**Introduction**

A growing amount of literature accords the benefits of active versus passive learning in medical education, helping students gain a deeper understanding of content material and better recall.1-4 Active learning can involve multiple modalities including problem-based learning, team-based learning, flipped classroom, and self-directed learning.2

Self-directed learning (SDL) is a required element of medical education by the LCME (Standard 6.3). SDL experiences involve students being able to:

1. Identify, analyze, and synthesize information relevant to learning needs
2. Assess the credibility of information sources
3. Share information with peers and supervisors
4. Receive feedback on information-seeking skills

In academic year 2014-2015, the first year neuroscience curriculum at the Medical College of Georgia was restructured to include specific self-directed learning opportunities through the use of clinical case problem sets that targeted special senses, the somatosensory system, motor systems, and mental health. Problem sets allowed students to not only achieve medical knowledge learning objectives, but also communication, professionalism, and practice-based learning competencies.3

Problem sets incorporated clinical cases and discussion questions designed to guide students in SDL in order to master expected neuroscience learning objectives.4

**Methods**

**Aim 1:**
- **Sample:** MCG Class of 2017 Medical School (n=192) vs MCG Class of 2018 Medical School (n=192)
- **Data:** Collected data from problem set SDL student evaluations to document performance in domains of SDL
- **Analysis:** Descriptive statistics

**Aim 2:**
- **Sample:** MCG Class of 2017 (control) vs MCG Class of 2018 (test group) Medical School (n=192)
- **Data:** 26 identical test items mapped to learning objectives covered in problem sets were compared with the same test items mapped to learning objectives covered in lecture in the previous year
- **Analysis:** Two-tailed t-test of t-test items

**Results**

**Aim 1:** SDL Rubric Data

<table>
<thead>
<tr>
<th>Category</th>
<th>First Year</th>
<th>Second Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>4.8 ± 0.5</td>
<td>4.6 ± 0.6</td>
</tr>
<tr>
<td>Understanding</td>
<td>4.7 ± 0.6</td>
<td>4.7 ± 0.6</td>
</tr>
<tr>
<td>Analyze</td>
<td>4.7 ± 0.6</td>
<td>4.7 ± 0.6</td>
</tr>
<tr>
<td>Credible Sources</td>
<td>4.5 ± 0.5</td>
<td>4.6 ± 0.6</td>
</tr>
<tr>
<td>Communicate</td>
<td>4.8 ± 0.5</td>
<td>4.9 ± 0.6</td>
</tr>
</tbody>
</table>

**Aim 2:** Comparison of Test Items

<table>
<thead>
<tr>
<th>Category</th>
<th>First Year</th>
<th>Second Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture Based</td>
<td>83.9 ± 9.94</td>
<td>84.0 ± 11.3</td>
</tr>
<tr>
<td>Problem Set Test</td>
<td>84.0 ± 11.3</td>
<td>84.0 ± 11.3</td>
</tr>
</tbody>
</table>

Study showed that students effectively engaged in SDL using problem sets without negatively impacting coverage of medical knowledge. (A) Students demonstrated effective engagement in the different domains of SDL. (B) Two-tailed t-test of t-test items of percent correct for all test items indicated no statistically significant differences in student performance on test items mapped to learning objectives. (p=0.71, df=0.12)

**Discussion**

Neuroscience problem sets allowed students to exercise self-directed learning and be evaluated in the context of a basic science course.

SDL in the form of problem sets facilitated student learning and acquisition of neuroscience knowledge equivalent to that learned from a lecture based curriculum. Student participation in problem sets & discussion groups allows students to demonstrate competencies in medical knowledge, communication skills with peers and faculty, professionalism working in a small group, and practice-based learning.

Student feedback on the problem sets was mixed. While some students had preferred traditional lectures, most students felt that problem sets “did become a fitting way to learn this material. [They felt like they would] retain this information better than info from other modules because of the way [they] learned it” and enjoyed the “opportunity to discuss our findings with each other and to build our learning organically.”

Faculty that led discussion groups were overall impressed with students’ work ethic, knowledge, and quality of presentations and enjoyed the opportunity to have a discussion with students, something traditional lectures typically do not have time for.

While the study only looked at 26 test items, results showed SDL students were just as equipped to answer the same test items as lecture students. SDL students would not have been exposed to potential cues on test answers from lectures. SDL rubric was not able to measure if SDL skills improved from participation in problem sets, but it still allowed for students to practise their SDL skills, which would not have been done in an all lecture based curriculum.

**References**


**Acknowledgements**

We would like to thank Drs. David Kozlowski, Charys Martin, Carol Nichols, and Alexa Hryniuk for their input and assistance with this project.