

## **Practical Advice for Scaling Up Student Engagement Methods from Small to Large Classes**

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### **Abstract:**

*Studies have shown a strong connection between student engagement and academic achievement, and many student engagement strategies have been published in the literature. However, some of these strategies are geared towards smaller classes, and may not be feasible with classes of five hundred or more students. I present here a personal account of how I have modified and scaled up a variety of engagement strategies, which are divided into ten different categories of approaches to student engagement: (1) General Classroom Management Practices; (2) Active Note-Taking; (3) Encouraging Student Participation and Dialogue; (4) Kinaesthetic Learning Activities; (5) Student Preparation; (6) Fostering a Culture of Feedback; (7) Collaborative Learning and Peer-Instruction; (8) Case Studies; (9) Involving TAs in Student Engagement; and (10) Connecting with Students Outside the Classroom. The goal of this report is to share tested strategies in the hopes that other professors may be able to use them in their large classes.*

### ***Key Words:***

Student engagement strategies, classroom management, active note-taking; student participation, dialogue, kinaesthetic learning, feedback, connecting with students.

### **Introduction**

Student engagement has a broad definition that includes various parts of the total student experience, from both the academic and non-academic realms (Krause & Coates, 2008). Student engagement can also be looked at from different levels, such as behavioural engagement, emotional engagement, and cognitive engagement (Fredricks, Blumenfeld, & Paris, 2004). Personally, I consider my students to be engaged when they are active partners in their own learning, moving beyond mere participation. Studies have shown a correlation between student engagement and academic achievement (Carini, Kuh, & Klein, 2006; Chickering & Gamson, 1987; Krause & Coates, 2008; Kuh, 2003; Pascarella, Seifert, & Blaich, 2010), and multiple

student engagement strategies have been reported in the literature (Barkley, 2010; Garrett, 2011; Gray & Madson, 2007; Hepplestone, Holden, Irwin, & Parkin, 2011; Zepke & Leach, 2010). Some of these reports are discipline-specific, including disciplines such as Biology (Tanner, 2013), Physics (Hake, 1998; Rudolph, Lamine, Joyce, Vignolles, & Consiglio, 2014), Accounting (Gallagher, 2015), and Commerce (Jain & Farley, 2012), and many of these strategies are forms of active learning (Freeman et al., 2014).

These engagement strategies have been implemented in classrooms of many different sizes. Some techniques are easy to model in large classes, such as showing your own engagement (Garrett, 2011), however other techniques may be more difficult to scale up to large classes (500 or more students). Large classes may have greater diversity in terms of student background and student preparation, require more administration time, and may require more teacher preparation time depending on the activity or intervention. Below, I have detailed my experiences with some of these student engagement strategies and have highlighted how the strategies were scaled-up for the large classroom. All the strategies profiled below were tested in either a first year Introductory Biology class of two sections with up to 500 students each, or in a second year Introductory Genetics class with one section of up to 500 students. All classes took place at the University of Toronto Mississauga. Table 1 showcases several student engagement strategies, divided into ten categories: (1) General Classroom Management Practices; (2) Active Note-Taking; (3) Encouraging Student Participation and Dialogue; (4) Kinaesthetic Learning Activities; (5) Student Preparation; (6) Fostering a Culture of Feedback; (7) Collaborative Learning and Peer-Instruction; (8) Case Studies; (9) Involving TAs in Student Engagement; and (10) Connecting with Students Outside the Classroom.

**Table 1. Student Engagement Strategies**

Name of Engagement Strategy & Description	Challenges of Implementation in a Large Class	Approaches that Worked for Implementation in a Large Class
<b>(1) General Classroom Management Practices</b>		
<b>Learn Students' Names:</b> Learning student names can help to foster the feeling of community in class and invite students to more actively participate in their learning (Gleason, 1986).	In small classes a seating chart can assist with learning student names, however this may not be feasible in a large lecture class. Also, a seating chart may not help the professor to attach student faces to names when the class is large.	Using a memorization technique, such as that described in <i>Moonwalking with Einstein</i> (Foer, 2012) can help in learning names. When students ask or answer questions, ask for their names and write them down on a lecture map at the podium, then use memorization techniques outside of class time to try to commit names to memory. Also, using an App such as TeacherKit may be useful in remembering student faces and names.

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Name of Engagement Strategy & Description	Challenges of Implementation in a Large Class	Approaches that Worked for Implementation in a Large Class
<b>(1) General Classroom Management Practices (continued)</b>		
<p><b>Expectations Document:</b> Classroom management may become more feasible if an expectations document is used. This is a document that is signed by both the students and the professor and highlights expected classroom behaviour by all parties.</p>	<p>In small classes, this document can be made together with the professor and students and then signed on paper. Large classes might be prohibitive of signing on one piece of paper by all members in the class.</p>	<p>In large classes, the document can be constructed by sending out an online survey to ask students what expectations of the students and the professor should appear on this document. The professor can then collate and edit responses, and send the document out to all students to review. The document can then be signed online by all students individually. Also, I have found it is feasible to print the document and have all students come to me to sign it at the end of class. I ask my students to make sure they sign it at some point in the first two weeks of class, and this can spread out the crowds of students. I also find that this allows me to shake hands and say hello to each student individually.</p>
<p><b>Maintain eye contact:</b> Maintaining eye contact can help keep connected to your audience (Wise, Chang, Duffy, &amp; Del Valle, 2004)</p> <p>and can “anchor” your students to the lecture (Gray &amp; Madson, 2007).</p>	<p>Some educators recommend going ‘row by row’ to make sure a connection is made to every student during lecture (Gray &amp; Madson, 2007). With a 60-minute lecture involving 500 students, making eye contact with each student would mean connecting with 8-9 students every minute. This may become overwhelming for both the professor and students.</p>	<p>Using quadrants, rather than the ‘row by row’ approach can help to establish eye contact in large lectures. Divide the lecture space into quadrants, try to establish eye contact with multiple students within a specific quadrant, and then switch quadrants every 5-10 minutes. This will depend greatly on classroom design and lecture space.</p>

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Name of Engagement Strategy & Description	Challenges of Implementation in a Large Class	Approaches that Worked for Implementation in a Large Class
<b>(2) Active Note-Taking</b>		
<b>Note-Taking Scaffold:</b> Encouraging students to actively take notes by providing a skeletal outline (Gray & Madson, 2007) can increase student engagement. Providing full notes ahead of class may have the opposite effect however, causing the students to take passive notes, or not take notes at all.	Providing skeleton notes can work well in both small and large classes. The one issue I have found in large classes is occasionally students will post their notes to share with students that haven't attended class.	Rather than posting full lecture slides, I post skeleton notes which contain note-taking prompts throughout. I originally tagged lecture slides (with a distinctive icon in the corner of my slides) that needed notes to be added in class, however I found that students seemed to "tune out" on other slides, and only took notes on the tagged slides. Thus, I changed my slides such that nearly every lecture slide had something for students to add to their notes.
<b>(3) Encouraging Student Participation &amp; Dialogue</b>		
<b>Pause Procedure:</b> Using the 'pause procedure' can allow students time to discuss issues related to class (Ruhl, Hughes, & Schloss, 1987).	It's important to note that when this technique was proposed by Ruhl and colleagues in 1987, mobile phones weren't ubiquitous. In small classes it may be possible to observe all students to make sure phones don't dominate this time, however this isn't always feasible in large classes.	To ensure that mobile phones don't suddenly emerge during the 'pause procedure' it's important to scaffold this activity for the class by providing concrete tasks/topics to discuss. The professor may want to walk amongst the class and make sure students aren't sitting by themselves and are within talking distance of another student. The professor can also engage in discussion with groups of students. I have also had TAs attend some classes, with the goal of participating with students in discussion during pauses. At the end of the pause procedure, randomly ask students to share their responses.

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Name of Engagement Strategy & Description	Challenges of Implementation in a Large Class	Approaches that Worked for Implementation in a Large Class
<b>(3) Encouraging Student Participation &amp; Dialogue (continued)</b>		
<b>Personal Response Systems:</b> Personal response systems, such as dedicated devices like “clickers,” or Apps on mobile phones, can be used for active learning in lecture. This has been shown to increase student learning (Blasco-Arcas, Buil, Hernández-Ortega, & Sese, 2013; Carnaghan, Edmonds, Lechner, & Olds, 2011; Hoekstra, 2008).	<p>A no-tech solution to personal response systems is the use of coloured cards in the classroom. However, coloured cards may not work in large classes. With personal response systems such as clickers, it can be an additional administrative task to manage all student registrations.</p>	<p>Personal response systems can be used in multiple ways, such as to introduce a topic and find out about existing student background knowledge, or to assess misconceptions and understanding. They can also be used to gather student opinions on contentious topics, and for this it may be useful to change the setting to anonymous when collecting clicker data. For large classes, it may be helpful to set clicker ground rules, such as no talking during the answer period, or setting a timer on the lecture slide that shows how long students have to answer a question. In large classes, it can be challenging to get students back on task, and following a set structure for clicker questions can help. Regarding administration of grades for personal response systems, I have found it useful to assign a dedicated TA to organize registration and grades, as well as having a dedicated discussion forum on the course learning management system dealing with personal response systems.</p>
<b>Ask before you tell:</b> Before discussing a new topic, pose a question to students to (a) find out what they don’t know, and (b) help them to make connections between what they are learning and their prior knowledge (Gray & Madson, 2007).	<p>When posing a question to a large class, it can be difficult to elicit student responses. Students may feel shy or be nervous in replying in such a large class.</p>	<p>When posing a question to the class, sometimes silence is the response from students. If you set the expectation that you won’t proceed until responses are given, students will eventually start to respond more quickly. In the first lecture, ask a question and wait, and state that you will wait until you get a response. Experience has shown that after 2-3 lectures, students start replying much more quickly. Use of personal response systems can also gather immediate feedback on a question.</p>

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Name of Engagement Strategy & Description	Challenges of Implementation in a Large Class	Approaches that Worked for Implementation in a Large Class
<b>(3) Encouraging Student Participation &amp; Dialogue (continued)</b>		
<p><b>Call on a student every 2-3 minutes:</b> Gray and Madson (2007) suggest that the professor call on students from the class every 2-3 minutes by reading student names off cue cards that get shuffled throughout class. It's important to keep shuffling the pack during class so that students may get called on more than once.</p>	<p>It can be labour intensive to prepare cue cards for 500 students. Also, maintaining an accurate roster of cue cards can be challenging when students switch lecture sections or drop the class.</p>	<p>There are a few different methods of "student calling" that can be used: (1) Have students write their name on a cue card in the first class and collect the cards to use. This requires the professor to supply the cue cards, and the professor needs to remember to bring them to every class. (2) Print off a class list and cut each line with the student's info, and keep these in a small bag or basket to draw from. However, cue cards may work better for visual impact, as the professor can hold up the card to show the name to the class. (3) There are some online widgets/Apps wherein you can upload your class list, and it will randomly select a student and display the name at the top corner of your slides. While this involves few supplies that the professor needs to bring to class, there may be privacy concerns about sharing the class list with a third party. One advantage of this method is that you can easily update your class list if students drop the class or switch lecture sections.</p> <p><b>Note:</b> Something that has worked well in both small and large classes is to add the professor's name on several cue cards and mix them into the pile (or on the class list), as suggested by Gray and Madson (2007). If the professor's name comes up, then students are allowed to ask any question of that professor.</p>

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Name of Engagement Strategy & Description	Challenges of Implementation in a Large Class	Approaches that Worked for Implementation in a Large Class
<b>(4) Kinaesthetic Learning activities</b>		
<b>Movement-based lecture activity:</b> Kinaesthetic learning activities get the students to physically move their bodies in order to connect with course content and learn course material (Breckler & Yu, 2011).	Getting all students to participate in a large class can be challenging, and the lecture hall design might limit the type of activity that can be undertaken.	<p>For movement-based activities, it's important to plan them in such a way that requires all students to participate. For example, in an introductory biology class, we have the entire class form a DNA molecule by pretending their left hand is a phosphate, and their right elbow is a base for pairing. It's possible to get the entire class to "bind" to one another through doing this method, and it helps identify misconceptions about bonding and molecular structure.</p> <p>In order to avoid a collective class groan when asking students to stand up and put away the tablet-arm tables in the lecture hall, I make sure I give the students notice that we'll be moving in the class so they don't have too many materials out on their desks.</p>
<b>(5) Student Preparation</b>		
<b>Encourage readings through weekly pretests:</b> In order for students to meaningfully participate in lecture, they need to arrive prepared and having read the course content. In order to encourage this, weekly reading tests or pretests can be implemented.	Some professors employ this method with paper-based weekly pretests at the start of every week. Paper-based tests in large classes can be administratively burdensome.	Weekly accountability tests or pretests can be administered to large classes online using the learning management system. In order to pre-empt student requests to increase grades or be exempt from tests due to medical issues, the professor can implement a grading scheme whereby the bottom two test scores are dropped from the students' final score.

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Name of Engagement Strategy & Description	Challenges of Implementation in a Large Class	Approaches that Worked for Implementation in a Large Class
<b>(6) Fostering a Culture of Feedback</b>		
<p><b>Ticket out the door:</b> The 'Ticket-Out-The-Door' technique involves asking students to answer questions or prompts on a piece of paper, and anonymously hand in that paper on their way out the door at the end of lecture (Harris, 2013).</p>	<p>Preparing response sheets with prompts can be labour intensive for large classes. Also, reading through student responses can be time-intensive.</p>	<p>Using post-it notes instead of photocopied ticket-out-the-door prompts, allows easier administration, collection and analysis. While the lecture is underway, students take a post-it note as large pads of notes circulate the class. Near the end of lecture, put a 'ticket-out-the-door' prompt on your lecture slide, and ask students to respond on their post-it note. As students leave the lecture hall, they add their note to a pile by the door (usually held by a volunteer). When back at your office, the post-it note format allows you to easily organize and collate the notes. It is important to follow up on some student responses in the next class.</p> <p><b>Sample prompts include:</b></p> <ul style="list-style-type: none"> <li>•<u>Keep/Stop/Start:</u> Name one thing you want me to keep doing, one thing you want me to stop doing, and one thing you want me to start doing to help you learn.</li> <li>•<u>Got It / Need Help:</u> Name one concept that you feel you know well, and one concept you are struggling with.</li> <li>•<u>Any Q:</u> Ask me any question.</li> </ul>
<p><b>Minute papers:</b> Minute papers can be used in class to allow students to reflect and write in response to a prompt (Chizmar &amp; Ostrosky, 1998). They are usually paragraph responses that are written based on a time-limit.</p>	<p>Reading through 500 minute papers can be time intensive.</p>	<p>Using peer review to get students to read through and comment on each other's minute papers can allow minute papers to be used in large classes. Peer review is also pedagogically valuable for the students, and it gives them perspective on their classmates' knowledge and experience, while helping them learn reviewing skills. I find it is important to give the students a peer review framework, as well as review prompts, to guide them through the process of peer review.</p>

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Name of Engagement Strategy & Description	Challenges of Implementation in a Large Class	Approaches that Worked for Implementation in a Large Class
<b>(7) Collaborative Learning and Peer Instruction</b>		
<b>Think-pair-share:</b> The Think-Pair-Share technique involves posting a question to the class, getting students to think of the response, then asking students to pair with a neighbour and share their response (Millis & Cottell, 1998). The think-pair-share technique is a form of peer-assisted learning (Newbury, 2011; Porter, Bailey Lee, Simon, & Zingaro, 2011).	In large classes, it can be difficult to keep all students on task when they pair to share their thoughts.	In large classes, I ask students to answer a question using clickers, then to pair with a neighbour and discuss the answer, and then answer again. This encourages students to commit to an answer prior to discussing with their neighbour, and can also be useful in getting students to self-identify misconceptions they may have. For misconception-type questions, the professor can show a graph of all responses after students have answered individually. These graphs might show that the whole class is split between two answers. This encourages much more productive discussion when the students “pair and share.”
<b>Collaborative Testing:</b> Collaborative testing involves students working together in small groups to answer test questions. (Gilley & Clarkston, 2014)	In large lecture halls, it can be administratively difficult to manage 500 students in a collaborative testing scenario.	In order to try and make collaborative testing work in a large lecture, we employed a two-stage approach that involved the students completing a test individually, followed by getting into groups and rewriting a subset of the test, usually consisting of harder questions. The key to making this work in a large lecture hall was to have more TAs present than usual (10 TAs for a class of 500 students), and to prepare the students well for what would happen during the test. During the term we held three two-stage midterms, and the second and third midterms ran much more smoothly than the first midterm. It is easier to conduct a two-stage midterm in a lecture room without tablet arms.

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Name of Engagement Strategy & Description	Challenges of Implementation in a Large Class	Approaches that Worked for Implementation in a Large Class
<b>(8) Case Studies</b>		
<p><b>Interrupted Case Studies:</b> Interrupted case studies involve pausing a case study to insert moments of discussion or active learning through clicker questions, and have been correlated with increased engagement and learning gains (Manohar et al., 2015; Murray-nseula, 2011).</p>	<p>Large classes can present challenges in classroom management of interrupted case studies, as it can be difficult to bring the class back to the case after the discussion and question pauses.</p>	<p>In order to encourage students to focus during case studies, and not be distracted by phones and laptops, you can have a class rule wherein the only thing the students are allowed to have out on their desks during the case are their clickers. Also, to encourage productive discussion, select questions that are grounded in misconceptions of the case background material. A sample case that has used this technique is “Sex and the Komodo Dragon” (Rawle, Dryer, &amp; Sharp, 2017). Students may be anxious to take notes during the case, and it may be helpful to post summary notes after lecture. If the professor uses clicker questions for marks, then students will not be tempted to skip the case studies. Many other active learning based science case studies can be found at <a href="http://sciencecases.lib.buffalo.edu/cs/">http://sciencecases.lib.buffalo.edu/cs/</a></p>
<b>(9) Involving TAs in Student Engagement</b>		
<p><b>TAs and Audio Feedback:</b> Using innovative ways of giving feedback to students, such as audio feedback (Lunt &amp; Curran, 2010), may increase student engagement and help foster a feeling of community in large classes.</p>	<p>Incorporating new ways of giving feedback in large classes is time intensive and consists of more administrative tasks due to TA training requirements, as well as technical trouble shooting with students that are unable to access or hear audio feedback. Sometimes, it will be necessary to assign a lead TA to deal with technical problems.</p>	<p>To foster feelings of community and give more personal feedback on written assignments in large classes, TAs could record audio feedback messages that are sent directly to students. This could be in lieu of, or as a supplement to, the usual written comments that are received on assignments. If a course already has a paperless submission system for written assignments, with a complete e-submission and response format, incorporating audio feedback will not require a full reconsideration of paper submission and return, but will require the attachment of an audio file upon paper return.</p>

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Name of Engagement Strategy & Description	Challenges of Implementation in a Large Class	Approaches that Worked for Implementation in a Large Class
<b>(10) Connecting With Students Outside the Classroom</b>		
<b>Walking Office Hours:</b> Walking office hours involve meeting students on campus to walk through campus trails and discuss course content, rather than meeting in a professor's office (Rawle, 2017).	With large classes, it can be difficult to predict how many students will participate in walking office hours, and sometimes too many students may show up for these sessions resulting in them not having enough time for personal communication. The professor may need to adjust the walking office hour schedule to accommodate more students.	In order to make walking office hours work, pick a campus route that is a ~fifteen minute loop and post the route to the course learning management system along with departure times. The departure location should be a central location, such as near the library or student centre. Also, plan to walk the loop a set number of times. This allows students to leave the walk, or continue, as they wish. It is also important to consider mobility issues in case students with impaired mobility wish to attend the walk. If this arises, be sure to have a back-up route in mind that starts and stops at the same location.

There are many other strategies in the literature that have been shown to encourage student engagement and academic success, that aren't profiled in this article. These include peer assessment and peer-assisted learning (Batz, Olsen, Dumont, Dastoor, & Smith, 2015); learning communities (Zhao & Kuh, 2004), mentoring (Grant, 2013), online discussion forums (Williams & Lahman, 2011), and reflective journals (Everett, 2013), amongst others.

An additional student engagement strategy that is crucial to highlight here is the strategy of "orienting students to their new roles" (Barkley, 2010, pp.96-97). This is a strategy that should be implemented in all classes, both small and large, to highlight the partnership between teacher and student in the learning process, and also to encourage students to take responsibility for their own learning.

It's important to note that a course that contains all of the student engagement strategies profiled here might result in "technique whiplash" for both the student and the professor. Rather than overscheduling these interventions, professors may find it useful to identify a few student engagement strategies that are employed every lecture (such as using student names, establishing eye contact, and using think-pair-share), some

strategies that are used a few times a month (such as minute-papers and ticket-out-the-door), and a few strategies that are used a few times throughout term (such as kinaesthetic activities and interrupted case studies), as was suggested by Gray and Madson (2007). Another option would be to briefly describe the potential engagement activities to students and ask them to vote and give input on which techniques they'd like to see in their class. After all, learning is really based on a partnership between the professor and student, and offering students the opportunity to give input on course design regarding engagement might result in them being more engaged and taking more responsibility for their own learning.

## References

- Barkley, E. (2010). *Student Engagement Techniques: A Handbook for College Faculty*. San Francisco, CA: Jossey-Bass. 398 pages.
- Batz, Z., Olsen, B. J., Dumont, J., Dastoor, F., & Smith, M. K. (2015). Helping struggling students in introductory biology: A peer-tutoring approach that improves performance, perception, and retention. *CBE Life Sciences Education*, 14(2), 1–12. <http://doi.org/10.1187/cbe.14-08-0120>
- Blasco-Arcas, L., Buil, I., Hernández-Ortega, B., & Sese, F. J. (2013). Using clickers in class. The role of interactivity, active collaborative learning and engagement in learning performance. *Computers & Education*, 62, 102–110. <http://doi.org/10.1016/j.compedu.2012.10.019>
- Breckler, J., & Yu, J. R. (2011). Student responses to a hands-on kinesthetic lecture activity for learning about the oxygen carrying capacity of blood. *Advances in Physiology Education*, 35, 39–47. <http://doi.org/10.1152/advan.00090.2010>
- Carini, R. M., Kuh, G. D., & Klein, S. P. (2006). Student engagement and student learning: Testing the linkages. *Research in Higher Education*, 47(1), 1–32. <http://doi.org/10.1007/s11162-005-8150-9>
- Carnaghan, C., Edmonds, T. P., Lechner, T. A., & Olds, P. R. (2011). Using student response systems in the accounting classroom: Strengths, strategies and limitations. *Journal of Accounting Education*, 29, 265–283. <http://doi.org/10.1016/j.jaccedu.2012.05.002>
- Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin*, Mar, 3–7. [http://doi.org/10.1016/0307-4412\(89\)90094-0](http://doi.org/10.1016/0307-4412(89)90094-0)
- Chizmar, J. F., & Ostrosky, A. L. (1998). The One-Minute Paper: Some Empirical Findings. *The Journal of Economic Education*, 29(1), 3–10. <http://doi.org/10.2307/1182961>
- Everett, M. C. (2013). Reflective Journal Writing and the First-Year Experience. *International Journal of Teaching and Learning in Higher Education*, 25(2), 213–222. Retrieved from <http://www.isetl.org/ijtlhe/>
- Foer, J. (2012). *Moonwalking With Einstein: The Art and Science of Remembering Everything*. Penguin Books.
- Fredricks, Blumenfeld, & Paris. (2004). School Engagement: Potential of the Concept, State of the Evidence. *Review of Educational Research*, 74(1), 59–109.
- 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. <http://doi.org/10.1073/pnas.1319030111>

- Gallagher, S. M. (2015). Improving Student Engagement Through Consultation. *Accounting Education*, 24(6), 564–568. <http://doi.org/10.1080/09639284.2015.1108777>
- Garrett, C. (2011). Defining, Detecting, and Promoting Student Engagement in College Learning Environments. *Transformative Dialogues: Teaching & Learning Journal*, 5(2). Retrieved from [http://www.kpu.ca/sites/default/files/Teaching and Learning/TD.5.2.5.Garrett\\_Student\\_Engagement.pdf](http://www.kpu.ca/sites/default/files/Teaching and Learning/TD.5.2.5.Garrett_Student_Engagement.pdf)
- Gilley, B. H., & Clarkston, B. (2014). Collaborative Testing: Evidence of Learning in a Controlled In-Class Study of Undergraduate Students. *Journal of College Science Teaching*, 43(3), 83–91. <http://doi.org/10.1017/CBO9781107415324.004>
- Gleason, M. (1986). Better Communication in Large Courses. *College Teaching*, 34(1), 20–24. <http://doi.org/10.1080/87567555.1986.10532325>
- Grant, R. (2013). *Peer Mentoring: An Effective Approach to Enhancing Student Engagement and Success*. Retrieved from <https://repository.openpolytechnic.ac.nz/handle/11072/1587>
- Gray, T., & Madson, L. (2007). Ten Easy Ways to Engage Your Students. *College Teaching*, 55(2), 83–87. <http://doi.org/10.3200/CTCH.55.2.83-87>
- Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics*, 66(1), 64–74. <http://doi.org/10.1119/1.18809>
- Harris, B. (Teacher). (2013). *Battling Boredom : 99 Strategies to Spark Student Engagement*. Taylor and Francis. Retrieved from <https://books.google.co.uk/books?hl=en&lr=&id=ISAjAQAQAQBAJ&oi=fnd&pg=PP1&dq=%22student+engagement%22+and+%22ticket-out-the-door%22&ots=jbyctMG6U9&sig=X1fJebI-DkEDTBuUDg0R8p5xFFw#v=onepage&q=%22student+engagement%22+and+%22ticket-out-the-door%22&f=false>
- Hepplestone, S., Holden, G., Irwin, B., & Parkin, H. J. (2011). Using technology to encourage student engagement with feedback: a literature review. *Research in Learning Technology*, 19(2), 117–127. <http://doi.org/10.1080/21567069.2011.586677>
- Hoekstra, A. (2008). Vibrant student voices: exploring effects of the use of clickers in large college courses. *Learning, Media and Technology*, 33(4), 329–341. <http://doi.org/10.1080/17439880802497081>
- Jain, A., & Farley, A. (2012). Mobile Phone-Based Audience Response System and Student Engagement in Large-Group Teaching. *Economic Papers*, 31(4), 428–439. <http://doi.org/10.1111/1759-3441.12002>
- Krause, K.-L., & Coates, H. (2008). Students' engagement in first-year university. *Assessment & Evaluation in Higher Education*, 33(5), 493–505. <http://doi.org/10.1080/02602930701698892>
- Kuh, G. D. (2003). What We're Learning About Student Engagement From NSSE: Benchmarks for Effective Educational Practices. *Change: The Magazine of Higher Learning*, 35(2), 24–32. <http://doi.org/10.1080/00091380309604090>
- Lunt, T., & Curran, J. (2010). "Are you listening please?" The advantages of electronic audio feedback compared to written feedback. *Assessment & Evaluation in Higher Education*, 35(7), 759–769. <http://doi.org/10.1080/02602930902977772>
- Manohar, P. A., Acharya, S., Wu, P., Hansen, M., Ansari, A., & Schilling, W. (2015). Case Studies for Enhancing Student Engagement and Active Learning in Software V&V Education. *Journal of Education and Learning*, 4(4). <http://doi.org/10.5539/jel.v4n4p39>
- Millis, B. J., & Cottell, P. G. (1998). Cooperative Learning for Higher Education Faculty. Series on Higher Education. *American Council on Education Oryx Press series on higher*

- education. Retrieved from  
<http://eric.ed.gov/ERICWebPortal/recordDetail?accno=ED415756>
- Murray-Nseula, M. (2011). Incorporating case studies into an undergraduate genetics course. *Journal of the Scholarship of Teaching and Learning*, 11(3), 75–85.
- Newbury, P. (2011). Effective Peer Instruction using Clickers. *CWSEI Peer Instruction Workshop*, (December), 1–42. Retrieved from  
[http://www.cwsei.ubc.ca/Files/PeerInstructionWorkshop\\_NewburyHeiner.pdf](http://www.cwsei.ubc.ca/Files/PeerInstructionWorkshop_NewburyHeiner.pdf)
- Pascarella, E. T., Seifert, T. A., & Blaich, C. (2010). How Effective are the NSSE Benchmarks in Predicting Important Educational Outcomes? Change: *The Magazine of Higher Learning*, 42(1), 16–22.
- Porter, L., Bailey Lee, C., Simon, B., & Zingaro, D. (2011). Peer instruction. In *Proceedings of the seventh international workshop on Computing education research - ICER '11* (p. 45). <http://doi.org/10.1145/2016911.2016923>
- Rawle, F. (2017). Thinking Outside the Office (Hours). *National Teaching and Learning Forum*, 26(4), 6-7.
- Rawle, F., Dryer, M., & Sharp, J. (2017). Sex and the Komodo Dragon. *National Center for Case Study Teaching in Science* (in press).
- Rudolph, A. L., Lamine, B., Joyce, M., Vignolles, H., & Consiglio, D. (2014). Introduction of interactive learning into French university physics classrooms. *Physical Review Special Topics - Physics Education Research*, 10(1), 1–18.  
<http://doi.org/10.1103/PhysRevSTPER.10.010103>
- Ruhl, K. L., Hughes, C. a., & Schloss, P. J. (1987). Using the Pause Procedure to Enhance Lecture Recall. Teacher Education and Special Education: *The Journal of the Teacher Education Division of the Council for Exceptional Children*, 10(1), 14–18.  
<http://doi.org/10.1177/088840648701000103>
- Tanner, K. D. (2013). Structure matters: Twenty-one teaching strategies to promote student engagement and cultivate classroom equity. *CBE Life Sciences Education*, 12(3), 322–331. <http://doi.org/10.1187/cbe.13-06-0115>
- Williams, L., & Lahman, M. (2011). Online Discussion, Student Engagement, and Critical Thinking. *Journal of Political Science Education*, 7(2), 143–162.  
<http://doi.org/10.1080/15512169.2011.564919>
- Wise, A., Chang, J., Duffy, T., & Del Valle, R. (2004). The Effects of Teacher Social Presence on Student Satisfaction, Engagement, and Learning. *Journal of Educational Computing Research*, 31(3), 247–271. <http://doi.org/10.2190/V0LB-1M37-RNR8-Y2U1>
- Zepke, N., & Leach, L. (2010). Improving student engagement: Ten proposals for action. *Active Learning in Higher Education*, 11(3), 167–177.  
<http://doi.org/10.1177/1469787410379680>
- Zhao, C.-M., & Kuh, G. D. (2004). Adding Value: Learning Communities and Student Engagement. *Research in Higher Education*, 45(2), 115–138.  
<http://doi.org/10.1023/B:RIHE.0000015692.88534.de>