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Strategies to Address Challenges With Large Classes: Can We Exceed Student Expectations for Large Class Experiences?

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As funding for higher education has decreased and demand for measurable learning outcomes has increased, working to develop courses that can be effectively taught in large class formats is critical. At 1 large Midwestern university, introductory psychology has been redesigned into a blended course with large sections of approximately 330 students. To address some of the potential pitfalls associated with large class sizes, the instructional team focuses on using pedagogical strategies designed to make a large class feel smaller by (a) encouraging active student engagement, (b) reducing students' feelings of anonymity, and (c) providing individualized feedback. Data comparing students' perceptions of the course according to these 3 dimensions show that students in the large sections rate the course highly across these dimensions, although student ratings in smaller classes remain higher.

Keywords: class size, student engagement, individualized feedback

As funding for higher education has decreased and demand for measurable learning outcomes has increased, many institutions are seeking to simultaneously improve student learning outcomes and reduce instructional costs (Hudson et al., 2015; Liu, Bridgeman, & Adler, 2012; O'Flaherty & Phillips, 2015). In this climate, working to develop courses that can be effectively taught in large class formats is critical. However, there are several challenges inherent with large class sizes that must be carefully considered to avoid prioritizing the perceived economic advantage of large classes at the expense of student learning (Gibbs & Jenkins, 2013). At one large Midwestern university, introductory psychology was completely redesigned in 2012 and is now taught in sections of 330 students. The details of the redesign process and outcomes have previously been published (see Drab-Hudson et al., 2012; Hudson, Whisenhunt, Shoptaugh, Rost, & Fondren-Happel, 2014; Hudson et al., 2015), but the current project sought to focus specifically on addressing some of the potential pitfalls associated with large class sizes. To do so, the instructional team focuses on using pedagogical strategies designed to make a large class feel smaller by (a) encouraging active student engagement, (b) reducing students' feelings of anonymity, and (c) providing individualized feedback.

Student engagement is one challenge related to large sections of introductory psychology (Blatchford, Bassett, & Brown, 2011; Cuseo, 2007; Freeman et al., 2014). Engagement can suffer in large classes for a variety of reasons. For example, class demonstrations in large classes are time consuming and may involve only a few students. To encourage active student engagement in large sections of introductory psychology, our instructional team uses the following three strategies: (a) use of a student response system (i.e., clickers) in the classroom, (b) use of peer instruction, and (c) active class demonstrations that involve the entire class. Clickers have evidence of effectiveness in promoting engagement and enhancing student learning by providing an opportunity for every

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student to become involved multiple times throughout a seated class period by testing immediate concept understanding, conducting anonymous opinion or behavioral polls, and implementing class experiments or demonstrations (Blasco-Arcas, Buil, Hernández-Ortega, & Sese, 2013; Caldwell, 2007; Morling, McAuliffe, Cohen, & DiLorenzo, 2008; Wentao, Jinyu, & Zhonggen, 2017). Peer instruction is another effective tool that involves every student in the class and has strong evidence of effectiveness in improving learning (Crouch & Mazur, 2001; Vickrey, Rosploch, Rahmanian, Pilarz, & Stains, 2015). We often use peer instruction when students continue to struggle to understand a concept (assessed via clickers) despite instructor-led discussion or other activities. In these cases, a peer can often explain the concept to a fellow student from a different perspective, which then promotes comprehension. Finally, each seated class period involves a minimum of one large-class demonstration that involves every student. For example, in one demonstration every student receives a package of FunDip to participate in a classical conditioning activity when discussing the chapter on learning.

Even when various classroom engagement strategies are used, students in large classes can still experience an increased sense of anonymity, which can have a negative impact on learning and engagement (Benjamin, 1991; Cuseo, 2007). To reduce feelings of anonymity in introductory psychology, our program uses undergraduate learning assistants (ULAs). A total of five to seven carefully selected, top psychology students are assigned as ULAs in each section of introductory psychology (for a total of 21–28 ULAs each semester). These ULAs enroll in a 3-credit hour course (Teaching of Psychology) and attend a full day of training prior to the beginning of the semester. The ULAs meet as a class periodically throughout the semester to learn about best practices in teaching and how to lead small group study sessions for students in introductory psychology. In addition, ULAs attend their assigned section of introductory psychology each week, and each ULA is assigned to a group of students in the class. Every student writes an online introduction letter that ULAs read and respond to, and ULAs receive photo rosters that help them to identify and remember individual students in their assigned group. After each class, every absent student receives a check-in e-mail from his or her ULA (attendance is taken by ULAs using rosters sorted by group, and then the ULAs mark any absences after class on a shared Excel document). In addition, ULAs lead small group study sessions (consisting of 12–15 students) prior to exams that every introductory psychology student is required to attend, and they hold open tutoring hours outside class time. These efforts are designed to help students understand that they are more than just a number or a face in the crowd and that there is individual help available.

A third barrier for success in large class sections is the difficulty of providing timely, individualized feedback for students, which has been shown to positively impact learning (Van der Kleij, Feskens, & Eggen, 2015). Assessments in large classes typically involve multiple-choice exams (Bowen & Wingo, 2012) or other easily graded assignments, and individualized feedback to students is rare. To provide frequent, immediate individual feedback in introductory psychology, students complete weekly online homework assignments that are automatically graded. Exams are administered using clickers so students can see their grade immediately. In addition, students receive individualized feedback emails after each exam, depending on their performance. For example, students who perform well (e.g., receive an A or B) will receive an e-mail that is sent to everyone in the A/B group but has the appearance of a personalized e-mail (e.g., "I noticed you got an A on your exam and I just wanted to take a quick minute to e-mail you and tell you congratulations."). Students frequently respond to these e-mails, which leads to an actual, one-on-one conversation with the instructor. Finally, students who are struggling in the class are specifically invited to schedule an individual meeting with the instructor, during which their progress is reviewed in depth. At the conclusion of these meetings, the student leaves with an individualized prescription plan with specific feedback for improving their performance in the course. For example, the student leaves with a form demonstrating his or her performance on each assignment in the class, a brief written summary of the discussion, and a list of agreed-upon goals to improve the student's performance in the remainder of the class. Whereas all

these techniques may not be available or feasible for all faculty, using the resources available to engage students, reduce feelings of anonymity, and provide timely feedback should lead to improved course outcomes.

The redesigned course has led to significant improvements in learning outcomes and marked reductions in our percentage rate of students who receive a D or F or withdraw from the course (Hudson et al., 2014, 2015). The improved learning outcomes and retention have remained stable over time, which has led us to examine some of the specific course factors that may contribute to the successful outcomes. To evaluate our success in addressing three potential problems related to class size (lack of student engagement, feelings of anonymity, and difficulty providing individualized feedback), we asked students to provide feedback about their expectations at the beginning of the course and their perceptions of the course at the end of the semester. The same questionnaire was completed by students at a nearby state institution who were enrolled in small sections of introductory psychology.

Hypotheses

Hypotheses include the following:

(1) Students' ratings of the course (in terms of perceptions of class engagement, feelings of anonymity, and individualized feedback) will improve significantly from the first day of class to the last day of class, regardless of class size.
(2) At the end of the semester, students in our large sections of introductory psychology will rate the course similarly to students taking the course in small section sizes.

Method

Participants

Participants included a total of 2576 students enrolled in introductory psychology at one large Midwestern university (University A) and a second nearby state institution (University B; n = 2422 at University A and n = 154 at University B). Data from University A were collected over the course of two semesters, whereas data from University B were collected during one semester only. Demographic data from three classes at University A (n = 576) and two classes at University B (n = 72) were collected during the posttest measurement in the spring of 2017. We believe the demographics of this subset are representative of the demographics for the full sample. The subset sample consisted of 39.3% male and 60.7% female students. The majority of the participants identified as White (89.9%) and 5.1% identified as Black/African American. Enrollment in introductory psychology classes at University A is 330 students per section compared with fewer than 40 students per section at University B.

Materials

Student Impression Scale. Participants completed a 10-item Student Impressions Scale (SIS) on the first day of class and the last day of class. The items on the SIS were developed to measure student perceptions of class engagement, feelings of anonymity, and individualized feedback. Each question was answered on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Whereas the questions administered on the first day of class were the same as those given on the last day of class, the tense was changed to reflect expectations of the class at the outset (e.g., "I believe I will be actively involved during class time.") and the students' actual experiences of the class (e.g., "I was actively involved during class time.") at the end of the class. We used exploratory factor analysis with an oblique rotation to determine whether there were underlying factors in the 10 items developed to assess student impressions of the course. Two negatively worded items were reversed scored. All 10 items loaded on one factor. Therefore, we combined the 10 items into a composite score by calculating the mean of the items. Higher mean scores on the SIS administered on the first day of class indicate high expectations of being actively engaged in class and of having a responsive course staff. Mean scores on the SIS completed on the last day of class represent the participants' actual experience. That is, higher mean scores suggest the participant felt actively engaged in class, did not feel anonymous, and believed they received adequate feedback from the course staff. Cronbach's alpha for the 10-item scale

Table 1
Factor Loading for Exploratory Factor Analysis With Oblique Rotation of the Student Impressions Scale

Student impressions scale items	Factor loading
I believe that the course staff cared about my success in this course.	.76
I received frequent feedback about my performance in this class.	.73
Class time provided opportunities for me to frequently participate.	.69
I received individual feedback about my performance in this class.	.68
I was actively involved during class time.	.61
I felt comfortable in a class this size.	.59
I believe I was just a number in this class. (RS)	.56
If I e-mailed a course staff member, I got a timely response.	.51
I was actively involved with the text and course material throughout the course.	.49
No one noticed if I did not come to class. (RS)	.31

Note. RS = reverse scored.

was .82 and the items and factor loadings are presented in Table 1.

Results

We examined differences between students' ratings of their impressions the first day of class and the last day of class, collapsing across class size. Means and standard deviations are presented in Table 2. For all comparisons, the first-day mean was subtracted from the last-day mean; therefore, negative values indicate the last day was higher than the first day. As hypothesized, students' class impressions ratings increased significantly between first day and last day, $t(2528) = -8.07$, $p < .001$, $d = -0.32$, 95% confidence interval (CI) [−0.34, −0.21]. This increase occurred in both large sections of the class, $t(2,420) = -7.87$, $p < .001$, $d = -0.32$, 95% CI [−0.33, −0.20 and small sections of the class, $t(152) = -3.62$, $p < .001$, $d = 0.59$, 95% CI [−0.78, −0.24].

To examine whether students in large sections rated the course similarly to students in small sections, we compared the first-day and last-day mean ratings for the large sections with the mean ratings for the small sections. Students in small sections demonstrated higher ratings compared with the ratings of students in large sections, for both the first day, $t(1375) = -7.58$, $p < .001$, $d = -0.83$, 95% CI [−0.78, −0.46], and the last day, $t(1151) = -7.25$, $p < .001$, $d = -0.93$, 95% CI [−1.09, −0.63].

We also examined differences in students' ratings between the first day and last day by instructor to determine whether instructor variables, in addition to class size, may have contributed to student ratings on the SIS. Descriptive statistics are shown in Table 3. Of the two small sections, student ratings of impressions increased significantly from the first day to the last day for one of two sections (Instructor 1). Of the four large sections, student ratings showed a significant increase from the first day to the last day for two of the four sections (Instructor 3 and Instructor 4).

Discussion

This study empirically compared student perceptions regarding student engagement, feelings of anonymity, and individualized feedback in small versus large classes. Our prediction that students' perceptions of their class would improve from the first day to the last day of class was confirmed, and we found this improvement

Table 2
Pretest and Posttest Statistics for the Student Impressions Scale by Section Size

	SIS: first day				SIS: last day			
Class size	*M*	*SD*	*n*	95% CI	*M*	*SD*	*n*	95% CI
All sections	4.66	.76	1406	[4.62, 4.70]	4.93	.94	1170	[4.88, 4.98]
Large sections	4.61	.74	1316	[4.58, 4.66]	4.88	.93	1106	[4.83, 4.94]
Small sections	5.23	.92	90	[5.04, 5.43]	5.74	.70	64	[5.57, 5.92]

Note. CI = confidence interval. SIS is scored on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Table 3
Student Impressions Scale: First Day and Last Day by Instructor

Variables	Pretest			Posttest			*d*	*t* test (*df*)
	M (SD)	*n*	95% CI	*M (SD)*	*n*	95% CI		
Small sections								
Instructor 1	5.22 (1.01)	64	[4.96, 5.47]	5.81 (.66)	50	[5.62, 6.00]	−.68	−3.57*** (111)
Instructor 2	5.28 (.65)	26	[5.02, 5.54]	5.51 (.78)	14	[5.06, 5.96]	−.33	−.98 (38)
Large sections								
Instructor 3	4.63 (.75)	513	[4.57, 4.70]	5.10 (.85)	456	[5.02, 5.18]	−.58	−8.84*** (944)
Instructor 4	4.65 (.72)	298	[4.57, 4.73]	5.00 (.86)	255	[4.89, 5.10]	−.44	−5.14*** (541)
Instructor 5	4.67 (.69)	258	[4.58, 4.75]	4.67 (.93)	212	[4.55, 4.80]	.01	.07 (464)
Instructor 6	4.48 (.75)	247	[4.38, 4.57]	4.44 (1.00)	183	[4.29, 4.58]	.04	.45 (420)

Note. CI = confidence interval. Data from Instructor 1 and Instructor 3 are from multiple sections; SIS is scored on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).
*** $p < .001$.

in both large and small sections of the course. Contrary to the hypotheses, students in small sections of introductory psychology rated the class more positively both at the beginning and at the end of the semester compared with students in large sections. Surprisingly, when we examined data by instructor, we found improvements in just one instructor's classes among the small sections and in just two instructors' classes among the large sections, suggesting that individual instructor variables may be as important as class size in influencing students' perceptions of the course.

It is also important to consider that although student perceptions in the small classes were statistically higher than those in the large classes, those differences may not be large enough to justify the large amount of resources necessary to deliver courses in the smaller format. For example, at University A, we teach five sections of introductory psychology each fall with approximately 1,500 students using five full-time instructors and five senior learning assistants (typically graduate teaching assistants). If we were to teach the course in sections of 30–35 students, it would require 42–50 sections, which would raise the cost to deliver the course dramatically. In the current academic climate in which resources are scare, this kind of course change would be unlikely to be realistic or sustainable. Because both large and small courses were evaluated positively (e.g., above a rating of neutral) and previous work has shown that our large class format is associated with significant learning gains and reduced the percentage rate of students who receive a D or F or withdraw from the course, the relatively small difference in student perceptions on the measured dimensions may be acceptable.

All sections of the large classes examined in this study are highly standardized with shared class structure, syllabi, assignments, and class demonstrations. We expected the course setup, with its focus on engaging students in class time, reducing anonymity, and providing frequent performance feedback, to be the driving force behind students' perceptions of the class. If this were the case, we would expect students' ratings to be similar across all instructors. However, given that we found improved perceptions of the class for only some instructors, it is possible that some instructors are more skilled than others at implementing strategies designed to tackle challenges associated with large class size. Therefore, it might be worth examining the strategies used by these class-shrinking instructors both in and out of the classroom. Future research might ask students open-ended questions regarding specific behaviors or techniques used by instructors in large classes to make the class feel small.

It is worth noting that all ratings were above the scale's midpoint, even on the first day of class. It is surprising that, even from the very first day, students in large sections expect to be highly engaged, to not feel anonymous, and to receive frequent feedback on their performance, despite the size of the class. One possible explanation for students' early, positive expectations of the large class is that each instructor sends an e-mail to students the week before classes start. This e-mail has a friendly tone,

includes helpful tips about purchasing and registering course materials, and encourages students to respond with questions or concerns. Numerous students respond with questions, so by the time the semester starts, several have had back-and-forth e-mail exchanges with the instructor. It is possible that this welcome e-mail and subsequent e-mail exchanges set an initial, positive tone in the large class. Future research might examine the effects of e-mail communication before classes begin on students' expectations of the class. It might be that such relatively simple instructor overtures serve to quickly mitigate students' negative impressions of large classes.

Our goal was to illustrate that when large classes are carefully designed to target the specific challenges associated with high enrollment, students will rate those classes similarly to students enrolled in small sections. Although we found more positive ratings in small sections, there is still evidence of the value of making intentional efforts to enhance engagement, reduce feelings of anonymity, and provide frequent performance feedback in large classes. Our redesign of introductory psychology involved increasing class size from 150 to 330 students. Despite this increase in size, students in the redesigned, larger class now show greater learning and better completion rates compared with students in the smaller, traditional version of the course (Hudson et al., 2014, 2015). In addition to benefiting our students, teaching large sections has brought unexpected benefits to the faculty who teach the course. The development of an introductory psychology teaching team has fostered a comradery among colleagues, sparked a shared goal for continuous course improvement, and prompted collaborative research opportunities that would otherwise not be possible. Unfortunately, it is impossible to know how our traditionally taught, large classes would have responded to the SIS but that may be an avenue for empirical investigation for other institutions considering a course redesign.

A limitation of the current study is that students' two sets of ratings on the SIS were based on different sources of data. That is, students' ratings on the first day of class were speculative and based on expectations of the course, whereas their ratings on the last day of class were based on actual experiences. Although there is no way to rectify this limitation (i.e., ratings made on the first day of class will necessarily be based on expectation alone), future research might also compare large and small classes on additional, more objective, outcome measures, like performance and attendance, and link these measures to students' ratings on the SIS. Adding measures of course performance would also allow for a better understanding of how efforts to make large classes feel smaller might relate not just to students' perceptions of the course but also to their learning. Toward this aim, future research might ask students to speculate about how specific aspects of the redesigned course (e.g., frequent feedback on quizzes) contributed to their comprehension of course material.

There are numerous challenges associated with high enrollment classes, but in our current climate of decreased funding for higher education, such classes are the reality for many American students, and introductory-level courses are disproportionately affected by this trend (Stanley & Porter, 2002). The results associated with our redesigned introductory psychology course illustrate that it is possible to increase class size while still providing a highly engaging learning environment, making personal connections with students, and providing frequent feedback on performance. Whereas it might not be possible to make large classes feel as intimate to students as small classes do, we have shown that it is possible to deliver a high-enrollment course in a way that approximates the desirable characteristics of a small class.

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