Drawing as assessment in Human Anatomy & Physiology courses

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Introduction
Recent research shows that drawing can be used as an effective form of evaluation in undergraduate education, providing a creative way to gather misconceptions and giving insight to alternative conceptions [2]. This type of evaluation provides valuable insight on students’ misconceptions and spatial understanding. In addition, drawing requires a higher level of cognitive thought, as shown by Bloom’s Taxonomy [1]. This study uses drawings to assess students’ understanding of cell structure.

Research Questions
• What misconceptions are held by students concerning the structure of the cell?
• How can student generated drawings assess student understanding?

Methods
• Human Anatomy and Physiology class (400+ students)
• Weekly in-class drawing assignments, previous to instruction
• Coding based on a previous study [3]
• Drawings were sorted into three categories (Table 1)
• Students were evaluated on the correctness of the content they included, regardless of the amount

Results:
Results: Cell Shape

<table>
<thead>
<tr>
<th>Description</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct</td>
<td>51%</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Partially Correct</td>
<td>45%</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Incorrect</td>
<td>3%</td>
<td></td>
<td></td>
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</tbody>
</table>

Table 1. Coding Categories

Findings
• For the most part, there is a basic understanding of the presence of the structures of the cell
• In situations where structural location and shape is crucial to function, there is misalignment in functional organization, such as the flow of information from nuclear envelope to RER to SER
• Most misconceptions were due to size, shape and location of the organelles
• The inclusion of an organelle does not necessarily mean the function is understood
• Features exclusive to plant cells, such as a cell wall, are rarely paired with correct shape (rectangular) or specific organelles (chloroplast)

Conclusion
• Student generated drawings force students to create their own representation of a cell, choosing what they think is important.
• Most students tended to draw a generalized cell instead of identifying organelles to a specific type of cell.
• Therefore, inclusion of an organelle represents a structural component rather than a functional component.

References

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