and provide feedback as a summative assessment	Asses learning after instruction; summative assessment
Multiple possible solutions	End product/artifact, one shared goal for project	Work through reasoning for a known solution
Facilitation strategies used elicit learning within ZPD and scaffolds support learning	Specifications for project and product guides learning	Instructional strategies derived mostly from Socratic questioning
Collaboration key; inclusive for all learners	Collaborative and inclusive for most learners	Not inclusive of all learners

HOW TO GET STARTED

Reframe or Create Course Questions

Recommendation: Essential Questions by McTighe and Wiggins

Micro-Lessons

Introductory Activity or Flipped Classroom

One or two sessions, less than three hours

Mini-PBL Unit

Design scenarios and tasks based on taxonomy of PBL problems and aligned to goals and characteristics of PBL

Three or more sessions, engaged in five hours or more

Essential to align with the goals and key characteristics of PBL

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PROBLEM-BASED LEARNING VIDEO

Maastricht University *Leading in Learning!*

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RESOURCES

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Additional **Project-Based Learning (PjBL)** resource mentioned by Dr. Jen Regelski in the PBL session. University of Washington's Knowledge in Action research project.

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