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Project Title: Facilitating student engagement in a large lecture course
Course: EPI-4000: Introduction to Epidemiology – Foundations and Practice
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Project summary: This project incorporates two classroom strategies – Poll Everywhere (class polling using smartphones) and Immediate Feedback Assessment Technique (IF-AT) scratch-off cards – into a large undergraduate lecture course, EPI-4000: Introduction to Epidemiology, in Fall 2016. In this class of 79 students, it was hoped that the use of one or both of these strategies would maximize individual participation and create a smaller classroom environment by engaging students in small group learning.

Work completed during fall 2016: This fall, several activities were completed as described below.

1. *Creation of Poll Everywhere questions:* Poll Everywhere questions were designed to meet specific classroom needs. Questions largely aimed to initiate discussion, e.g. create a list of examples or capture responses from group activities that could be reviewed and examined for themes. Other questions were used as a quick "check-in" to see how many students did the reading or understood a concept immediately after it was covered in lecture.

2. *Creation of IF-AT check-in activities:* Once it was decided which classes would incorporate IF-AT activities, questions were drafted in sets of five. Some questions were focused on reviewing the assigned reading, others were designed to apply concepts presented in class (e.g. work through calculations and interpretations of findings). To encourage classroom attendance (at this 8am class), the IF-AT card "check-ins" were unannounced and points were earned toward students' course grades.

3. *Qualtrics course evaluation survey:* It was learned that the University's course evaluation tool (Blue Evaluations) does not allow for customized questions to be added by instrucors. Thus, a Qualtrics survey was created to gather qualitative and quantitative information on the use of IF-AT cards and Poll Everywhere, as well as check-ins in general. Student perceptions about the effectiveness of these strategies and impact on classroom environment and learning were assessed, as well as student recommendation for using these strategies in future EPI-4000 classes.

<u>Poll Everywhere: What "worked" as expected</u>

Poll Everywhere was used to check how many students were doing the required reading, serve as a starting point for providing students with additional information and examples for concepts introduced in the reading, and to spark discussion through soliciting students' thoughts and examples. Several things "worked" as anticipated:

1) **High participation rate:** The anonymous nature of Poll Everywhere provides a "safe" way for students to guess an answer, contribute to class, and self-assess without being put on the spot

in front of their classmates. It also allows for participation via text messaging or a web link, which allows students with and without smartphones to participate. Thus, even though it was not mandatory for students to participate, a high response rate was anticipated. From the first time Poll Everywhere was used, it was evident that students were engaged, with responses submitted by nearly all students present. This observation was consistent in all classes in which Poll Everywhere was used.

2) **Strategy to initiate class discussion:** Poll Everywhere was used to solicit examples from the class as a way to have a starting point for discussion. With such a large class, it was anticipated that Poll Everywhere would allow for a large number of responses to be quickly volunteered (vs. calling on individual students). It was great to see students feel comfortable texting their answers and to see these responses immediately appear on the screen so that I (and the students) could process them, comment on themes, and ask for students to reflect on or identify other themes, as well as elaborate on responses. This also allowed me to see a larger number of thoughts/responses than if only a few students were called on to contribute due to time constraints. One example that illustrates this is from our class on (disease) surveillance; students submitted examples (via short phrases) of how surveillance was used in their disciplines (public health, health management, emergency management, biostatistics). Submissions immediately appeared on the screen where everyone could see them. We then examined these further, with students volunteering to explain their examples to the class.

3) **Strategy to guide class agenda:** It was hoped that Poll Everywhere would provide immediate feedback that would allow me to see where the majority of class understood or had trouble with concepts. It quickly became evident – to me and to the class as a whole – when students had not completed the required reading or were confused. Seeing this in "real time" allowed for immediate clarification of points and let me devote time for more in-depth coverage of concepts if needed before we moved to application activities/examples.

4) **Student self-assessment:** It was anticipated that Poll Everywhere would help students realize that the expectations that they would complete the reading prior to class and actively participate in class were real and to be taken seriously. As described students described in the course evaluation feedback, this realization occurred.

Poll Everywhere: What didn't "work" as expected

I expected to use Poll Everywhere more frequently that I did throughout the semester. As the semester progressed, students seemed to want more IF-AT opportunities (see below) rather than Poll Everywhere opportunities, likely because IF-AT opportunities contributed to course grades and Poll Everywhere participation was voluntary. I also realized that there were times when it would have been useful to quickly gather class-wide responses via Poll Everywhere to gauge understanding of a concept that was just covered. However, those "check-in" points were spontaneous (e.g. it was difficult to tell from looking at the class whether students had expressions of confusion or boredom), and I found that I did not have time to pause class to quickly draft a Poll Everywhere question and then present it to students for responses.

IF-AT Cards: What "worked" as expected"

It was anticipated that IF-AT cards would promote discussion among students, support individual participation and create the feeling of a smaller classroom environment despite the large enrollment. In these ways, it was expected that IF-AT cards would positively impact student learning. Based on observation and student feedback, the cards achieved these goals. Specifically:

1) **Promote discussion:** The classroom was never quiet when IF-AT activities were used. While circulating among groups as they worked, it was observed that conversations focused on the questions posed (rather than on non-class topics) and that students were actively debating answers and coming to consensus. This is likely because performance on the activities was factored in to course grades. According to course evaluation findings, 83% (n=24) of respondents believed the IF-AT cards promoted discussion about the material.

2) **Support individual participation:** Because it can be daunting to individually participate in a larger lecture course, it was anticipated that IF-AT activities would facilitate contribution from students who might not feel comfortable speaking in front of a large group. Again, class observation found that a majority of students appeared to be involved in discussion about questions and decision-making about which response to choose.

3) **Create a feeling of a smaller environment:** Student evaluation feedback found that the majority of respondents (76%, n=22) believed the IF-AT cards specifically helped a large class feel smaller.

4) **Promote student learning:** Because the IF-AT activities were designed to allow students to assess their learning and practice with questions at multiple points before exams, it was anticipated that they would positively impact student grades. Indirect assessment via course evaluation found that the majority of respondents believed the IF-AT activities helped them learn the course material (83%, n=24) and positively impacted their grade (83%, n=24). Still to e done (in the upcoming weeks), direct assessment will compare student performance on IF-AT activities to that on exams (midterm, final).

IF-AT Cards: What didn't "work" as expected
While use of the IF-AT cards appeared to achieve the expectations described above, student feedback also indicated that there was room for improvement:

1) **Exam preparation:** It was expected that IF-AT activities would serve as practice for exams. Questions assessed knowledge as well as application of concepts and synthesis of course material. All of these question types were included on the midterm and final exams. However, student evaluation feedback indicated that only 69% (n=20) of respondents believed that the IF-AT activities were good practice for exams.

2) **Role in guiding class agenda:** It was expected that some of the IF-AT activities would serve to quickly review required reading and serve as a springboard for the day's agenda. However, when used in the earlier weeks of the semester, it became evident that students had not adequately prepared for class. For instance, the average score on the first check-in was 6.5/10, compared to an average of 9.1/10 on the sixth check-in. The lower score on the first check-in forced a reassessment of how to use IF-AT activities in relation to the day's PPT slides and other

activities; it was clear from the first IF-AT check-in that in future class sessions, there were opportunities to better coordinate the day's PPT presentation with the IF-AT questions. Thus, the second IF-AT activity was designed to serve as an outline for that day's material; rather than anticipating that it would serve as a way to quickly review highlights from the reading before moving on to application of material, each question was drafted with the intention of having students complete the activity and then reviewing the answer as a class and supplementing with PPT slides/discussion/application before moving on to the second question.

Lessons Learned:

Of the 79 students in class, 29 students (36.7%) completed the Qualtrics evaluation. Respondents reflected the class composition and represented four different public health degree programs (n=2 biostatistics, n=2 emergency management, n=4 health management, n=21 public health). In general, 93% of students reported that the check-ins overall (Poll Everywhere, IF-AT) promoted interaction with their classmates , were a good use of class time, and should be retained in future EPI-4000 sections.

IF-AT: A total of 8 IF-AT card check-ins were offered over the 15-week semester. About 1/3 of respondents indicated they would have liked more of these opportunities. The majority (97%, n=27) of respondents had never used IF-AT cards before this course. 83% (n=24) reported that these were a good way to conduct check-ins, with 76% (n=22) reporting that they made a large class feel smaller. Qualitative feedback indicated that the cards were fun to use and made learning more exciting than just using "a piece of paper to answer question." Students reported that the cards did create a feeling of suspense as they waited to see if their "scratch" revealed the correct response, which was sometimes stressful. Overall, 79% (n=23) recommended that IF-AT cards should be use in future EPI-4000 classes.

Poll Everywhere: Nearly half of students (48%, n=14) had used Poll Everywhere in previous courses. The majority reported that Poll Everywhere promoted class discussion (75%, n=21) and felt that it gave them an opportunity to contribute to class 82% (n=23). Nearly all respondents felt Poll Everywhere was fun to use (93%, n=26), and about 1/3 (32%, n=9) would have liked to use it more frequently in class. Students noted that they liked the ability to anonymously submit answers to Poll Everywhere and that it was fun and interactive. Limitations included being distracted by other things on one's phone, that the nature of Poll Everywhere made it harder to discuss questions with individual people, and that because responding wasn't mandatory, response rates were sometimes low. Overall, 86% (n=24) of respondents recommended that Poll Everywhere should be retained for future EPI-4000 classes.

Application for other faculty members:

As Director of Undergraduate Public Health Programs at SLU's College for Public Health and Social Justice, I oversee four majors (public health, health management, biostatistics, and emergency management) and two minors (public health and emergency management), serving approximately 450 students. In this role, I oversee program assessment and curriculum changes as well as work with faculty on individual course design/content to ensure that our programs meet accreditation standards. As such, I have the opportunity to talk with faculty about ways they might use Poll Everywhere and IF-AT cards in their courses. With (indirect assessment) evidence that supports a positive impact on

classroom environment and student learning, I will seek opportunities to advocate for program funds to be used for these tools in the future, particularly if they will be utilized across several courses. This is important because faculty do not necessarily have their own funding to support purchasing these tools. I also hope to present my experiences with using Poll Everywhere and IF-AT cards at the 2018 Association of Schools and Programs of Public Health annual Undergraduate Global and Education Summit (March 2018); this is an opportunity to share teaching experiences with colleagues involved in undergraduate public health education across the country.

Potential for future use and/or additional pedagogical innovation:

While I have reviewed indirect assessment data gathered from course evaluation, I will examine direct assessment data this semester. Specifically, I plan to look at IF-AT and Poll Everywhere responses in relation to exam performance in order to further assess the impact of these tools on student learning. For example, I will be able to look at the portion of students that incorrectly answered an IF-AT or Poll Everywhere question in relation to the portion that (in)correctly answered a related test question. In some instances, test questions were directly repeated from IF-AT questions. Because students received credit for each completed IF-AT activity, it will be possible to look at both group and individual level data when comparing IF-AT and exam performance. However, because Poll Everywhere responses are anonymous, it will only be able to compare group level data for Poll Everywhere and exam questions.

Because a majority of students who provided evaluation feedback indicated that both IF-AT and Poll Everywhere were a good use of class time and should be retained in future EPI-4000 classes, I do plan to use them again. However, I would like to increase the use of Poll Everywhere as I tended to rely more on IF-AT activities as the semester progressed; this was likely because IF-AT activities were tied to student grades, and I wanted to offer students as many opportunities as possible with them, which sometimes meant using these rather than Poll Everywhere. I would also like to find opportunities for students to submit questions to be disseminated to the larger class via Poll Everywhere (e.g. students might draft questions to use for exam review sessions). Lastly, experience with IF-AT and Poll Everywhere showed me ways in which they can be used not just to recap information but to guide the day's agenda and to practice working through application problems (rather than me demonstrating this to the class as a whole). In these ways, I can restructure some of the other activities to use these strategies. I can also use them to allow for "on the spot" modification of the agenda to better emphasize/cover material (or move more quickly through material) based on the instant feedback from student responses or to further engage the students in problem-based learning during a class session.