Critiques of Student-Led Activities in the Classroom

Craig Miller
School of Computing
Last Spring at the Conference

Personalized Adage

Your Nemesis the bear
Show Adage

Sometimes you get the bear...
And sometimes the bear gets you.

```html
<html>
<head>
<meta charset="UTF-8">
<title>Personalized Adage</title>
<script>
function create() {
    var nemesis = document.getElementById("nemesisField").value;
    var message = "Sometimes you get " + nemesis + "..." + 
    "<br>And sometimes " + nemesis + " gets you.";
    document.getElementById("adageElement").innerHTML = message;
}
</script>
</head>
<body>
<h1>Personalized Adage</h1>
```
Why watch someone do a problem rather than work through it? I don’t get it.
Craig is locked into the 20th century teaching model. Class needs to be used for discussion not lectures.
Kirschner, Sweller & Clark (2006):

Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching

*Educational psychologist, 41*(2), 75-86.
Key Findings from Kirschner et al.

• Compared to problem-solving activities, studying worked examples produces superior learning---even when measured by problem-solving ability

• Supported by controlled studies

• Studies mostly involve physics, math and computer programming, but other disciplines have been studied (e.g. visual literacy, Rourke & Sweller, 2008)
I’m NOT claiming that

• Constructivism as a theory of learning is wrong (see Clark & Mayer, 2008)
• Problem-solving is not important
• The flipped classroom is a bad idea
• We don’t want to engage students in the classroom
• Problem-solving is never a good activity for learning
Electric Field Hockey: Problem-Solving in an Electrostatics Microworld
(a) Trajectory missing goal

(b) Noting difference between intended trajectory and resulting trajectory

(c) Moving charge closer for more bend
Alternatives to Student-Led Problem-Solving

• Study of worked examples
• Instructor-led problem solving
  – Includes live coding (Rubin, 2013)
• Self explanation
  – See Amber Settle’s talk this afternoon
• Scaffolded problem-solving
  – Example: provide explicit subgoals
Role of Problem-Solving

• Often effective for advanced learners
• Provides motivation
• Less studied for non-STEM disciplines
• Run your own study
  – We did! (Miller & Settle, 2011)
References


