

Making Large Classes Feel Smaller

Brief Description

Evidence-based approaches in course design, classroom activities, and assessment practices for large-enrollment classes which foster student learning and belonging by making classes feel small(er).

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Introduction

Teaching large-enrollment classes often poses logistical challenges for instructors. Additionally, students in large classes may not always feel seen and may struggle to stay engaged. “Small” teaching and learning strategies, which may take only a short time to prepare and to implement, can make large classes feel small(er) to students while ensuring the workload is manageable, adjustable, and sustainable for instructors. Integrating these evidence-based approaches into course design, classroom activities, and assessment practices can have a significant impact, particularly on enhancing the learning environment and fostering student belonging.

Challenges for Instructors and Students in Large-Enrollment Classes

The instructor-to-student ratio can greatly affect how both instructors and students experience the learning environment. Research has documented high levels of student disengagement, lack of depth in learning, and less than optimal interactions between instructors and students in large-enrollment contexts (Cash et al., 2017). However, negative outcomes in large classes are not a given. Instructor attributes and behaviors are a key determinant of student perceptions

and satisfaction. “Students [in the study] referred to engaging instructors who made them feel like important individuals despite being surrounded by hundreds of their peers. Instructors who walked through the aisles while lecturing and who learned their students’ names were deemed the most memorable and most effective at making a class feel smaller” (p. 7–8). Incorporating these and other relatively simple strategies increases the likelihood that students will have positive learning experiences.

Keeping Large Classes on Track

Instructors can follow the [three basic steps of backwards design](#) to keep large classes on track. As the architects of this framework observe, “Though considerations about what to teach and how to teach it may dominate our thinking as a matter of habit, the challenge is to focus first on the desired learnings from which appropriate teaching will logically follow” (Wiggins & McTighe, 2005, 14).

Step 1: Identify and Center Learning Goals

Being proactive about identifying and centering learning goals that spark students’ engagement and intrinsic motivation is vital when there are many students with diverse needs and wants. Taking the time to captivate students’ interests in the learning goals early on can promote the rapid spread of positive emotions, attitudes, and behaviors across the auditorium.

Sample Strategies for Setting a Welcoming Tone:

- **Build momentum for the journey ahead.** Students in large classes may have the mistaken impression that they will receive the bare minimum in terms of instruction and may calibrate their own investment accordingly. This is why it is so important to construct a syllabus thoughtfully and strategically to fuel students’ drive to learn and to provide a road map with intentions. In [Designing a Motivational syllabus: Creating a Learning Path for Student Engagement](#), Harrington and Thomas (2023) encourage instructors to clearly map the learning path, illuminating the “enduring understandings,” including knowledge, mindsets, and skills, that are the highest aspirations for what students will carry with them on their educational journeys (p. 16).
- **Empower rather than disempower.** Fearing the prospect of an unruly mass of students and losing control, instructors may be tempted to impose lots of rules or policies in large classes. Verschelden (2017), author of [Bandwidth Recovery: Helping Students Reclaim Cognitive Resources Lost to Poverty, Racism, and Social Marginalization](#), is critical of the “low-hope syllabus,” which is replete with punitive policies but devoid of any sense of a larger purpose or support for the challenging readings and rigorous assignments. In contrast, the “high-hopes syllabus” intentionally builds community, respects students’ funds of knowledge, affirms values and safety, provides reassurance and certainty, and promotes students’ self-efficacy.

Sample “High-Hopes” Welcome Letter

Please feel free to adapt.

Dear Student [Writers/Chemists/Historians/Artists/Engineers...],

I am delighted to share the syllabus for our upcoming course. As you will see, this will be an incredibly unique learning opportunity. The course has been designed to not only transform your thinking, but also to ensure that you don't get lost among the sea of faces in the auditorium. The syllabus will provide you with absolutely everything you need to know (seriously!), but if you have questions don't hesitate to ask. I enjoy the opportunity to connect with students.

Please don't be intimidated by the lengthy reading list and assignment options. It is a wish list, and we will calibrate as we go. While the responsibility for learning ultimately falls to you, I will provide both high levels of challenge and support, including structure, transparent expectations, and the resources you need to achieve the learning goals.

My goal as an educator is to cultivate a dynamic and inclusive learning environment conducive to the vibrant exchange of ideas. Of course, a successful class requires a collective effort so please make a commitment to thoughtfully engage. In our first class meeting, I look forward to sharing more about my background, educational journey, and deep interest in this topic and to hearing about how this course aligns with your academic and career goals. Looking forward to meeting you and to all that we will learn together!

Step 2: Plan Assessment of Student Learning Outcomes

With a large number of students, it is important to calculate how much time will need to be allocated for grading and providing feedback. Instructors must be especially careful not to “over-effort” by creating more assignments than necessary, which can consequently lead to misalignment between goals and assessments. Careful mapping of the assessments to the learning outcomes is key. Instructors can begin by asking themselves the following questions: What behaviors or artifacts will indicate that students are achieving the goals that have been set? How can every student be given equitable opportunities to successfully demonstrate their learning? What is the right balance of formative and summative assessment?

Sample Strategies for Integrating Formative Assessments:

Formative assessments can be used for a variety of purposes, such as giving students low-stakes opportunities to demonstrate their learning and giving instructors insight into the class's progression. These kinds of intentional “temperature checks” signal care and can better

position instructors to be more responsive and well-timed in their teaching. Formative assessments can also help build community by giving students a chance to connect with one another and co-create meaning.

- **Use online tools for grading and feedback.** Apps such as [Crowdmark](#), [Poll Everywhere](#), or [Socrative](#) simplify the work of grading for instructors and provide immediate feedback for learners.
- **Collect an “exit-ticket” survey.** Prompt students to list what they learned and/or what they are still confused about (e.g., “quickly identify the muddiest point from today’s lecture”). Tanner (2010) points out that even reading a 10 percent sample of student responses in large-enrollment classes can give instructors valuable insight about what to focus on in the next class. Collecting responses from all students contributes to each individual feeling seen among the masses.
- **Vote to test comprehension.** Devote time for students to consider their own responses, discuss in pairs or small groups, and then vote on the correct answer. After students view everyone’s responses, further discussion and revoting ensues. Smith and colleagues (2009) found that the discussion following the class vote can promote student learning. This approach creates opportunities for students to connect with one another, and instructors can monitor student learning trends in real-time. Anonymous tabulation is preferable to randomly calling on students to share responses; the latter practice has been identified as a driver of participation inequities (Cooper, 2021) and can be time consuming if the instructor has to intervene in re-directing or re-gaining control of the class (Nadile et al., 2023b).
- **Save time with group assessments.** Two examples of group assessments are [cooperative quizzes](#) and [two-stage exams](#). The basic set up is that after students complete an individual quiz, they have higher levels of investment, which can be channeled into discussions with classmates to debate and reach a consensus on each answer. These approaches have been shown to increase student understanding, motivation, self-confidence, and collaboration and to lower anxiety and academic integrity violations. Cooperative learning has been associated with positive learning outcomes in courses with 250 students or more (Armstrong, Chang, and Brickman, 2007).
- **Reimagine traditional, high-stakes summative assessment.** Instructors in large classes can easily become overwhelmed by the volume of grading, especially when it is their first time teaching a course or when there are new and unexpected demands on their time. Grading effectively and efficiently should be the goal. It is in the instructor’s purview to make modifications to the assessment plan outlined in the syllabus when needed.

Sample Strategies for Reimagining Summative Assessments:

- **Save time grading while still providing thorough feedback.** Look for trends across student work to identify common patterns. The themes that emerge from the patterns

can be shared with students in two ways. A broad overview of written or verbal feedback addressing those themes can be shared with the whole class. Alternatively, keep a bank of common feedback, which can be copied and pasted to provide thorough feedback customized to individual students.

- **Enlist students as co-designers of alternative assessments.** Co-creation increases students' sense of control and motivation and can allow instructors to shift attention to other aspects of the course. This can include metacognitive reflection on their own learning process. When students self-evaluate, they develop new understandings and are better able to identify target areas for ongoing improvement (for more ideas see [Stommel, 2020, Ungrading: an FAQ](#)).
- **Don't discount the value of closed-ended questions.** Essays and open-ended questions can be time consuming to grade. Research has demonstrated that student learning can be meaningfully assessed with [higher order multiple choice questions](#) that go beyond simple recall and explanation to application, analysis, and evaluation (Brame, 2022).
- **Engage in a mapping exercise to align course objectives with assessments.** Mapping is an intentional process which can illuminate areas where student learning is being sufficiently captured. If students have already met the learning goals, instructors can consider canceling a final exam. To avoid disadvantaging students who were counting on the final as an opportunity to demonstrate their learning, shifting the format or making the final exam optional has the added benefit of giving all students greater choice and autonomy.

Step 3: Facilitate Learning and Community Building

Being intentional about interactions with students facilitates learning and builds community in large-enrollment courses. Efforts to foster belonging complement the growing pedagogical repertoire of inclusive teaching practices. Inclusive educators are better equipped to be more responsive to the ever-changing needs of students, who are coming from a wide range of backgrounds with different motivations and levels of prior knowledge. *Learn more with [Northwestern's Inclusive Teaching Principles](#).*

Instructors can begin developing relationships with their students starting on the first day of the course (Meaders, et al., 2021) or even before. While it may seem like a daunting task to connect with all students in large-enrollment courses, there are varied and explicit types of invitations that take little time and resources. In 2016, Lang launched a movement with his book [Small Teaching: Everyday Lessons from the Science of Learning](#) and his [series in the Chronicle of Higher Education](#). These data-driven connection and inclusion strategies have powerful impacts in spaces with hundreds of students who hold a variety of perspectives.

Sample Strategies for Fostering Connection and Inclusion:

- **Design the first five minutes of class for transition.** As students enter the classroom, take a moment to welcome everyone into the learning space collectively. Pose a

reflection question to inspire thinking about the topic (Lang, 2016). This allows students to have an intentional moment to transition into a curious state of mind. Signaling what's coming next also helps get everyone on the same page before diving into content, and it can be done once most students have arrived.

- **Use student names with the aid of “name tents.”** On the first day of class, students can create name tents by writing their first names and pronouns on a piece of cardstock that is given to all students. Cooper and colleagues (2017) found that when name tents are used, students perceive their name to be known even if the instructor does not actually know everyone's name. This is particularly beneficial for instructors of large-enrollment courses who want to cultivate positive classroom climates and build community in the classroom. Instructors can encourage students to share the responsibility of using name tents with one another during think-pair-share or other small group activities.
- **Incorporate active learning techniques.** Active learning techniques move beyond passively conveying information to engaging students directly in the learning process. Active learning promotes collaboration and discussion in students (Miller and Metz, 2014). Using active learning techniques regularly increases students' familiarity with what is expected of them and activates students as co-creators of the learning experience. In a meta-analysis of over 200 STEM courses, Freeman and colleagues (2014) found that active learning is associated with more learning and less failing. Instructors find active learning to be effective at improving learning and motivation and students shared the same sentiment (Patrick, Howell, & Wischusen, 2016).
- **Share the rationale.** When incorporating active learning techniques such as think-pair-share, polls, and minute-papers, align the activities with course objectives and convey the value of engagement to encourage student buy-in. The rationale is especially important for those students who might be less eager to partake in active learning (Tharayil et al., 2018).
- **Invite scalable connection outside of class.** Instead of holding traditional “office hours” host “student hours.” This subtle linguistic shift can be a powerful driver of human connection (Felten and Lambert, 2020). It may be more efficient to set up remote office hours and to encourage students to attend in groups. Instructors can [set up group office hours in Canvas](#) using the Scheduler tool. The [waiting room settings in Zoom](#) can be used to prevent students from accidentally joining another student's private meeting. Alternatively, students can “drop by” an open session to ask a question or chat. Students in one study expressed an interest in listening to other students ask questions, along with other motivations for attending like clarifying content and help with homework. Some students felt that in online office hours it was more challenging to build relationships with instructions but also logistically more convenient and possibly less intimidating. The researchers recommend that instructors explicitly discuss the benefits, consider alternative locations (e.g., library) and other ways to lower structural barriers, and cultivate an inclusive environment that makes students feel welcomed (Hsu, Rowland-Goldsmith, Schwartz, 2022).

- **Explore alternative participation methods to promote equitable student engagement.** Nadile and colleagues (2021) demonstrated that students in large-enrollment science courses find it helpful when other students ask and answer questions in class, but 50% of students do not engage in those methods in front of the class due to discomfort and fear of being negatively evaluated by peers. One method to promote communication from students is to have class-wide forums or places for discussion, such as platforms like [Campuswire](#), [Slack](#), [Discord](#), [Yellowdig](#), or [Piazza](#). These can be completely anonymous and can allow students to ask questions that most students might have questions about. Further, some of these platforms can easily be integrated with Canvas for easy tracking and efficient and prompt question-answering. In their [annual list of recommendations](#) to promote learning and empathetic pedagogy, the Northwestern Associated Student Government (ASG) called for anonymous student-reflection, which can be done with those platforms, and integrating more of those discussion-based platforms into already existing class structures.

Student Voices

"Class-specific forums such as Campuswire and Piazza are often more convenient for students who have just a few quick questions. This also allows students in the class to answer questions, test their knowledge of the material, gain confidence in themselves, and see what other students are thinking about."

—2022–23 Associated Student Government
[Learning Recommendations Letter](#)

- **Create opportunities for small group work.** Cooper and Robinson (2022) extol the virtues of small group work (3–4 students) in large class-settings:
 - Small group work promotes cognitive elaboration, enhances critical thinking and appreciation for diverse perspectives, provides instant feedback, fosters social and emotional development, and reduces student attrition.
 - Assigning alternating procedural roles (i.e., facilitator, reporter, recorder) also promotes equity in small groups by ensuring that each group member has an entry point for participation and skill building (Eddy et al., 2015; Tanner et al., 2003). Being explicit about roles students are expected to play when doing group work provides structure and helps students stay on task.
- **Foster collaboration virtually.** Take advantage of the many high-quality online teaching techniques that can make large in-person classes feel smaller, including breakout rooms for discussion. The classic fishbowl technique can be easily modified for a synchronous or asynchronous conversation—a selected group of students (“the fish”) can be spotlighted while other students observe the interaction and reflect. Students can share

their responses via collaborative annotation tools ([Hypothesis](#), [Perusall](#)) or virtual whiteboards ([Miro](#), [Padlet](#)).

- **Schedule time to pause.** With fewer students it may be easier to stay in-tune with and be adaptive to the energy levels in the classroom. In [Hitting pause: 65 lecture breaks to refresh and reinforce learning](#), Rice (2023) extols the virtues of building in deliberate pauses. This intentional act helps students focus, improves retention of information, arouses curiosity, and activates prior knowledge. This act allows instructors to take a break, pivot as needed, and to share insight into their pedagogical choices with students. Additionally, building in regular breaks may reduce disadvantages associated with being in a neurominority, while maintaining the ability to receive education (Hamilton and Petty, 2023). Instructors can take a moment at the end to praise the whole class for their contributions rather than individual praise (Eddy, et al., 2017).
- **Connect student to academic and/or mental health support.** Again, with so many students, it can be more difficult to recognize when a student is struggling and to provide individualized attention. Communicate available campus resources to students in the syllabus and on the first day of class followed by friendly and frequent reminders to utilize services, such as [Academic Support and Learning Advancement](#) and [TimelyCare](#). Another way to show commitment to fostering physical, mental, and emotional well-being is to develop an explicit course policy that *every* student can miss a class session without explanation or impact on their grade.

Sample Strategies for Personalizing Instruction:

Personalization can come in different forms and can be automated in large classes allowing meaningful connections to grow between students and instructors. Personalization can be embedded in aspects of course design and extended beyond the classroom to intentionally build and sustain meaningful relationships with students. These automation strategies can be set up to run throughout the course with little additional time investment from the instructor.

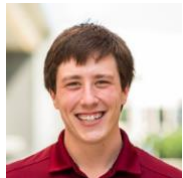
- **Ask for student names using technology.** [NameCoach](#) is an easy-to-use tool that integrates with Canvas to allow individuals to record themselves pronouncing their name for others to hear and practice. Asking students to do this demonstrates interest in who they are and is quick to set up.
- **Personalize emails to students using a mail merge tool.** Nadile and colleagues found that when instructors sent emails with student preferred first names in a large science class, they felt acknowledged and like the instructor cared about them, compared to those who only received emails addressed to the whole class (Nadile et al., 2023a).
- **Collect personalized information to drive student motivation.** Instructors can send out a pre-survey, which can also be sent out using a mail merger, to get to know students better and to reference throughout the course. It is useful to be explicit about how the information will be used. Questions can explore motivations for taking the course and prior engagement with the subject matter. This practice makes students feel

psychologically close or “immediate,” which increases student motivation and autonomy (Baker, 2010).

- **Engage in “non-content instructor talk.”** Seidel and colleagues (2017) define this as any language not related to course content that allows the instructor to establish a warm and welcoming classroom environment. Language that validates the importance of all students bringing in different perspectives shows respect, which fosters the relationship between instructors and students.
- **Bridge psychological distance with ease of communication.** Letting students know how and when they can communicate increases the sense of psychological closeness. Research suggests students want prompt responses, which might not always be possible, but there are ways to demonstrate “being there” for students. A variety of communication channels not only accommodate communication differences but also enhance students’ sense of belonging (Hamilton & Petty, 2023).

Ideas on Teaching Large Classes from Northwestern Colleagues

To get a glimpse at effective yet manageable strategies, hear from two Northwestern instructors who teach large-enrollment courses about how they sustain meaningful learning in those spaces.



[Connor Bain](#)

Assistant Professor of Instruction

Department of Computer Science and Learning Science

Searle Fellow 2023–24

“In COMP_SCI 111 (Fundamentals of Computer Programming) we focus on building students’ computational literacy—the ability to see the world as computable. Part of building this literacy is not only being able to write computer programs but also to be able to reason and talk about them with others. However, because the class is now close to 500 students, it’s easy for students to feel disconnected from the content and isolated in their learning. To overcome these difficulties, each quarter we survey students on their programming experience and learning preferences and assign them into ‘Tutorial Teams’ of eight students, which are then also assigned an undergraduate TA as a ‘guide’ throughout the quarter. Students work with their team each week on both in-class and out-of-class assignments, building a series of smaller communities within our larger course. Not only does this help students build comfort with each other and the course staff, it also allows for undergraduate TAs to collate feedback from individual teams for me so that I can have a deeper understanding of how the class is progressing than I would gain from office hours and assignments alone.”



[David William Schieber](#)

Assistant Professor of Instruction
Department of Sociology
Searle Fellow 2023–24

“When planning large courses, it is important to think about overall learning objectives while acknowledging the on the ground realities of teaching large classes. This is where I find backward course design the most beneficial. Small rubric or syllabus changes can mean drastic differences in time spent grading or answering emails when hundreds of students are enrolled. Every minute spent thinking carefully about what you want students to get out of the class when preparing a syllabus, and then thinking about how to make that happen in a pedagogically rigorous but straightforward way, can drastically reduce the workload for instructors and teaching assistants throughout the entire quarter. I often lean on technology like Poll Everywhere, Canvas online submission portals, and rolling due dates to smooth out the day-to-day workload for students, teaching assistants, and instructors knowing that every person involved in the course is a busy person in their own right.”

Staying Flexible and Open

Things will not always go according to plan. Accordingly, Northwestern instructors are asked to include the following [statement](#) on their syllabi: “Please note that the specifics of this course syllabus are subject to change in the case of unforeseen circumstances. Instructors will notify students of any changes as soon as possible. Students will be responsible for abiding by the changes.” When unanticipated situations arise, instructors may need to pivot to ensure the continuity of student learning and a sustainable workload. In the [Teaching in Higher Ed podcast](#), Zamora advocates for emergence as “an administrative strategy for leaving things open.” She describes a “roadmap,” which can be followed and aligned to course learning outcomes but that is flexible and open as new ideas emerge spontaneously (Stachowiak, 2023).

Conclusion

Instructors of large classes can give students a small class experience by using strategies that personalize instruction and encourage students to actively engage with the course material during class time. Doing so will help students to feel seen and maximize their connection to the instructor and each other, which increases their motivation, engagement, and sense of belonging. What is critical is that these efforts do not come at the cost of instructor well-being. We cannot stress enough the importance of a manageable workload when teaching large-enrollment courses to safeguard instructor vitality. We close by inviting you to:

- try these data-driven strategies for re-imagining how to teach efficiently and effectively in large classes,
- share your innovative approaches with colleagues,
- be aspirational in your teaching of large-enrollment courses.

Recommended Resource

Smock, Kristin. [Teaching Large Enrollment Courses](#). Teaching and Learning Resource Center. The Ohio State University.

References

Armstrong, N., Chang, S. M., & Brickman, M. (2007). Cooperative learning in industrial-sized biology classes. *CBE Life Sciences Education*, 6(2), 163–171.

Baker, C. (2010). The impact of instructor immediacy and presence for online student affective learning, cognition, and motivation. *Journal of Educators Online*, 7(1), n1.

Brame, C. (2022). Writing higher order multiple choice questions. Vanderbilt University Center for Teaching. Retrieved January 23, 2024, from Vanderbilt's Center for Teaching <https://cft.vanderbilt.edu/writing-higher-order-multiple-choice-questions/>.

Bowen, R. S. (2017). Understanding by Design. Vanderbilt University Center for Teaching. Retrieved March 8, 2024, from <https://cft.vanderbilt.edu/understanding-by-design/>.

Cash, C. B., Letargo, J., Graether, S. P., & Jacobs, S. R. (2017). An analysis of the perceptions and resources of large university classes. *CBE Life Sciences Education*, 16(2), ar33.

Cooper, J. L., & Robinson, P. (2022). The argument for making large classes seems small. *New Directions for Teaching and Learning*, 2022(170), 21–30.

Cooper, K. M., Haney, B., Krieg, A., & Brownell, S. E. (2017). What's in a name? The importance of students perceiving that an instructor knows their names in a high-enrollment biology classroom. *CBE Life Sciences Education*, 16(1), ar8.

Cooper, K. M., Schinske, J. N., & Tanner, K. D. (2021). Reconsidering the share of a think–pair–share: Emerging limitations, alternatives, and opportunities for research. *CBE Life Sciences Education*, 20(1), fe1.

Eddy, S. L. (2023). Recent research in science teaching and learning. *CBE Life Sciences Education*, 22(4), fe3.

Eddy SL, Brownell SE, Thummaphan P, Lan M-C, Wenderoth MP. (2015). Caution, student experience may vary: Social identities impact a student's experience in peer discussions. *CBE Life Sciences Education*, 14:ar45.

Eddy, S. L., Converse, M., & Wenderoth, M. P. (2015). PORTAAL: A classroom observation tool assessing evidence-based teaching practices for active learning in large science, technology, engineering, and mathematics classes. *CBE Life Sciences Education*, 14(2), ar23.

Felten, P., & Lambert, L. M. (2020). Relationship-rich education: How human connections drive success in college. JHU Press.

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the national academy of sciences*, 111(23), 8410–8415.

Gainsburg, I., & Lee Cunningham, J. (2023). Compassion fatigue as a self-fulfilling prophecy: Believing compassion is limited increases fatigue and decreases compassion. *Psychological Science*, 09567976231194537.

Hamilton, L. G., & Petty, S. (2023). Compassionate pedagogy for neurodiversity in higher education: A conceptual analysis. *Frontiers in Psychology*, 14, 1093290.

Harrington, C., & Thomas, M. (2023). Designing a motivational syllabus: Creating a learning path for student engagement. Taylor & Francis.

Hsu, J. L., Rowland-Goldsmith, M., & Schwartz, E. B. (2022). Student motivations and barriers toward online and in-person office hours in STEM courses. *CBE Life Sciences Education*, 21(4), ar68.

Lang, J. M. (2021). Small teaching: Everyday lessons from the science of learning. John Wiley & Sons.

Li, M. H., & Yang, Y. (2016). A cross-cultural study on a resilience–stress path model for college students. *Journal of Counseling & Development*, 94(3), 319–332.

Meaders, C. L., Senn, L. G., Couch, B. A., Lane, A. K., Stains, M., Stetzer, M. R., ... & Smith, M. K. (2021). Am I getting through? Surveying students on what messages they recall from the first day of STEM classes. *International Journal of STEM Education*, 8(1), 1–16.

Miller, C. J., & Metz, M. J. (2014). A comparison of professional-level faculty and student perceptions of active learning: its current use, effectiveness, and barriers. *Advances in Physiology Education*, 38(3), 246–252.

Nadile, E. M., Alfonso, E., Barreiros, B. M., Bevan-Thomas, W. D., Brownell, S. E., Chin, M. R., ... & Cooper, K. M. (2021). Call on me! Undergraduates' perceptions of voluntarily asking and answering questions in front of large-enrollment science classes. *PLoS One*, 16(1), e0243731.

Nadile, E. M., Cooper, K. M., & Brownell, S. E. (2023a, May 18). *The Impacts of Using Personalized Emails in an Online Physiology Course* [Conference presentation]. TEACHx, Northwestern University, Evanston, IL. United States.

Nadile, E. M., Winton, M. R., Brownell, S. E., Cooper, K. M., & Collins, J. P. (2023b, June 25–30). *Should I let my students answer questions? The instructor perceived motivation, costs, and benefits of inviting students to answer questions voluntarily in large science courses* [Conference presentation]. Gordon Research Conference, Bates College, Lewiston, ME. United States.

Patrick, L. E., Howell, L. A., & Wischusen, W. (2016). Perceptions of active learning between faculty and undergraduates: Differing views among departments. *Journal of STEM Education: Innovations and Research*, 17(3), 42.

Rice, G. T. (2023). *Hitting pause: 65 lecture breaks to refresh and reinforce learning*. Taylor & Francis.

Seidel, S. B., Reggi, A. L., Schinske, J. N., Burrus, L. W., & Tanner, K. D. (2015). Beyond the biology: A systematic investigation of noncontent instructor talk in an introductory biology course. *CBE Life Sciences Education*, 14(4), ar43.

Smith, M. K., Wood, W. B., Adams, W. K., Wieman, C., Knight, J. K., Guild, N., & Su, T. T. (2009). Why peer discussion improves student performance on in-class concept questions. *Science*, 323(5910), 122–124.

Stachowiak, B. (Host). (2023, July 20). Making Space for Emergence (No. 475) [Audio podcast episode]. In *Teaching in Higher Ed*. <https://teachinginhighered.com/podcast/making-space-for-emergence/>

Stommel, J. (2020). Ungrading: an FAQ. Retrieved January 23, 2024. <https://www.jessestommel.com/ungrading-an-faq/>

Tanner, K. D. (2010). Order matters: Using the 5E model to align teaching with how people learn. *CBE Life Sciences Education*, 9(3), 159–164.

Tanner, K., Chatman, L. S., & Allen, D. (2003). Approaches to cell biology teaching: Cooperative learning in the science classroom—beyond students working in groups. *Cell Biology Education*, 2(1), 1–5.

Tharayil, S., Borrego, M., Prince, M., Nguyen, K. A., Shekhar, P., Finelli, C. J., & Waters, C. (2018). Strategies to mitigate student resistance to active learning. *International Journal of STEM Education*, 5, 1–16.

Wiggins, G. P., & McTighe, J. (2005). Understanding by design. Association for Supervision and Curriculum Development.

Acknowledgments

We would like to thank the instructors who shared their insights with us.

How to Cite this Guide

Nadile, Erika, and Jennifer Keys. "Making Large Classes Feel Smaller for Students and More Manageable for Instructors." Searle Center for Advancing Learning and Teaching Guide. Northwestern University. © 2024. Licensed under [Creative Commons](#) Attribution-NonCommercial-ShareAlike 4.0 International.

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