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Pedagogical Choices Make Large Classes Feel Small

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Foreword by Pat Hutchings

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Contents

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Abstract

Many students begin their college experience enrolled in large introductory classes. These classes are likely to enroll students who are at risk of leaving college without a degree. As such, these classes have the potential to reach at-risk students including first-year, first-generation, undeclared, and underrepresented minority (URM) students. Unfortunately, large lecture classes can make it difficult for students to develop meaningful relationships with faculty members or peers, even though it is known that the presence of strong faculty-student relationships predicts student engagement (Jaasma & Koper, 1999). One route to engaging students is the intentional use of evidence-based pedagogical practices. There have been substantial efforts to improve large lecture classes through the strategic use of discussion sections, active learning, and varied forms of assessment. Additionally, efforts to increase students' engagement and persistence have taken place outside of the classroom. We believe that some evidence-based practices developed outside the classroom are ripe for use in large lectures. In the current paper we describe an integration of academic content with practices that support student engagement and success in a large general education course, *Child Development*.

We begin with a brief description of the class, as it was before modification and as it is now. We then summarize some of the literature that describes evidenced-based methods of supporting at-risk students and explain how we have used this literature to inform our alignment of pedagogical practices with pedagogical goals. We share means of authentic assessment used in this course that target academic mastery and student well-being during and after the course's completion. Throughout this discussion we report on early indications that our modifications have met our intended goals. We conclude by considering principles that might guide redesign of other large classes.

Foreword

Over the last decade, more and more campuses have developed cross-cutting, institution-level student learning outcomes. This is a significant, often hard-won accomplishment, and it is also one that points the way to challenging next steps and questions. How do institution-level outcomes match up with those at the program- and course-level? How are the agreed-upon skills and proficiencies documented and assessed? Do the pedagogies and assignments designed and used by faculty effectively advance the achievement of all students? How are those achievements assessed and documented? All of these are questions about what is now commonly called "alignment."

Often alignment is thought of from the top down. Many campuses have engaged in a process of curriculum mapping, starting with degree- (or program-) level outcomes and documenting where each is being taught and assessed (or neglected). But alignment is also an important lens for bottom-up attention to classroom practice. Indeed, at its best, course design is a complex exercise in selecting and deploying a diverse mix of pedagogical practices that work together to foster the 21st century learning outcomes that today's students need to flourish.

It is, in fact, hard to imagine a more thoughtful, thorough-going process of alignment than the one described in this NILOA occasional paper by Karen Singer-Freeman and Linda Bastone. Their extensive redesign of a large introductory *Child Development* course at Purchase College, State University of New York is a story about the intentional implementation of an array of practices aimed, as the authors say, at making a large introductory lecture course "feel small" in ways that increase student engagement and success. These practices include well known, evidence-based classroom approaches such as active and problem-based learning, reflective writing, and the use of eportfolios. But the authors also "believe that some evidence-based practices developed outside the classroom are ripe for use in large lectures." Accordingly, they also employ a number of strategies drawn from the co-curricular and student life arena: learning communities, intentional mentoring by carefully selected and trained mentors, and "brief psychological interventions" such as the cultivation of grit and a growth mindset.

What is notable here is that this diverse set of approaches functions not as a laundry list of the latest evidence-based pedagogies but as a carefully integrated weave of experiences—a "bundling approach," as the authors put it—that work together to increase students' sense of belonging and engagement—conditions that correlate with academic success. In short, this is a story about effective pedagogical alignment.

Whatever the language (alignment, bundling, integration), this kind of thinking is critical if higher education is to deliver on the promises reflected in frameworks like the Degree Qualifications Profile, the Essential Learning Outcomes from the Association of American Colleges and Universities, and the locally devised institution-level outcomes that are now in place on so many campuses.

What is also critical—and central to the business of NILOA—is the emphasis on assessment as an integral aspect of the teaching and learning process rather than an add-on. As readers will see, the redesign of *Child Development* includes a move toward more frequent assessments that rely more heavily on reflective writing: ePortfolio assignments, weekly learning reflections, discussion section worksheets, weekly open-book scratch-off quizzes, and an optional final. Tasks like these increase students' ability to effectively regulate their own learning and advance the outcomes that Singer-Freeman and Bastone care about: mastery and retention of broad conceptual issues, the increased integration of academic learning with students' own experiences, and improving the success of under-represented minority students. Additionally, the redesigned course represents significant progress toward what they call "intervention goals": "the establishment of a culturally sensitive classroom, the development of a sense of belonging in college, a growth mindset, and a more self-regulated approach to academic tasks."

Foreword (continued)

The bottom line is this: clear degree-level outcomes are an essential component in shaping the undergraduate experience in more coherent, supported ways. But that goal can only be achieved if the classroom is shaped in parallel ways—with the activities, assignments, and assessments that faculty design and require of students intentionally integrated and aligned with each other as well as with larger goals. This paper offers a powerful illustration of what that kind of work looks like at its best.

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Pedagogical Choices Make Large Classes Feel Small

Karen Singer-Freeman and Linda Bastone

The Class

Child Development is offered as a lower-level class that seats between 60 and 100 students in different semesters. The class fulfills an elective requirement for psychology majors as well as the college general education requirement for social sciences. The class attracts primarily first-year students from diverse backgrounds. For example, last semester the class enrolled 36% underrepresented minorities (URM), 36% commuters, 31% first-generation students, and 22% transfer students; overall, 71% of students were classified in at least one of these groups. Many students fell into multiple potential risk groups with 31% of the class falling into 2-4 at-risk categories. Prior to the modifications described here, the class met three days a week as a lecture. The primary learning objectives of the class were to teach students: 1) research methods; 2) major theories and concepts; 3) stages of physical, social and cognitive development; and 4) application of the principles of child development to good practice with children. The original assessments included four brief writing assignments, four exams with multiple-choice and fill-in-the-blank questions, and an optional final. Students were very satisfied with the class and demonstrated mastery of the learning objectives. However, students expressed high levels of anxiety about the exams. The instructor felt that this anxiety interfered with the students' ability to fully contemplate the applications of the material to their lives. An additional concern was that URM students were receiving lower grades than European American students. Finally, the instructor had concerns about the extent to which the material would be retained after the end of the class.

Pedagogical goals are met most effectively when pedagogical practices are intentionally selected to align with these goals. We bring together a diverse set of pedagogical techniques in the service of supporting student learning and engagement.

Goals and Structure of Course Redesign

The course was redesigned with the intention of improving the mastery and retention of broad conceptual issues, increasing the extent to which students integrated learning with their own experiences, and improving the success of URM students. Additionally, the class was redesigned to meet intervention goals. These goals included the establishment of a culturally sensitive classroom, the development of a sense of belonging in college, a growth mindset, and a more self-regulated approach to academic tasks. In the revised class, lecture time was reduced, and discussion sections led by teaching-assistants were added. The number of assessments was increased so that assessments occurred more frequently and relied more heavily on reflective writing. Students completed ePortfolio assignments, weekly learning reflections, discussion section worksheets, weekly open-book quizzes, and an optional final. Each of the modifications that were implemented were informed by research. Broadly, the research described below examines techniques that have been used to support students' academic success and well-being. We believe that each of these techniques has the potential to enrich large lecture classes. Pedagogical goals are met most effectively when pedagogical practices are intentionally selected to align with these goals. We bring together a diverse set of pedagogical techniques in the service of supporting student learning and engagement.

Evidence-Based Practices to Improve Success and Authentic Learning

Learning Communities

Learning communities have been implemented on many college campuses as a means of providing students with a sense of community. Students' participation in learning communities has been associated with increased academic success and engagement (Lord, Coston, Blowers, Davis, & Johannes, 2012; Pike, Kuh, & McCormick, 2011; Zhao & Kuh, 2004). One way in which learning communities might support student success is by invoking a sense of belonging. Walton, Cohen, Cwir and Spencer (2012) found that even when students were induced to feel a minimal sense of belonging, they experienced increased motivation and persistence. Participation in a learning community provides students with the belief that they will have enhanced opportunities to form social relationships with other students. Thus, it seems likely that some of the positive effects of participation in a learning community might derive from a sense of belonging. Learning communities also provide students with increased contact with a faculty member who frequently forms a mentoring relationship with students. Finally, learning communities encourage integrative learning across the curriculum. Although it is not possible to deliver all of the rich experiences of a typical learning community in a large class, we have explored ways to deliver some of the core elements of learning communities through class-based activities.

Students' comments on an exit survey indicated that they felt a sense of community with the class, despite its large size.

In *Child Development* we invoke a sense of belonging in a number of ways. The professor introduced the discussion sections by explaining that they create smaller communities of students who will get to know each other as they discuss class-related topics. This introduction is similar to instructions that were found to induce a sense of belonging (Walton et al., 2012). The instructor also used students' weekly learning reflections to build a sense of community. Rather than submitting the learning reflection as a homework assignment, students wrote emails to their teaching assistant describing the most interesting thing they had learned from the textbook that week. Teaching assistants responded to each student, establishing a reciprocal dialog. In this way, the relationship between the student and the teaching assistant was strengthened. The instructor read all of the emails and included references to common themes in lectures by telling the class when many of them had commented on the same aspect of the chapter. In this way, those students who had touched on common themes would have an enhanced sense of similarity to other students in the class. Students' comments on an exit survey indicated that felt a sense of community with the class, despite its large size. Additionally, an unexpected positive effect of increased feelings of community was increased comfort with speaking in the large lecture. By the middle of the semester, students were sharing personal experiences freely during lectures and responding to each other in class discussions. One student reflected, "This class helped me open up more and not be afraid to talk."

Mentoring

Mentoring, either within a learning community or as an independent program, is another technique that has been used to improve social connections, academic success, and retention among college students. Studies involving diverse groups of undergraduate students have found that participation in mentoring programs is associated with increases in college satisfaction, involvement, academic performance, graduation, and gradu-

ate school applications (Bordes & Arredondo, 2005; Crisp & Cruz, 2009; Hurtado, Carter, & Spuler, 1996; Luna & Prieto, 2009; Terrion, 2010). A meta-analysis of mentoring studies found that the benefits of academic mentoring are generally stronger than the benefits of other types of mentoring, and mentoring affects students' attitudes more than their behaviors (Eby, Allen, Evans, Ng, & DuBois, 2008). The benefits of mentoring appear to be especially strong among URM students. On the basis of these findings, we hypothesize that mentoring efforts have the potential to influence at-risk students' feelings of belonging in ways that might be important for their persistence and well-being.

A common element of large lecture classes is required attendance in smaller discussion sections. Research has demonstrated that participation in well-planned discussion sections can improve students' engagement with a course as well as provide opportunities for students to develop integrative writing skills, improve grades, and personalize material (Buckley, Bain, Luginbuhl, & Dyer, 2004; Fullilove & Treisman, 1990; Kleiner, 1997). Discussion sections used as a vehicle to provide mentoring, might be especially helpful for underserved students. Ovink and Veazey (2011) posit that providing a sense of community among URM students may reduce social isolation and help students to combat stereotypes. We hypothesize that discussion sections, though widely used, may be underutilized in the promotion of student well-being and engagement.

Like learning communities, mentoring programs generally enroll only the students who opt in. The incorporation of mentoring activities into discussion sections has the potential to reach a much broader group of students than stand-alone mentoring programs.

Like learning communities, mentoring programs generally enroll only the students who opt in. The incorporation of mentoring activities into discussion sections has the potential to reach a much broader group of students than stand-alone mentoring programs. Although there is not a great deal of empirical research on the importance of different facets of mentoring, Campbell and Campbell (2007) outline a number of best practices for faculty mentoring of college students. Each of these has the potential to be enacted by teaching assistants leading discussion sections. In this way, teaching assistants can also function as peer mentors.

1. *Mentoring should be intentional and scheduled at regular intervals*. Campbell and Campbell (2007) explain that mentoring programs should be structured formally in ways that are intended to meet program goals. In *Child Development*, discussion sections occurred at regularly scheduled times and had goals that were explicitly tied to course goals. We also provided teaching assistants with a schedule of expected email outreach. In this way, the discussion sessions fulfill Campbell and Campbell's guideline.
2. *Mentors should actively mentor*. Although some of the positive effects of mentoring relationships likely stem from passive modeling of positive behaviors, ideally mentors should go beyond modeling and actively engage mentees to help them make progress toward program goals. In *Child Development* we designed discussion section activities that ensured active mentoring by following reflective writing exercises with structured mentoring discussions (See Appendix A as a seperate attachment).
3. *Mentors should be selected carefully.* Careful attention to mentors' personal characteristics can minimize negative effects of perceived differences (Crisp & Cruz, 2007; Terrion, 2010). Finding mentors who are productive, warm, empathetic, available, and have integrity is essential. This requires additional selection criteria for teach-

ing assistants that are being recruited to fulfill both an academic and a mentoring role. In *Child Development* we recruited mentors who were successful in the psychology major and demonstrated high levels of warmth, empathy, availability, and integrity.

4. *Mentors and mentees should be carefully matched.* In general, attempts should be made to pair mentors and mentees who share demographic characteristics and personal interests. Unfortunately, matching individual mentors and mentees is not possible in class-based discussion sections. However, in *Child Development* we selected warm, empathetic mentors who, as a group, shared demographic characteristics with the students.
5. *Mentors should receive training including information about appropriate boundaries*. Many students have interacted with traditional teaching assistants and are likely to initially view the position without consideration of a mentoring relationship. When teaching assistants serve in a dual role, training and ongoing supervision, in which mentoring communications are monitored and discussed, is essential. In *Child Development* we provided teaching assistants with materials that would support good mentoring (e.g., sample emails, grading rubrics, and instructions on positive framing of corrections). During weekly meetings, mentors practiced discussion section activities and discussed student communications.

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Although it is impossible to provide every student in a large class with intensive individual mentoring that characterizes the best mentoring programs, it is possible to incorporate some of the best practices of mentoring into discussion sections. To foster the mentoring relationship and sense of community, each discussion section began with a "check-in" in which students shared their weekly "highs" and "lows." The teaching assistants also wrote positive comments responding to each ePortfolio assignment and emailed their students weekly to remind them about upcoming assignments. If a student was not turning in assignments or attending class, the teaching assistant reached out to the student. We asked students to complete a subset of questions from the College Student Mentoring Scale (Crisp, 2009) in order to assess the extent to which we successfully established a mentoring relationship between the students and the teaching assistants. We measured the extent to which the teaching assistant served as a role model, provided emotional and psychological support, and provided support for academic goals using a 5-point Likert-type scale. We found that students did view the teaching assistants as mentors, with 81% agreeing or strongly agreeing that the mentors provided academic support, 77% agreeing or strongly agreeing that the mentors were role models, and 70% agreeing or strongly agreeing that the mentors provided emotional and psychological support. Interestingly, students' feelings about their mentors were similarly positive regardless of whether the student and mentor were from the same ethnic group (average rating = 3.79) or from different ethnic groups (average rating = 3.75). These results suggest that discussion sections can be effectively used to deliver mentoring to large groups of students. Brief psychological interventions offer another means by which discussion sections can support student well-being.

Brief Psychological Interventions

Brief psychological interventions have the potential to improve individuals' lives long after the intervention is over by changing the way they think and feel about the world. Brief psychological interventions have been shown to improve students' grades, persistence, and overall well-being for long peri-

ods of time (Walton, 2014). Some schools have begun to incorporate brief psychological interventions as part of student orientation. The classroom is another environment in which several interventions could be successfully introduced or reinforced (Boaler, 2013). We have already described some of the positive outcomes associated with one brief psychological intervention designed to increase a sense of belonging (Walton et al., 2012). In addition to this, we describe three other brief psychological interventions and then discuss their promise for use in large classes below.

Values Affirmation. Reflecting on one's core values has the potential to promote students' feelings of efficacy in the face of academic challenges. Low-achieving African American students who were given the opportunity to affirm core values early in middle school improved academic performance and retained equivalent levels of self-efficacy throughout middle school (Cohen, Garcia, Purdie-Vaughns, Apfel, & Brzustoski, 2009). This was in contrast to the experience of non-affirmed low-achieving African American students who showed a declining level of self-efficacy. We believe that the first-year experience of college students is a similar moment at which students face increased academic demands and may suffer from impairment to their sense of academic self-efficacy. This risk is especially strong for students from groups that are at risk of not completing college. An affirmation intervention has the potential to have a similar buffering effect for these students. We provided students in *Child Development* with a modified version of the affirmation intervention during the first discussion section. Students reflected on their core values during childhood and considered how important people in their lives influenced these values (See Appendix A as a seperate attachment).

Sense of Belonging. Many students who are at risk of leaving college struggle with their initial adjustment. For students who lack a visible community on campus or lack a home community that includes college graduates, initial feelings of isolation can be interpreted as evidence that they do not belong in college. Walton and Cohen (2011) implemented an intervention that was designed to help students view their current feelings of isolation as temporary. During their second semester of college, some students read a report of the results of an alleged survey of advanced students at the college describing how their initial feelings of isolation were replaced by feelings of connection. The students then wrote letters and recorded messages to future students providing advice about ways to find community in college. African American, but not European American, students who participated in this intervention received higher grades over the next three years than similar students who had read letters about an unrelated subject. African American students who participated in the intervention also expressed more certainty about their feelings of belonging at the college and less self-doubt than similar students who had not participated in the intervention.

We provided students in *Child Development* with a modified version of the social belonging intervention during a discussion section that occurred in the middle of the semester. During this session students discussed ways that children effectively join social groups and then read letters from graduating seniors describing how their feelings of isolation were replaced by feelings of connection. The students then discussed ways that successful social entry is similar in childhood and adulthood. The session ended with students writing a letter to future first-year students providing advice about ways to develop community at college (See Appendix A as a seperate attachment).

Many students who are at risk of leaving college struggle with their initial adjustment. For students who lack a visible community on campus or lack a home community that includes college graduates, initial feelings of isolation can be interpreted as evidence that they do not belong in college.

Preliminary data suggest that participation in this intervention may have supported students' sense of belonging at the college as well as their persistence. On an exit survey, 86% of the students reported that they planned to graduate from our college and 98% reported that they planned to complete a bachelor's degree. Similarly, 84% were excited about the possibility of making new friends at the college. Early retention data also appear promising. Our college's average first-year student retention rate is 81%, however, 86% of first-year students who took the modified class in Spring 2015 returned to the college for the Fall 2015 semester. We saw even higher rates of retention for other groups that are typically considered to be retention risks: 88% transfer students; 89% URM; 90% students on academic probation; and 96% commuters.

When students are taught to take a growth view of intelligence, they become more interested in attempting difficult tasks and more likely to persist after an initial failure.

Growth Mindset and Grit. When students are taught to take a growth view of intelligence, they become more interested in attempting difficult tasks and more likely to persist after an initial failure. Unfortunately, many American students enter college believing that intelligence is genetically determined and unchangeable. Dweck (2006) refers to this as a fixed mindset and pioneered work in which brief lessons on brain plasticity led to shifts in students' views of intelligence. The determination to achieve long-term goals and a willingness to persevere in the face of obstacles has been termed grit (Duckworth & Gross, 2014). Duckworth, Peterson, Matthews, and Kelly (2007) have found that grit influences a wide range of outcomes, including educational attainment, grade point average, success in military training, and even success in the National Spelling Bee. Interestingly, grit is not related to IQ but is related to the personality construct of conscientiousness (Duckworth et al., 2007). Given the strong research support for the importance of grit, it is not surprising that many interventions are currently being tested to develop grit in students. Nearly all of these interventions seek to develop both grit and a growth mindset (Snipes, Fancsali, & Stoker, 2012). This grouping reflects the related nature of these two constructs. The positive effects of a growth mindset on grit have been replicated in many domains of learning and across many groups (Boaler, 2013).

Students in *Child Development* complete two sequential ePortfolio assignments near the end of the semester in which modified versions of existing interventions were used (Aronson, Fried, & Good, 2002; Duckworth, Grant, Loew, Oettingen, & Gollwitzer, 2011; Morisano, Hirsh, Peterson, Pihl, & Shore, 2010; Paunesku, Walton, Romero, Smith, Yeager, & Dweck, 2015; See Appendix B). The early responses to these interventions have been positive. In an exit survey 82% endorsed a growth mindset. We also observed that many students responded to Duckworth et al.'s (2007) Grit Scale in ways that indicated grit (on a scale from 1 to 5). Reviewing the responses of individual students, 62% could be classified as gritty (scores ranging from 3.08-4.5), 19% could be classified as not gritty (scores ranging from 1.75-2.92), and 19% could be classified as neutral (scoring 3). Many students spontaneously mentioned learning about grit and developing a growth mindset when asked to list the five most important things they learned in the class. Students also wrote heartfelt responses to the ePortfolio assignments. For example, one student described his growth mindset writing,

> I believe that I have a growth mindset. I think this came to me when I was about 14 years old and I realized that people of my color can become things. I say that because beforehand I thought that I was doomed to a simple 9-5 job and I couldn't be a lawyer because I was not white.

Another described her shifting mindset in the following way:

> I have always struggled with math. When it comes to my skills in math and intelligence in general, I view it as fixed. I believe this may have been a self-fulfilling prophecy. Expecting myself to fail made me accept my poor grades and never feel surprised. Telling myself that, if I put in more effort I could see better results, would help me establish a growth mindset.

We have completed qualitative coding on URM students' responses to the growth assignment and found that 71% reported a growth mindset. Interestingly, 41% described a change in their perspective from fixed to growth that had either occurred in the past or was currently in progress. We believe that the expression of a shifting mindset is the strongest indication that the intervention had a genuine impact because the description of a shifting mindset required a detailed response. Additionally, 47% expressed grit when responding to the growth assignment. For example, one student wrote,

> So far, I've been doing much better than I had before. I don't allow myself to take in criticism such as 'maybe science isn't for you' or 'she's just smart so that's why she does well.' I do well when I work hard. If I don't do well right away, I keep trying until I'm satisfied.

Learning communities, mentoring, and brief psychological interventions are proven techniques that support student success. As you increase the number of individuals in a group who benefit, the nature of the group will shift. This has been found to result in an improved group dynamic, which itself can lead to individual improvements (Powers, Cook, Purdie-Vaughns, Garcia, Apfel, & Cohen, 2016). By bundling interventions, individuals who are not helped by one intervention might benefit from another. Our students' cross-references between different interventions and references to several interventions as being among the most important things they learned in the class can be seen as evidence of the students' receptivity to bundling. A large lecture class is an ideal setting for the delivery of multiple supportive interventions as long as the interventions can be connected to class material. In order to maximize the positive effects of mentoring and brief psychological interventions, it is essential that there is alignment between these activities and other pedagogical elements.

Learning communities, mentoring, and brief psychological interventions are proven techniques that support student success.

Engaging Students in the Large Class

Active Learning. Traditionally, introductory courses have used didactic lectures as the primary means of instruction (Buckley et al., 2004). In a typical lecture the majority of communication is unidirectional, flowing from the professor to the students, with only a small percentage of class time devoted to discussion or questions. One method of improving student outcomes in large classes is the use of exercises in which students engage with each other in small groups. Active learning experiences are considered one of a group of high impact practices which have been shown to improve educational outcomes for all students (Finley & McNair, 2013; Kuh, 2008). The incorporation of active learning into introductory classes is an ideal way to expose students to a high impact experience early in college. Technologies such as classroom response systems and course management systems have provided more instructional flexibility. The use of learning platforms that allow immediate feedback, requests for clarification, and in-class polling have been shown to improve engagement in large lecture classes (Shaw, Kominko, & Terrion, 2015).

Similarly, there are a number of resources available to faculty to support active, problem-based learning. For an example of a case study on vaccine safety, see Singer-Freeman (2015; http://www.aacu.org/stirs/casestudies/singer-freeman). There are a number of examples in which active learning experiences have improved introductory classes. Prather, Rudolph, and Brissenden (2011) found that the addition of interactive learning strategies in an astronomy course resulted in large and equivalent learning gains in students regardless of sex, ethnicity, or prior preparation. **Porter**, Guzdial, McDowell, and Simon (2013) found that the inclusion of paired assignments and peer instruction in computer programming classes reduced attrition and increased both course and degree completion. Finally, Armbruster, Patel, Johnson, and Weiss (2009) found that students in a biology class with active problem-based learning viewed the class more positively and received higher grades than students in a traditional biology class. The changes to this course also improved the instructor's enthusiasm for teaching the course.

Small discussion sections can be another route for implementing active learning experiences and improving in-class engagement. In *Child Development*, students' participation in discussion section activities that promoted feelings of belonging and engagement created a classroom environment in which students participated actively. During the first six weeks of class we monitored students' level of participation during lectures. We found that 85% of the students in the class participated at least once in a class discussion. Impressively, rates of participation were high across groups of students that are frequently viewed as being at risk of not engaging during class, including URM (85% participation), first-year (80% participation), transfer (83% participation), and first-generation (100% participation) students.

Assessment. Assessments in large classes are often multiple-choice or short-answer format. These types of assessments require students to express their learning via tightly conscripted responses. Frequently, there is little demand for higher-order reasoning and little opportunity for students to express learning in their own voices. The reliance on didactic lectures and assessments that are aligned with lower-order reasoning may limit students' engagement with the material, the instructor, and the college, thereby reducing the positive impact of other supportive programming attached to a class. Educationally underprepared students often struggle in a large lecture setting. Schunk and Zimmerman (1997) hypothesize that educationally underprepared students are less likely to have strong self-regulatory skills or experience taking notes during extended lectures than educationally well-prepared students. Students with weak self-regulatory skills are at risk of missing key points during lectures as well as feeling increasingly disengaged from the content and the class.

Small changes in assessment structure have the potential to function as interventions, resulting in large improvements in performance. For example, when Pennebaker, Gosling, and Ferrell (2013) added brief daily testing to an introductory psychology course, students' academic performance improved in that class and in other classes the students were taking. This improvement resulted in a 50% reduction in the achievement gap among students of different social classes. Daily assessment also provided continuous information about student mastery. Pennebaker et al. hypothesized that daily testing helped to improve educationally underprepared students' self-regulatory skills because the students received frequent feedback about their academic mastery and their standing in the class. The use of daily testing provided students with information that appeared to increase their academic efforts.

Small changes in assessment structure have the potential to function as interventions, resulting in large improvements in performance.

Research on the testing effect supports the efficacy of frequent testing as a means of improving retention for material (Roediger, Putnam, & Smith, 2011). There is substantial evidence that testing is effective in supporting the retention of lower-order, factual, knowledge (Roediger & Karpicke, 2006), but testing may also support higher-order, integrative reasoning (Jensen, McDaniel, Woodard, & Kummer, 2014). Despite well-documented benefits of testing, testing can also have negative effects if the testing situation evokes feelings of stereotype threat (Steele & Aronson, 1995). In order for testing to maximally benefit at-risk students, efforts must be taken to reframe tasks and tests as non-diagnostic of ability (Quinn & Spencer, 2001).

In *Child Development* we sought to improve students' self-regulation without inducing stereotype threat by providing low-stakes testing and written assignments that focused on the integration of new concepts through autobiographical writing. Students completed weekly open-book quizzes on which they were allowed to select additional responses if they answered incorrectly (receiving partial credit). These questions also appeared on a closed-book optional final. The purpose of the quizzes was to: a) reduce anxiety around testing; b) regulate attention during lectures; c) provide immediate feedback on conceptual understanding; and d) encourage attendance.

We believe that frequent low-stakes testing was effective at supporting conceptual mastery. Scores on in-class quizzes was very high, averaging 87%. Scores on the optional final were lower. A representative half of the class completed this 100-question multiple choice exam and the average score was 68% (similar to averages on exams in *Child Development* during semesters when high-stakes testing was used as the primary means of assessment). Students also responded positively to this assessment practice, indicating reduced anxiety and increased ability to engage in authentic learning. For example, one student responded to a question about how her experience in the class changed her by saying, "I didn't worry about memorizing information, all I did was focus on learning." Another student sent an email after the semester describing his reaction to the assessment format this way,

> I will say that I felt that the quizzes, by virtue of their scratch-and-reveal nature, lowered stress and increased confidence (and therefore, presumably, understanding) by letting me know that I will know when I am right, know when I am wrong, and be able to keep changing my thought process until I learn the correct concept behind the correct answer.

A second way in which we supported self-regulated learning was by requiring students to complete assignments for nearly every class and by personalizing the method of assignment submission. When students uploaded their chapter reflections to our course management system, response rates averaged 69%. However, when students sent emails with their reflections directly to their teaching assistant, response rates rose to 90%. Several students commented on the fact that the frequent assignments helped them learn to be better students. One student wrote, "It has made me a more knowledgeable person that became better at managing my time with all the assignments that were due. It made me less likely to procrastinate." We also redesigned our assessment plan to rely heavily on reflective writing that required students to actively select self-relevant material. The assignments were introduced during the first class with the explanation that students

Students also responded positively to assessment practice, indicating reduced anxiety and increased ability to engage in authentic learning.

would be challenged to determine which information from the class would be useful to them. One student said, "I learned so many real-life lessons through being in *Child Development* and I am now able to apply these lessons to parts of my own life." We also provided opportunities for students to engage in authentic learning by integrating conceptual issues with their own past experiences and future plans in a series of ePortfolio assignments.

ePortfolio-Based Assessment. ePortfolio use in higher education has become increasingly prevalent (Rhodes et al., 2014). There is evidence that ePortfolios help students and faculty evaluate growth and reflect on students' academic achievements (Buzzetto-More, 2010). Eynon, Gambino, and Török (2014) found evidence that ePortfolio use correlates positively with student success indicators and can help advance and support deep thinking, integration, and personal growth. ePortfolios have the potential to focus student attention away from lower-order learning of facts and towards higher-order learning of principles. Thus, the use of ePortfolios may promote the learning and retention of core principles. General education classes seek to expose students to the major concepts and guiding principles that are the foundation of different approaches to understanding; ePortfolios have the potential to support this outcome. ePortfolio development may also support student well-being. The creation of ePortfolios has been found to help students develop academic identity, future orientation and a sense of belonging to a community of scholars (Nguyen, 2013; Singer-Freeman, Bastone, & Skrivanek, 2014). A challenge in the use of ePortfolio-based assessment in a large lecture class is the potentially heavy burden of assessment; however, rubrics can minimize assessment burdens at the same time as providing authentic evaluations. Rubrics can also enhance learning and instruction by making expectations clear to both students and faculty. Buyarski and Landis (2014) found that rubrics were an effective means of evaluating learning in ePortfolios that were developed as a part of a first-year seminar. Similarly, Singer-Freeman, Bastone, and Skrivanek (2016) found that rubrics reliably assessed applied and collaborative learning, as well as academic identity, in ePortfolios that were created to document a science research experience.

General education classes seek to expose students to the major concepts and guiding principles that are the foundation of different approaches to understanding; ePortfolios have the potential to support this outcome.

We provided students in *Child Development* with the opportunity to engage in reflective autobiographical writing that had a conceptual focus in nine ePortfolio assignments. For the most part, the assignments followed a similar format, requiring that students: 1) summarize an area of research or several broad concepts; 2) apply concepts and theories (often autobiographically); 3) engage in future planning by considering ways they would like to interact with children in the future; and 4) select the most important three things they would like to remember. We used rubrics to assess learning outcomes (See Appendix B as a separate attachment).

When examining the efficacy and manageability of implementing ePortfolio-based assessment in a large class we found that the teaching assistants and instructor spent more time on assessment of ePortfolios than had been required with more traditional forms of assessment. However, the use of rubrics enabled the instructors to complete the assessments and provide feedback to students in a timely manner. Students responded very positively to the ePortfolio assignments: 76% believed they enhanced learning and allowed an accurate assessment of learning; 78% believed they encouraged reflection; 82% believed they provided a permanent record of learning; and 89% believed their use in the class should be continued. One student commented on the value of personal reflections as encouragement for authentic

learning, saying, "I think the ePortfolios are a great way to get a student invested in the subject for more than just a grade." Another responded to a question asking about the most important things learned in the class in this way: "Connecting concepts that we learned with my own childhood…getting that 'aha' moment." Students also appreciated the focus on higher-order conceptual issues over lower-order facts. Many students included broad concepts in their list of the most important things they learned in the class. One student described the value of ePortfolios as a means of encouraging conceptual integration as follows: "They helped pull together large ideas." We conclude that the ePortfolio assignments enriched students' experience of the course and increased their focus on the applications of broad conceptual issues to real world experience. We believe that these benefits outweigh the cost of increased assessment time.

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Applications

We have described the ways in which we changed *Child Development* to incorporate evidence-based practices that support student success and well-being. Broadly, these modifications created a sense of community, provided group mentoring, supported the development of a growth mindset, helped students to become more self-regulated learners, and encouraged authentic learning. We now consider ways that some of these practices might be modified for use in other introductory classes.

Bringing a Learning Community into the Classroom

A large class cannot provide the many different types of formal and informal interaction between students and faculty that are a common element of successful learning communities. However, efforts to instill a sense of belonging and build feelings of community can encourage increased participation and engagement. The following techniques could be used broadly.

1. *Discussion sections in which teaching assistants invoke a sense of belonging by inviting students to share similarities.* For example, implementing exercises in which students take positions on an issue by standing in a location can allow students to identify other students with whom they share views or experiences.
2. *Sharing information about common views or experiences of students during lectures.* We implemented this by sharing common themes that were expressed in learning reflections and ePortfolios. In a very large class this could be accomplished using classroom response systems to anonymously survey student opinions.
3. *Infusing lectures with information about diverse ethnic, racial, and socioeconomic groups.* Inclusive lectures will help students from underrepresented groups feel a stronger sense of community with each other as well as with the scholarly community in the discipline being taught. One way this can be accomplished in a wide range of disciplines is by providing focused biographical information about scholars from these groups.

Transforming Teaching Assistants into Mentors who Teach

Although it is difficult to provide students with intensive individual mentoring, it is possible to incorporate mentoring into discussion sections. The following principles should guide faculty interested in creating discussion sections that will serve both an academic purpose and provide mentoring.

1. *Select teaching assistants who are academic role models and also warm and empathetic.* As a group, it is ideal if the demographic characteristics of the teaching asssistants mirror those of the students.
2. *Educate and train teaching assistants.* Teaching assistants should read about mentoring best practices and participate in training that includes: information about appropriate boundaries; instructions on positive framing of corrections; and information about when a student should be referred to the professor or supportive services.
3. *Design activities that evoke personal reflection and support the development of a mentoring relationship.* Elements of our activities that would be broadly applicable include: beginning each discussion section with a "check-in;" affirmations in which students reflect on the relationship between their personal values and the values of the discipline; and group work in which students identify shared positions about a topic of study.
4. *Provide a detailed schedule that outlines when and how teaching assistants should communicate with students.* A schedule of mentoring activities can support the development of a mentoring relationship by providing teaching assistants with a series of appropriate moments for important guidance. For example, at a point in the semester when many students are getting feedback on exams, mentors could be instructed to discuss how to respond positively to negative academic feedback.
5. *Mentor teaching assistants.* Teaching assistants should receive ongoing supervision during which problematic interactions are discussed they arise. Common difficulties that teaching assistants face when mentoring include setting appropriate boundaries and directing students to appropriate resources when crises arise.

Developing a Growth Mindset and Promoting Grit

A lecture class is an ideal setting for the delivery of multiple supportive interventions as long as the interventions can be connected to class material. Growth interventions have been successfully offered in connection with introductory classes in psychology, biology, education, sociology, child development, and neuroscience (Snipes et al., 2012). In each of these areas, relatively small changes would allow an instructor to incorporate the intervention as a graded assignment. Interested instructors can refer to Snipes et al. to see descriptions and references to many different versions of psychological interventions. In addition to implementation of interventions, it is possible to structure lectures, assessments, and feedback to students in ways that will support the development of grit and a growth mindset. These principles can be widely implemented:

1. *Provide proactive instructions that support student success.* During the first class meeting, outline the steps a student should take in order to achieve mastery. For every assignment, include detailed instructions and rubrics, indicate elements of the assignment that previous students have found difficult, and provide instructions about ways to master these elements.
2. *Design assessments that enable students to recover from an initial failure.* Allowing students to drop a low grade, rewrite a paper, or retake a test are ways that this can be accomplished.

A lecture class is an ideal setting for the delivery of multiple supportive interventions as long as the interventions can be connected to class material.

3. *Communicate confidence in students' ability to improve.* Provide individual feedback that details weaknesses at the same time as expressing confidence in students' ability to do better with greater effort.
4. *Encourage effort.* When returning assignments, describe the efforts of students who improved their performance. A brief notation such as, "great improvement," can indicate to students that, regardless of their current grade, the professor is aware of their progress.
5. *Provide students with realistic biographies as models of academic growth and persistence.* Many highly accomplished scholars' achievements are the result of persistence in the face of failure. When discussing leaders in the field, include biographic details that exemplify grit and scholarly growth.

Creating Self-Regulated Learners

Even small pedagogical decisions have the potential to help students become more self-regulated learners. Most of the modifications that we made to support self-regulated and authentic learning are broadly applicable.

1. *Use low-stakes testing.* Creating an assessment structure in which tests are low stakes will reduce anxiety that disproportionately harms at-risk students, but still provide the benefits of testing to all students.
2. *Require frequent assessments accompanied by rapid feedback.* Increased assessment structure and feedback help students, especially those who are educationally underprepared, develop better work habits.
3. *Provide students with continuous information about academic standing.* Accurate information about academic standing will minimize differences in regulation that result from students' differential attention to grades. Continuous feedback in one class has the potential to help students learn to monitor their academic progress more closely in future classes.
4. *Personalize assignment delivery and feedback*. Using emails instead of a learning platform might increase completion rates, increasing self-regulated learning.

Creating Engaged Learners

The true goal of education is to create permanent change in students. However, assessments traditionally used in large lectures often encourage brief and shallow processing of material. In order to produce authentic learning we must engage students in a discipline. Once students are invested in a discipline, there is an intrinsic motivation to integrate current learning with previous knowledge. The following pedagogical practices that support engagement can be implemented broadly.

1. *Challenge students to discover the information or skills that will be useful to them.* Encouraging students to view their college education as an opportunity to participate in authentic learning will help them become engaged. Pointing out specific skills a student will gain that might be added to a resume can help students to begin thinking in this way.
2. *Infuse assignments with self-reflective activities to increase engagement, conceptual integration, and retention*. Personalization can occur in a wide range of disciplines. For example, in a statistics class, variables

Even small pedagogical decisions have the potential to help students become more self-regulated learners. Most of the modifications that we made to support self-regulated and authentic learning are broadly applicable.

can be analyzed from a college database, in a biology class students can look at their own cells under a microscope, or in a literature class students can imagine themselves in a text.

3. *Use ePortfolios to provide students with a lasting record of learning in which new conceptual information is integrated with personal experiences and shared.* The creation of an academic showcase in which the student reflects on the self, using new concepts, will support the development of academic identity. ePortfolios that include reflections on interventions and letters to the future self might strengthen the effect of interventions. If ePortfolios are shared among students in a class, these positive effects might be amplified.

Conclusions

Many at-risk students begin college in large introductory classes which may not provide optimal support. Many support programs only help students who seek support. However, many at-risk students do not avail themselves of these resources and stand-alone support programs are costly. Finding economical ways to support all students is essential. We transformed one large lecture course by aligning wide-ranging pedagogical practices with far-reaching pedagogical goals. The practices used in our redesign have the potential to be applied broadly. We hope others will use this case study as a model for productive curricular alignment. The integration of practices that support academic mastery with those that support student well-being can transform large lecture classes from being part of "the problem" to being part of "the solution."

We transformed one large lecture course by aligning wide-ranging pedagogical practices with far-reaching pedagogical goals. The practices used in our redesign have the potential to be applied broadly.

References

Armbruster, P., Patel, M., Johnson, E. & Weiss, M. (2009). Active learning and student-centered pedagogy improve student attitudes and performance in introductory biology. *CBE Life Sciences Education, 8*, 203-213. doi:10.1187/cbe.09-03-0025

Boaler, J. (2013). Ability and mathematics: The mindset revolution that is reshaping education. *Forum, 55*, 143-152. Retrieved from http://www.ncpdf.org/pdf/steering/2013-09-06/12.0%20Boaler_FORUM_55_1_web.pdf

Bordes, V., & Arredondo, P. (2005). Mentoring and 1st-Year Latina/o college students. *Journal of Hispanic Higher Education, 4*, 114–133. doi:10.1177/1538192704273855

Buckley, G. L., Bain, N. R., Luginbuhl, A. M., & Dyer, M. L. (2004). Adding an "active learning" component to a large lecture course. *Journal of Geography, 103*, 231-237.

Buyarski, C. A., & Landis, C. M. (2014). Using an ePortfolio to assess the outcomes of a first-year seminar: Student narrative and authentic assessment. *International Journal of ePortfolio, 4*, 49-60. Retrieved from http://ezproxy.purchase.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eue&AN=95908165&site=eds-live

Buzzetto-More, N. (2010). Assessing the efficacy and effectiveness of an e-portfolio used for summative assessment. *Interdisciplinary Journal of E-Learning and Learning Objectives, 6*, 61-85. Retrieved from http://www.ijello.org/Volume6/IJELLOv6p061-085Buzzetto691.pdf

Campbell, T. A., & Campbell, D. E. (2007). Outcomes of mentoring at-risk college students: Gender and ethnic matching effects. *Mentoring and Tutoring: Partnership in Learning, 15*, 135–148. doi:10.1080/13611260601086287

Cohen, G. L., Garcia, J., Purdie-Vaughns, V., Apfel, N., & Brzustoski, P. (2009). Recursive processes in self-affirmation: intervening to close the minority achievement gap. *Science, 324*, 400-403. doi:10.1126/science.1170769

Cohen, G., Steele, C., & Ross, L. (1999). The mentor's dilemma: Providing critical feedback across the racial divide. *Personality and Social Psychology Bulletin, 25*, 1302–1318.

Crisp, G. (2009). Conceptualization and initial validation of the College Student Mentoring Scale (CSMS). *Journal of College Student Development, 50*, 177-194. doi:10.1353/csd.0.0061

Crisp G., & Cruz, I. (2009). Mentoring college students: A critical review of the literature between 1990 and 2007. *Research in Higher Education, 50*, 525-545. doi:10.1007/s11162-009-9130-2

Duckworth, A. L., Grant, H., Loew, B., Oettingen, G., & Gollwitzer, P. M. (2011). Self-regulation strategies improve self-discipline in adolescents: Benefits of mental contrasting and implementation intentions. *Educational Psychology, 1*, 17-26.

Duckworth, A. L., & Gross, J. J. (2014). Self-control and grit: Related but separable determinants of success. *Current Directions in Psychological Science, 23*(5), 319-325. doi:10.1177/0963721414541462

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*, 1087–1101.

Dweck, C. S., (2006). *Mindset: The New Psychology of Success*. New York, NY: Ballantine Books.

Eby, L. T., Allen, T. D., Evans, S. C., Ng, T., & DuBois, D. L., (2008). Does mentoring matter? A multidisciplinary meta-analysis comparing mentored and non-mentored individuals. *Journal of Vocational Behavior, 72*, 254-267. doi:10.1016/j.jvb.2007.04.005

Eynon, B., Gambino, L. M., & Török, J. (2014). What difference can ePortfolio make? A field report from the connect to learning project. *International Journal of ePortfolio, 4*, 95-114. Retrieved from http://ezproxy.purchase.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eue&AN=95908169&site=eds-live

Finley, A., & McNair, T. (2013). *Assessing underserved students' engagement in high-impact practices*. Association of Washington, DC: American Colleges and Universities. Retrieved from http://www.aacu.org/sites/default/files/files/assessinghips/AssessingHIPS_TGGrantReport.pdf

Fullilove, R. E., & Treisman, P. U. (1990). Mathematics achievement among African American undergraduates at the University of California, Berkeley: An evaluation of the Mathematics Workshop Program. *Journal of Negro Education, 59*, 463–478.

Hurtado, S., Carter, D. F., & Spuler, A. (1996). Latino student transition to college: Assessing difficulties and factors in successful college adjustment. *Research in Higher Education, 37*(2), 135–157. doi:10.1007/BF01730113

Jaasma, M. A. & Koper, R. J. (1999). The relationship of student-faculty out-of-class communication to instructor immediacy and trust and to student motivation, *Communication Education, 48*, 41-47.

Jensen, J. L., McDaniel, M. A., Woodard, S. M. & Kummer, T. A. (2014). Teaching to the test…or testing to teach: Exams requiring higher order thinking skills encourage greater conceptual understanding. *Educational Psychology Review, 26*, 307-329. doi: 10.1007/s10648-013-9248-9

Kleiner, K. A. (1997). Collaborative learning is possible in large courses. In S. J. Hamilton (Ed.), *Collaborative Learning: Teaching and Learning in the Arts, Sciences, and Professional Schools* (pp. 153-158). Indianapolis, IN: Indiana University.

Kuh, G. D. (2008). High-impact educational practices: What they are, who has access to them, and why they matter. *Peer Review, 14*(3), 29.

Lord, V. B., Coston, C. T. M., Blowers, A. N., Davis, B., & Johannes, K. S. (2012). The impact of a discipline-based learning community on transfer students: A multi-dimensional pilot study. *Journal of the First Year Experience and Students in Transition, 24*, 63-84. Retrieved from: https://fyesit.metapress.com/content/kg366j4n313v8277/resource-secured/?target=fulltext.pdf

Luna, V., & Prieto, L. (2009). Mentoring affirmations and interventions: A bridge to graduate school for Latina/o students. *Journal of Hispanic Higher Education, 8*(2), 213–224. doi:10.1177/1538192709331972

Morisano, D., Hirsh, J. B., Peterson, J. B., Pihl, R. O., & Shore, B. M. (2010). Setting, elaborating, and reflecting on personal goals improves academic performance. *Journal of Applied Psychology, 95*, 255-264.

Nguyen, C. F. (2013). The ePortfolio as a living portal: A medium for student learning, identity, and assessment. *International Journal of ePortfolio, 3*, 135-148. Retrieved from: http://ezproxy.purchase. tedu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eue&AN=91687152&site=eds-live

Ovink, S., & Veazey, B. (2011). More than 'getting us through:' A case study in cultural capital enrichment of underrepresented minority undergraduates. *Research in Higher Education, 52*(4), 370-394. doi:10.1007/s11162-010-9198-8

Paunesku, D., Walton, G. M., Romero, C., Smith, E. N., Yeager, D. S., & Dweck C. S. (2015). Mind-set interventions are a scalable treatment for academic underachievement. *Psychological Science, 26*, 784-793. doi:10.1177/0956797615571017

Pennebaker, J. W., Gosling, S. D., & Ferrell, J. D. (2013). Daily online testing in large classes: boosting college performance while reducing achievement gaps. *PLoS ONE, 8*(11):e79774. doi:10.1371/journal.pone.0079774

Pike, G. R., Kuh, G. D., & McCormick, A. C. (2011). An investigation of the contingent relationships between learning community participation and student engagement. *Research in Higher Education, 52*, 300-322. Retrieved from: http://ehis.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=3&sid=5dd1c1fa-3b6a-4a6a-a4bc-82edc0f84c24%40sessionmgr104&hid=110

Porter, L., Guzdial, M., McDowell, C., & Simon, B. (2013). Success in introductory programming: What works?. *Communications of the ACM, 56*(8), 34-36. doi:10.1145/2492007.2492020

Powers, J. T., Cook, J. E., Purdie-Vaughns, V., Garcia, J., Apfel, N., & Cohen, G. L. (2015). Changing environments by changing individuals: The emergent effects of psychological intervention. *Psychological Science*, 1-11. doi: 10.1177/0956797615614591

Prather, E., Rudolph, A., & Brissenden, G. (2011). Using research to bring interactive learning strategies into general education mega-courses. *Peer Review, 13*(3), 27-30.

Quinn, D. M., & Spencer, S. J. (2001). The interference of stereotype threat with women's generation of mathematical problem-solving strategies. *Journal of Social Issues, 57*, 55-71. Retrieved from http://ezproxy.purchase.edu:2048/login?url=http%3a%2f%2fsearch.ebscohost.com%2flogin.aspx%3fdirect%3dtrue%26db%3da2h%26AN%3d4325887%26site%3dehost-live

Rhodes, T., Chen, H. L., Watson, C. E., & Garrison, W. (2014). Editorial: A call for more rigorous ePortfolio research. *International Journal of ePortfolio, 4*, 1-5. Retrieved from http://ezproxy.purchase.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eue&AN=95908162&site=eds-live

Roediger, H. L., III, & Karpicke, J. D. (2006). Test-enhanced learning: Taking memory tests improves long-term retention. *Psychological Science, 17*, 249–255.

Roediger III, H. L., Putnam, A. L., Smith, M. A. (2011). Ten benefits of testing and their applications to educational practice. *Psychology of Learning & Motivation, 55*, 1–36. doi:10.1016/B978-0-12-387691-1.00001-6

Schunk, D. H., & Zimmerman, B. J. (1997). Social origins of self-regulatory competence. *Educational Psychology, 32*: 195–208. doi:10.1207/s15326985ep3204_1

Shaw, J., Kominko, S., & Terrion, J. L. (2015). Using LectureTools to to enhance student-instructor relations and student engagement in the large class. *Research in Learning Technology, 23*, doi:10.3402/rlt.v23.27197

Singer-Freeman, K. E. (2015). MMR Vaccine and Autism: Scientific Inquiry, Ethics, and Evidence-Based Problem Solving. *AAC&U Scientific Thinking and Integrative Reasoning Skills Case Study*. doi:10.13140/RG.2.1.1624.5928

Singer-Freeman, K. E., Bastone, L., & Skrivanek, J. (2014). ePortfolios reveal an emerging community of underrepresented minority scholars. *International Journal of ePortfolio, 4*, 85-94. Retrieved from http://www.theijep.com/pdf/IJEP131.pdf

Singer-Freeman, K. E., Bastone, L., & Skrivanek, J. (2016). Using eportfolios to assess applied and collaborative learning and academic identity in a summer research program for community college students. *International Journal of ePortfolio, 6*, 45-57. Retrieved from http://www.theijep.com/current.cfm

Snipes, J., Fancsali, C., & Stoker, G. (2012). *Student academic mindset interventions: A review of the current landscape*. San Francisco, CA: Stupski Foundation.

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology, 69*, 797-811. http://dx.doi.org/10.1037/0022-3514.69.5.797

Terrion, J. L. (2010). Motivation of peer mentors and unpaid peer helpers in higher education. *International Journal of Evidence Based Coaching and Mentoring, 8*(1), 85-103.

Walton, G. M. (2014). The new science of wise psychological interventions. *Current Directions in Psychological Science, 23*(1), 73-82. doi:10.1177/0963721413512856

Walton, G. M., & Cohen, G. L. (2011). A brief social-belonging intervention improves academic and health outcomes of minority students. *Science*, *331*, 1447-1451. doi:10.1126/science.1198364

Walton, G. M., Cohen, G. L., Cwir, D., & Spencer, S. J. (2012). Mere belonging: The power of social connections. *Journal of Personality and Social Psychology, 102*, 513-532. doi: 10.1037/a0025731

Zhao, C. M., & Kuh, G. D. (2004). Adding value: Learning communities and student engagement.*Research in Higher Education, 45*, 115-138. Retrieved from: http://link.springer.com/article/10.1023/B%3ARIHE.0000015692.88534.de#page-1

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NILOA's primary objective is to discover and disseminate ways that academic programs and institutions can productively use assessment data internally to inform and strengthen undergraduate education, and externally to communicate with policy makers, families and other stakeholders.

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NILOA Occasional Papers are commissioned to examine contemporary issues that will inform the academic community of the current state-of-the art of assessing learning outcomes in American higher education. The authors are asked to write for a general audience in order to provide comprehensive, accurate information about how institutions and other organizations can become more proficient at assessing and reporting student learning outcomes for the purposes of improving student learning and responsibly fulfilling expectations for transparency and accountability to policy makers and other external audiences.

Comments and questions about this paper should be sent to niloa@education.illinois.edu.

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- The National Institute for Learning Outcomes Assessment (NILOA) was established in December 2008.
- NILOA is co-located at the University of Illinois and Indiana University.
- The NILOA website contains free assessment resources and can be found at http://www.learningoutcomesassessment.org/.
- The NILOA research team has scanned institutional websites, surveyed chief academic officers, and commissioned a series of occasional papers.
- One of the co-principal NILOA investigators, George Kuh, founded the National Survey for Student Engagement (NSSE).
- The other co-principal investigator for NILOA, Stanley Ikenberry, was president of the University of Illinois from 1979 to 1995 and of the American Council of Education from 1996 to 2001.

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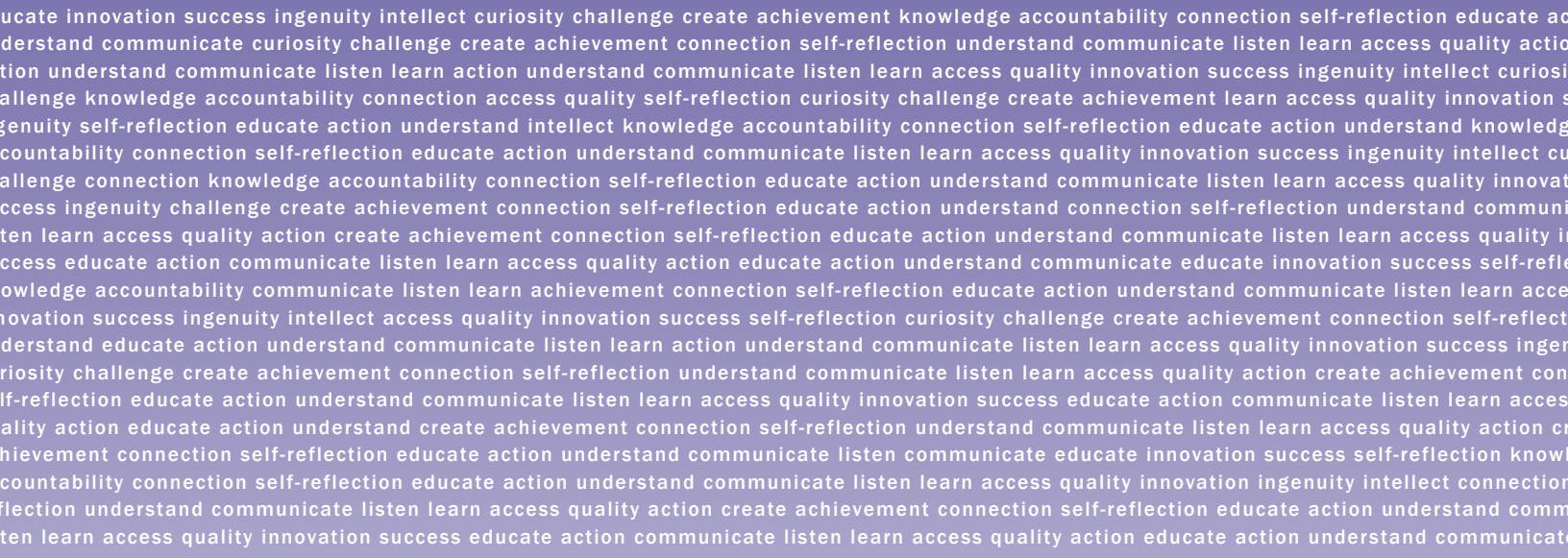

National Institute for Learning Outcomes Assessment

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