

LITERATURE REVIEW

Lecture has been used to transmit information to students since Western European universities were first conceived (Brockliss, 1996). However, over the last several decades, a more student-centered approach called active learning has gained support in higher education. The use of active learning teaching methods supports a shift from focusing on instructor-centered teaching to that of student-centered learning. Bonwell and Eison (1991) first described the modern conception of active learning as the use of in-class learning activities designed to engage students in higher-order thinking (e.g., analysis, synthesis, evaluation) and reflection upon one's own learning. Active learning requires students to think about what they are learning as they are learning it, emphasizing the cognitive activity taking place rather than any observable behavioral activity (Prince 2004). The role of the instructor in an active learning class can be viewed as an expert guide to facilitate students' cognitive processing toward desired learning outcomes, often via iterative formative assessment (Mayer, 2004).

Active learning is best conceived of as an approach rather than a method, since the spectrum of active learning strategies ranges from simple techniques such as reflection to more complex techniques including case-based and inquiry learning (O'Neal & Pinder-Grover, n.d.). The selection of active learning teaching strategies may draw upon any number of teaching and assessment practices, largely based on the foundational work of Angelo and Cross (1993). Instructors may choose a specific active learning strategy, discussion structure, or assessment technique based on the time and effort they wish to invest or for its alignment with the instructor's intended goals, the latter helping to anchor the purpose of active learning; better achievement of student learning outcomes (Van Amburgh et al., 2007; Major & Palmer, 2006).

Active Learning Promotes Student Success and Reduces Equity Gaps

Significant evidence supports the notion that active learning approaches improve student engagement (Prince, 2004; Kuh, 2007; Pascarella et al., 2004), one of the most important predictors of college success (Astin, 1993), as well as a variety of learning outcomes essential for student retention and attainment in undergraduate education (Chickering & Gamson, 1987; Reinholz, 2015). This student-centered approach enables instructors to better cultivate critical and independent thought among their students, building the capacity for lifelong learning and better preparing future graduates (O'Flaherty et al., 2015). As a result of successfully implemented student-centered teaching, students gain transferable intellectual skills such as critical and analytical thinking, creativity, problem solving, and the ability to apply knowledge in diverse settings (Rhodes, 2019). Active learning is associated with strong writing and critical thinking skills (Baepler, Walker, & Driessen, 2014; Bernstein & Greenhoot, 2014; Bonwell & Eison, 1991; Freeman et al., 2014) and improved conceptual understanding of basic concepts in the hard sciences compared to traditional instruction (Hake, 1998; Redish, Saul, & Steinberg, 1997). A meta-analytic study (225 studies between 1998-2010) of the use of active learning in undergraduate STEM courses demonstrated that the use of active learning strategies is associated with increased exam performance by half a letter grade compared to traditional lecturing courses (Freeman et al., 2014). Active learning also has the potential to yield positive psychosocial and motivational outcomes among students, such as increased peer relationship-building and self-efficacy (Harlow, 2021). There are myriad research studies on the effectiveness of active learning in the college classroom, and although it is crucial to examine the magnitude of improvement resulting from active learning teaching methods, consensus points to improved student engagement, long-term retention of course content, improved student competencies, and higher course grades (Kuusinen, Mittelstadt, & Jordan, 2017).

Engaging students as active participants in their learning also can bolster student attainment and close achievement gaps for first generation and minoritized college students (Eddy & Hogan, 2014; Haak et al., 2011; Harackiewicz et al., 2016). In a double-blind randomized study on increasing task value, researchers found that first-generation minoritized students experiencing active learning had an increased interest in the course subject matter and a 61 percent reduction of final course grade differences between first-generation minoritized students and majority students (Harackiewicz et al., 2016; Hulleman et al., 2010). Another study found that including active learning methods increased the course performance of all students, but disproportionately increased course performance for first-generation Black college students (Eddy et al., 2014). A recent meta-analytic study (41 studies between 2010-2016, more than 50,000 students) comparing the performance of underrepresented and overrepresented students in active learning versus traditional lecturing courses found that active learning reduced grade equity gaps for minoritized and low-income students by 33 percent and narrowed passing rate gaps by 45 percent (Theobald 2020).

Although the results described here may seem to indicate active learning is a panacea for equitable student learning, instructors should take care to interrogate whether chosen active learning strategies impede or promote equitable learning opportunities (Cooper & Brownell, 2016; Eddy et al., 2014; Harlow & Poproski, 2021). Students who identify with the LGBTQIA community have reported feeling that active learning exercises present challenges because of the increased relevance of their social identity. In particular, LGBTQIA students reported feeling uncomfortable during some class discussion exercises due to the potential for gender misidentification and/or a negatively perceived identity (Cooper & Brownell, 2016). It is important, therefore, that instructors select and structure active learning teaching strategies in ways that support a welcoming and inclusive classroom environment.

Overcoming Student Resistance to Active Learning

Despite the overwhelming evidence of the positive impact of active learning on student academic success, many instructors still use traditional methods. Instructors cite many obstacles to adopting active learning teaching strategies: insufficient time, limited resources, lack of departmental support, concerns about content coverage, and concerns about evaluations of their teaching (Deslauriers et al., 2019; Henderson et al., 2005; Dancy & Henderson, 2007; Felder & Brent, 1996; Silverthorn et al., 2006; Fagen et al., 2002; Turpen et al., 2010). Instructors also perceive that students prefer traditional teaching methods to active learning teaching strategies (Felder, 2007; Henderson et al., 2012; Vuorela & Nummenmaa, 2004). Deslauriers and colleagues (2019) identified an inherent, unfounded bias among their students against active learning techniques. Although their students perceived that they learned less in active learning classrooms than in traditional lecture classrooms, they actually scored higher on assessments following participation in classes where active learning teaching techniques were used. Importantly, this is consistent with evidence that subject novices do not accurately assess their own competence or changes to their own learning (Kruger & Dunning, 1999; Bransford et al., 1999; Porter, 2013; Carpenter et al., 2013).

Instructors can prepare for and mitigate potential student resistance to active learning strategies by using explanation and facilitation strategies (Tharayil et al., 2018). Instructors may provide students with the rationale for including active learning in the classroom (e.g., data on improved learning gains and knowledge retention), provide transparent instructions on how to successfully participate in the active learning classroom, use incremental steps for the initial adoption of active learning techniques, and provide students with support and feedback throughout. When instructors use such explanation and facilitation strategies, student attitudes toward active learning improve and student resistance to active learning is likely to lessen (Doyle, 2008; Seidel & Tanner, 2013; Tharayil et al., 2018; Finelli et al., 2021).

Flexible Classrooms Reduce Barriers to the Implementation of Active Learning

While active learning can occur in any classroom environment, classroom space design is trending toward flexible teaching spaces to reduce barriers to the implementation of active learning (Ellis, 2016). Active learning classrooms are designed to encourage student collaboration and provide flexibility in seating or working arrangements. Such spaces may also feature multiple screens and/or white boards for both instructor and student use, with the goal of providing collaborative spaces that make student thinking and learning visible to both instructor and peers. Examples of model active learning spaces include Student-Centered Active Learning Environment for Undergraduate Programs (SCALE-UP) and Technology Enabled Active Learning (TEAL) classrooms (Beichner, 2008; Dori & Belcher, 2005; Schratzenstaller, 2010).

Physical classroom space that encourages peer and instructor interaction can have broad positive impacts on institutional culture (Strange, 2001; Talbert & Mor-Avi, 2019). Learning spaces that seat students in pods or groups have been shown to promote student interaction and have a positive impact on student engagement, learning, and feelings of support and belonging (Harlow, 2021; Strange et al., 2001). When large lecture halls incorporate swivel chairs to promote group discussions, students have been shown to score higher on course assessments than students taking the same course in a fixed-seat lecture hall (Ogilvie, 2008). Also, students learning in active learning classrooms reported feeling more comfortable participating and felt they were engaged in a more enriching experience (Talbert & Mor-Avi, 2019).

Instructional Development Supports Successful Implementation of Active Learning

Importantly, a willingness to incorporate active learning approaches does not guarantee improved student learning. Faculty need access to training or support for the implementation of the constructivist learning theory elements necessary for the success of active learning exercises in order to promote student learning (Andrews et al., 2011). Ongoing professional development and critical reflection upon the implementation of one's active learning approaches encourage a more nuanced understanding and continued successful use of active learning practices (Camburn, 2010; Condon et al., 2016). Furthermore, the coupling of instructional development programming alongside active learning space redesign initiatives results in a greater likelihood of individual successful active learning implementations, as well as substantive changes to institutional teaching and learning culture (Morrone et al., 2017).