

# Application for the Truly Innovative Teaching Award

## Michèle Shuster (1/18/2019)

### Section 1: Contact information

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Confirmation: Available for the Gala (Monday 4/29/19 @ 4:00 pm)

### Section 2: The Innovation

Since Fall 2015, I have been regularly teaching Biol 211G in the **TEAL classroom** (HJLC 228), using a flipped classroom approach to leverage the unique features of this teaching and learning environment. I see the innovation as having two interrelated parts: **leveraging the TEAL classroom as a teaching space** and **using a flipped classroom approach to take full advantage of the TEAL classroom**. I have also been the “course lead” in all but two semesters, mentoring faculty teaching the other sections in this room and with this approach.

#### A. The TEAL Classroom

NMSU’s TEAL Classroom is based on established models, known as SCALE-UP (Student-Centered Active Learning Environment with Upside-down Pedagogies), ALCs (Active Learning Classrooms) or Studio Classrooms. Generally speaking, the classroom is designed for students to engage in interactive and collaborative work, applying course material to relevant problems and authentic scenarios. Two of the critical features of the NMSU TEAL classroom are whiteboard-painted walls and round tables (seating nine students per table).

The whiteboard-painted walls facilitate transparent communication between students and the instructional team. Students use “wall activities” to illustrate (draw) various concepts on their walls. These include student-generated diagrams that illustrate how DNA replication occurs (that have revealed previously unsuspected misconceptions), graphs (representing data) and cartoons of experiments (showing how an experiment would be carried out). “Wall activities” generally follow table-level discussions, in which students work with their table mates to determine how to respond to a prompt. Table brainstorms can also lead to meaningful discussions in the context of clicker questions, even if students are not prompted to engage in a “wall activity”.

The technology available in the TEAL classroom, particularly the ability to switch display “sources” for the flat screen monitors associated with each table, also contributes to collaborative learning in the TEAL classroom. In one Biol 211G activity, students work on a case study that involves the use of online bioinformatics tools to analyze altered and unaltered protein sequences. In this activity, students use laptops at their tables, and can display their bioinformatics results on their individual flat screen monitor. This allows me (the instructor) to see how students are working through the activity and helps me ensure that all tables are making good progress through the activity. In general, the whiteboards and technology make student thinking transparent, and allow the instructional team to more meaningfully interact with students. There have been several cases where alternative conceptions of biological content have been revealed by use of the walls for

more open-ended problems. Such misconceptions were invisible prior to the use of the whiteboard walls in the TEAL classroom. Additionally, the round tables facilitate collaborative student learning, promoting meaningful discussions of potentially challenging content.

### ***B. A Flipped Classroom Approach***

The TEAL room is designed to facilitate active learning. While the room can support traditional (and dynamic) lecturing, that is not its strength. In order to leverage the strength of the TEAL classroom, I have adopted a **flipped classroom approach**. In this approach, students complete pre-class activities (such as readings, interactive online tutorials or videos) to learn basic concepts, then use class time to reinforce, extend and apply the basic concepts in **case studies** and other **active learning approaches** that leverage the strengths of the room.

In the first semester in the TEAL room, I used Doceri to generate pre-class videos (with my own “art” and voiceover). Students were expected to watch and listen to the video, then answer a series of “prep questions”, provided as a separate Word document. While students would comment in class on the videos (finding them humorous or fun), very few students came to class with the prep questions answered. This made the subsequent case study (known to students as in-class activities) challenging, as students were not adequately prepared to extend and apply the relevant material. I suspected that students were not easily connecting the separate Word document (with the prep questions) to the video, and/or that they were struggling to move back and forth between the video and the Word document with the corresponding questions.

In order to address the challenge of moving between a video and an associated questions document, I changed the format of the pre-class prep assignments to more integrated reading-based “primers”. In this model, I write short (between one and three) page Word documents focusing on key concepts for the up-coming activity/case study and referring to relevant figures from the textbook. The readings are focused strictly on the necessary background and anticipate what students are or are not already familiar with. In this way, the pre-class prep assignments are more tractable than assigning several pages from the textbook. The associated reading questions are included in the same Word document, meaning that students do not need to navigate between a video and the document with the questions in order to complete the prep assignment.

Since the transition to integrated reading-based prep assignments, far more students are coming to class with their prep assignments completed. Additionally, students appear to be more easily navigating the in-class case studies (known as in-class activities), even case studies that are asking students to synthesize and integrate at a higher level. This has permitted the development of new case studies, expanding the linkage of course material to scenarios that are relevant and/or interesting to students (e.g. blood doping, the unethical promotion of Vioxx® by its manufacturer, use of unapproved drugs for weight loss, and lactose intolerance).

### **Section 3: The Innovation and the Teaching Academy**

I have facilitated several workshops and short courses related to teaching in the TEAL classroom, active learning and using case studies in teaching, listed below.

**1. TEAL Classroom Short Course** Fall 2015 (2 sections; each met for four 75-minute sessions)  
 This short course was intended to familiarize faculty with the TEAL room, to provide examples of effective TEAL activities (e.g. taking advantage of the whiteboard-painted walls and technology), and to allow faculty to develop short “TEAL tidbits” to practice teaching in the TEAL classroom.

**2. “Active Learning. What? Why? How?”** Fall 2016 Workshop (two sessions)  
 This 50-minute workshop reviewed the impact of active learning, and provided an overview of active learning strategies. Participants were also introduced to active learning resources (e.g. collections of classroom activities).  
*This workshop received the Teaching Academy Outstanding Workshop Award for 2016-2017.*

**3. “Case Studies in Every Class”** Fall 2017 and Summer 2018 Workshops (three sessions)  
 I reviewed the evidence supporting the use of case studies. Participants then experienced the “hooks” for several case studies, and had the opportunity to consider how they would use case studies in their own classes.

**4. “NMSU’s TEAL Classroom. What is it and why would you want to teach in it?”** Spring 2018 Workshop  
 This workshop was designed to provide an overview of the TEAL classroom, and the evidence that it has made a positive impact on student learning and attitude in Biol 211G. Several participants have since gone on to teach in the TEAL classroom.

#### **Section 4: Evidence of a Positive Impact on Student Attitude, Motivation &/or Learning**

A. Table 1 presents average scores (on a 5-point scale) for three items from my end-of-semester student evaluations in Biol 211G. Two of these items address the impact of case studies (“activities”) on **student understanding** and **student interest**, and one of these addresses **attitude towards biology** at the end of the course. Students find that the case studies help them understand the material and make them more interested in the material. They also express a substantially higher interest in biology at the end of the course, relative to the start.

Table 1: Summary of selected items from end-of-semester student evaluations in Biol 211G (taught in the TEAL room)

	Activities helped me understand the material*	Activities made me more interested in the material*	Compared to the start, my interest in biology is#
<b>Fall 2015 Sec. M01</b>	4.47 +/- 0.71	4.44 +/- 0.75	4.27 +/- 0.77
<b>Fall 2015 Sec. M02</b>	4.42 +/- 0.79	4.44 +/- 0.82	4.10 +/- 1.09
<b>Spring 2016 Sec. M02</b>	4.56 +/- 0.60	4.43 +/- 0.69	4.13 +/- 0.77
<b>Spring 2016 Sec. M03</b>	4.51 +/- 0.82	4.14 +/- 0.82	4.07 +/- 0.95
<b>Spring 2017 Sec. M01</b>	4.36 +/- 0.78	4.20 +/- 0.95	4.22 +/- 0.82

\* Strongly Agree (5)- Strongly Disagree (1) with “neutral/no opinion” as the midpoint; mean +/- standard deviation

# Much Higher (5) - Much Lower (1) with “about the same” as the midpoint; mean +/- standard deviation

	Activities helped me understand the material*	Activities made me more interested in the material*	Compared to the start, my interest in biology is <sup>#</sup>
<b>Spring 2018 Sec. M01</b>	4.44 +/- 0.65	4.30 +/- 0.80	4.15 +/- 0.88

B. Students also express positive attitudes specific to the TEAL classroom environment and its impact on their excitement to learn, desire to attend class on a regular basis and enrichment of their learning experience. Table 2 shows responses [on a 4-point scale of strongly agree (4) to strongly disagree (1)] to items on end-of-semester student evaluations for students in the very first TEAL offering of Biol 211G (Fall 2015, my section M01).

Table 2: Summary of TEAL Classroom items (Biol 211G, Fall 2015, Sec. M01)

Item	Mean Score (4 pt scale)	SD
Classroom increases my excitement to learn	<b>3.41</b>	0.62
Classroom helps develop real world skills	<b>3.21</b>	0.67
Classroom enriches my learning experience	<b>3.47</b>	0.6
Classroom encourages active participation	<b>3.59</b>	0.69
Classroom makes me want to attend regularly	<b>3.27</b>	0.7
Classroom helps with connections with classmates	<b>3.43</b>	0.71
Classroom engages me in the learning process	<b>3.56</b>	0.52
Classroom nurtures a variety of learning styles	<b>3.57</b>	0.55

C. I have selected student quotes from my end-of-semester anonymous evaluations. These are quotes that I have previously captured for annual reports, and I have chosen ones that illustrate student perceptions of learning, attitude and/or motivation in the TEAL classroom.

- *This class helped me to understand biology much better*
- *The activities did a great job of connecting the real world to what we were learning in class, which made the class more interesting and fun to be in*
- *I've been taught a lot of the subjects presented in this class before, but never had this good of an understanding of them.*
- *Drawing diagrams on the walls really helped the material stick*
- *I really like how we were in groups because the first resource I turned to when I didn't understand something or had questions were the people at my table*

D. Based on an **indirect measure** of student learning (student success as measured by % ABC grades earned by students), the TEAL model of teaching Biol 211G has increased student success for all students, with a greater increase for under-represented minority (URM) students. These increases are relative to Biol 211G prior to course reform. The performance gap (differences in % ABCs) between URM and non-URM students has been reduced from 17.3% (pre-course reform) to 11.9% (TEAL classroom; 21 sections, 8 instructors from Fall 2015-Spring 2018). This is an important accomplishment for a Hispanic-serving institution, and illustrates that the Biol 211G TEAL innovation is robust across a variety of instructors.