Engaging Today’s Students in Earth Science 101

It is a sad fact, or perhaps a happy one, that many geoscientists in academia will find themselves in front of a classroom of 100–300 undergraduate nonmajors, lecturing to them for three hours per week. Whether it’s for rocks or Rocks or Words for Babes, students often are under the impression that geoscience classes will be the least painful way to fulfill their science credit requirements. The sense of personal anonymity that can accompany large-enrollment classes often results in a different level of student engagement compared with smaller classes. Thus, if students are physically present at all, instructors often have only their unattended attention. How can professors keep 300 students, even the ones in the back of the classroom who are bascially asleep, awake and engaged?

This article presents results from a trial experience at the University of Florida, Gainesville, of an educational software system that claims to increase teacher-student interaction and thus the attentiveness of each individual student. Several such systems, which are referred to here as student response systems (SRS), exist in the market today. The technology allows an instructor to pose a question to the whole class, and allows the students to respond using a remote control transmitter with a graphical interface (one for each student’s keypad). Responses are automatically tabulated, can be immediately displayed in a graphical format, and are recorded for use in grading assessment, attendance, and other pedagogical strategies. With a focus on Earth sciences, the following outlines methods of use, and both the benefits and drawbacks that have been experienced with this new teaching technology.

Choosing and Using SRS Technology

Because Earth science instructors commonly teach large-enrollment general education classes, and students who attend their classrooms may have had their textbooks adopted long before they were born. Over the years, publishers have tried to market increasingly similar textbooks that are more attractive with such add-ons as exam tests, multimedia, or online versions. Most publishers, with publishers often providing the classroom hardware and software at no cost and students purchasing remote transmitters for about US$10 (~£5 or €5) have been observed. SRS systems encourage, pedagogic ends, and many qualitative benefits have been observed. SRS systems encourage and establish a greater sense of inclusion and self-confidence in learning within each student.

A number of characteristics of the geosci-

ic student body particularly useful in edu-

cational activities. One stems from the fact that because Earth science is so visually ori-

ented, it has become very common to use slide presentation systems such as Power-

point to create lecture notes. The present study with multimedia presentation software like PowerPoint enables one to use platform forms such as video and animation that help to illustrate processes occurring in a variety of temporal and spatial scales and concepts that are extremely difficult to grasp for most students. Often, the processes depicted by the images seem obvious to students, but for the non-scientist this is often not the case. Use of an SRS allows each student to observe, contemplate, and respond enabling the instructor to pose a question to the students’ understanding and encourages attendance and more continual study patterns. But per-

haps most gratifying, it initiates discussion and establishes a greater sense of inclusion in learning within each student.

Table 1. A Survey of 130 Students (of 155 Registered Students) in Introduction to Oceanography on a Random Midterm Day*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helps me see my understanding of the material in real time</td>
<td>24 (56)</td>
<td>4</td>
<td>11</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Makes me put more effort into discussion during lectures</td>
<td>22 (51)</td>
<td>18</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>30</td>
<td>12</td>
</tr>
<tr>
<td>Makes me a more active learner during lectures</td>
<td>16 (37)</td>
<td>27</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>Encourages me to attend lectures</td>
<td>16 (37)</td>
<td>10</td>
<td>10</td>
<td>14</td>
<td>30</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>Maximizes class time and a better learning environment</td>
<td>16 (37)</td>
<td>10</td>
<td>13</td>
<td>10</td>
<td>14</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>Cost ($5.15–$5.65) to the transmitter is worth the benefit it brings to class</td>
<td>5 (12)</td>
<td>19</td>
<td>10</td>
<td>27</td>
<td>19</td>
<td>30</td>
<td>15</td>
</tr>
</tbody>
</table>

Fig. 1. (top) Example of a PowerPoint/response system question slide (bottom) Question slide with class responses tabulated.

The East African Rift Valley is associated with a ...  
1. Divergent Boundary  
2. Convergent Boundary  
3. Shear Boundary  
4. Hot Spot  
5. Not at a Plate Boundary

Students cost on page 344

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Quantifying the variation in the motion of the Earth's polar axis. The Chandler wobble, which is the motion of the Earth's polar axis from day to day, can be detected by satellite. Many scientists consider that this phenomenon is due to changes in the mass of the polar ice caps. However, the data suggests that the variations in the motion of the Earth's polar axis are due to changes in the mass of the Earth itself. The authors propose a new model for the variation in the motion of the Earth's polar axis, which includes the effects of the Earth's internal structure, such as the fluid core and the mantle. The model is able to explain the observed variations in the motion of the Earth's polar axis, and it provides a new perspective on the dynamics of the Earth. The model suggests that the variation in the motion of the Earth's polar axis is due to changes in the mass of the Earth itself, rather than to changes in the mass of the polar ice caps.