Supporting students’ self-regulated learning in physics
Georg Rieger, Jess McIver, Silvia Mazabel (Education), and Eric Burkholder (Auburn University)

Supporting students in class and online
- Start as an online project
- Shifted focus to in-class SRL support after Deb Butler’s talk on SRL at 2019 FYE Symposium at UBC and workshop by Silvia Mazabel and Deb Butler

Online
Idea: create resources that enable students' self-regulated learning outside of class.
Principle: Try on your own as many times as you need, get support.

OER Resources (on edge.edX)
- Custom reading: excerpts from OpenStax textbook with integrated quizzes
  - All lecture questions
  - All tutorial questions
  - Homework questions
  - Videos with solutions for difficult questions
  - Numerical solutions for all questions available after trying.
- Correct incorrect answers always shown
- Students have infinite attempts
- Roughly 400 questions in total
- Everything available on day 1

In lecture
Idea: Targeting task-interpretation and strategic planning helps students getting started on solving problems-and/or concept questions

Implementation
- Emphasis on first steps
- Encourage students to use their resources: own initial ideas, course materials, discussion with peers
- Additional scaffolding steps and hints on worksheets

Encouragement through feedback
- Instructors acknowledged all contributions as valuable
- Class discussions: how student ideas and course resources can be constructively combined
- Instructors modeled strategies for evaluating ideas, double-checking and sensemaking

Example
- In the clicker question shown in Fig. 1, majority chooses incorrect answer (A).
- While incorrect, (A) is based on relevant concepts.
- After hearing student reasoning, opportunity to acknowledge relevant ideas.
- Then give hint and ask students to discuss again.
- Finally, student who changed their answer explains.

From worksheets to exams
Idea: Use the space on paper to write initial ideas and potentially relevant resources next to a question.

- Helps making connections between potential solutions and resources
- Frequent encouragement to annotated questions with initial ideas, relevant equations and other resources

Study
Compare SRL-focused section to similar section without SRL focus
Noted increase of annotations with ideas and resources on midterm exam (see Fig. 1)
- Small but significant effect on midterm grade (see Table 1)

More information
The work presented here is accepted for publication in The Physics Teacher.

Reference / Bibliography

Fig. 1: Example Clicker Question

Table 1: summary of regression models

<table>
<thead>
<tr>
<th>Model</th>
<th>R²</th>
<th>Intercept</th>
<th>Stimuli</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>0.263</td>
<td>0.468</td>
<td>0.064</td>
<td>&lt;0.001</td>
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<tr>
<td>Model 2</td>
<td>0.404</td>
<td>0.306</td>
<td>0.124</td>
<td>0.018</td>
</tr>
</tbody>
</table>

Fig. 2: Increased use of annotations in the SRL-focused lecture section

Table 2: Summary of the two models

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