Research Based Classroom Practices that Improve Student Learning

SDSU ASEE Best Practices in Engineering Education Series
Tuesday, September 17, 2013
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What is your impression?

Pre-survey

• I understand what is meant by research based classroom practices.
• Research based classroom practices are easy to implement.
• Research based classroom practices don’t fit in engineering classrooms.
• I use research based classroom practices in the courses I teach.
• Research based classroom practices help my students learn.
Overview

• Define research based classroom practices
• Examples of research based classroom practices
• Discussion of practices, what we have done, what worked, what didn’t
What is a research based classroom practice?

• A teaching practice that is based on research in:
  – Cognitive science
    • How our brains acquire and use information
  – Practices of Master teachers
    • Teachers whose classrooms show the highest gains in achievement in controlled environments
  – Cognitive supports to help students learn complex tasks
    • Instructional procedures that aid learning
<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
<th>Measured change in % points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocabulary</td>
<td>Focus on specific words</td>
<td>0.95 to 32</td>
</tr>
<tr>
<td><strong>Comparing, contrasting, classifying, analogies, and metaphors</strong></td>
<td>Analyze in terms of similarities, differences, relationships</td>
<td>1.61 to 45</td>
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<tr>
<td>Summarizing and note taking</td>
<td>Filling in or translating to a synthesized brief form</td>
<td>1 to 34</td>
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<tr>
<td>Reinforcing effort and giving praise</td>
<td>Added effort is recognized</td>
<td>0.8 to 29</td>
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<td>Homework and practice</td>
<td>Practice skills</td>
<td>0.77 to 28</td>
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<td>Nonlinguistic representation</td>
<td>Using figures and imagery</td>
<td>0.75 to 27</td>
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<td>Cooperative learning</td>
<td>Assigned working together</td>
<td>0.74 to 27</td>
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<tr>
<td>Setting objectives, providing feedback</td>
<td>Goal setting, direction, purpose</td>
<td>0.61 to 23</td>
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<tr>
<td>Generating and testing hypotheses</td>
<td>Deductive thinking, making predictions, checking</td>
<td>0.61 to 23</td>
</tr>
<tr>
<td>Cues, questions, advanced organizers</td>
<td>Retrieving what they already know</td>
<td>0.59 to 22</td>
</tr>
</tbody>
</table>
Vocabulary

• Do you implement this?
• How?
Comparing, Contrasting, etc.

• Do you implement this?
• How?
Summarizing, note-taking

• Do you implement this?
• How?
Reinforcing, Praising

• Do you implement this?
• How?
Homework, practice

• Do you implement this?
• How?
Nonlinguistic representation

• Do you implement this?
• How?
Cooperative learning

• Do you implement this?
• How?
Setting Objectives, feedback

• Do you implement this?
• How?
Generating and teaching hypotheses

• Do you implement this?
• How?
Cues, questions, advanced organizers

• Do you implement this?
• How?
What is your impression?

Post-survey

• I understand what is meant by research based classroom practices.
• Research based classroom practices are easy to implement.
• Research based classroom practices don’t fit in engineering classrooms.
• I use research based classroom practices in the courses I teach.
• Research based classroom practices help my students learn.
References

  accessed Sept. 17, 2013

• Marzano, Robert J., (2000) Ten Effective Research-Based Instructional Strategies, available on-line at:
  http://web.nmsu.edu/~susanbro/sc2/docs/research_based_strategies.pdf
  accessed on Sept. 17, 2013.