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EMERGING TRENDS TO FOSTER STUDENT-CENTERED LEARNING IN THE DISCIPLINES

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Introduction

Increasing interest in student-centered learning (SCL) has become evident across educational levels (e.g., K–12, higher education (HE), and professional education). SCL, an environment in which the locus of control for the learning experience is with the learner (Hannafin & Hannafin 2010), helps to create a context in which the learner has opportunities to create a deeper understanding based on individual needs and interests. K–12 teachers as well as post-secondary instructors have implemented SCL principles into varied learning contexts, including co-designing with learners, creating engaging activities with a real-world focus, and providing opportunities for collaboration and reflection (see Table 13.1 for a brief overview; see Hannafin & Hannafin 2010 for a more in-depth discussion).

Early discussions of SCL primarily focused on traditional K–12 educational contexts. Meanwhile, the contexts in which SCL is discussed and applied have grown exponentially in the last decade, ranging from HE to professional learning. There are many instances in which traditional pedagogies and approaches are implemented within the alignment of definitions and key characteristics of SCL (Hannafin et al. 1997). That said, varying aspects of SCL have been explored including the instructor and learner as well as objectives, activities and feedback (see, for example, Missingham & Matthews 2014; Vihavainen et al. 2011). In accordance with to national education standards (Common Core, assessment pressure versus teaching and learning in SCL), measures for success in SCL have also been extensively defined by emerging academic communities (APA 1997; Spector et al. 2016). The evolution of various research methodologies (i.e., mixed-methods approach, design-based research approach) have allowed scholars to measure the application of SCL’s effectiveness in various contexts (Baeten et al. 2010). In addition, student-centered approaches have expanded from a focus on effect on learning performance to recognizing the potential of SCL to meet varied sociocultural (e.g., gender, race, personality), and global educational needs (e.g., prior education experiences in home countries) (Frambaugh et al. 2014).

Some researchers have historically questioned the validity and expedience of SCL practices, focusing their critique on insufficient empirical support to document effectiveness (Clark 2009;
Seeking to explore this critique, we conducted a review of recent articles (2012–2016) focused on SCL and closely related areas (e.g., learner-centered instruction, constructivism, open-ended learning environments). We chose four prominent journals for the review: *British Journal of Educational Technology, Computers & Education, Educational Technology Research & Development* and *Instructional Science*. These journals were purposefully selected based on the results of reviews by previous researchers (e.g., Ritzhaupt et al. 2012; West & Rich 2012; West & Borup 2014), who analyzed journals’ relative rigor, impact and prestige using criteria such as citation statistics and acceptance rates. We used the following as keywords to guide the article search completed in each journal: student-centered learning, learner-centered learning, open-ended learning environment, constructivist, socio-constructivist, minimally guided instruction, project-based learning, problem-based learning, case-based learning and inquiry-based learning. From the broader search, we narrowed to selected articles focusing on SCL approaches and descriptions, critiques or reviews of SCL in HE settings, resulting in 54 journal articles for further analysis.

An in-depth analysis of the 54 articles revealed interesting overall trends. First, substantially more empirical (n = 51) than theoretical studies (n = 3) were published between 2012 and 2016. The empirical studies focused on interventions, designing SCL by applying and testing varied instructional strategies (i.e., problem-based learning, project-based learning, case-based learning, peer-tutoring). Further, the purposes and the findings of the empirical papers emphasized how to enhance the effectiveness of learning strategies by detailing learning processes and effective teaching via SCL approaches. Finally, the education context of the studies proved of interest. In 42 of the 54 articles, the primary context of the studies was within post-secondary settings, involving undergraduates, graduates, instructional designers, pre-service or in-service teachers, or post-secondary instructors.

In the following sections, we will highlight cases of emerging SCL in HE and discuss challenges associated with SCL across the disciplines including science, engineering, computing, and medical education. We will introduce how SCL has been adapted to achieve the disciplinary goals and what challenges have been found and accommodated to foster SCL in each discipline. We will then conclude this chapter with implications for theory, future research, and practice.

**Table 13.1 Key principles of student-centered learning**

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<thead>
<tr>
<th>Principle</th>
<th>Description</th>
<th>Key References</th>
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<tbody>
<tr>
<td>Locus of control with learners</td>
<td>From goals to activities, resources to products. Range from all learner-driven to negotiated with instructor/teacher.</td>
<td>Hardman &amp; Edwards (1989), Hannafin and Hannafin (2010), Hill et al. (2007)</td>
</tr>
<tr>
<td>Contextualized and relevant</td>
<td>Based on current needs of learners as well as prior knowledge and experience.</td>
<td>Hannafin and Land (2000), Papert (1993)</td>
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<tr>
<td>Collaborative and interactive</td>
<td>Individually and with others. Enables individual sense-making and more extensive levels of understanding.</td>
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<tr>
<td>Active engagement</td>
<td>With people (e.g., peers, instructor/teacher) and things (e.g., resources, ideas). Scaffolding and support provided to enrich the experience.</td>
<td></td>
</tr>
<tr>
<td>Reflective and reflexive*</td>
<td>Revised and re-experienced through various iterations because understanding takes time.</td>
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*Reflexive: reflecting in community.*
Emerging trends: examples from the disciplines

Science education

More student-centered and less didactical instruction has general agreement in the literature as a way to improve undergraduate education building a science workforce and promoting the involvement of under-represented groups in science (NASEM 2017; Olson & Riordan 2012). Science education policy advocates, peer interactions (hereinafter referred to as group work) in college courses (AAAS 2011; Couch et al. 2015; Handelsman et al. 2004; National Research Council 2015) provides opportunities for students to practice higher-order skills such as scientific reasoning, critical thinking, communication and problem-solving. These skills have been shown to result in greater gains in achievement within large science classrooms (Armstrong et al. 2007; Batz et al. 2015; Freeman et al. 2014; Johnson et al. 2000; Preszler 2009). They also align with some of the key principles associated with SCL: “collaborative and interactive” and “contextualized and relevant.”

Given some of the key SCL principles—collaborative, interactive and active engagement—more studies are needed to effectively enact group work within SCL contexts. Among large enrollment science college courses, for example, social interactions are indicated to encourage students within groups to contribute to support and assist each other while providing scaffolding and supervising groups (Haak et al. 2011). For example, peer-led Process Oriented Guided Inquiry (POGIL) is a student-centered instructional strategy with the objectives of promoting both content knowledge acquisition and scientific argumentation skill development (Farrell et al. 1999). As a teaching practice combining collaborative learning and inquiry for a large class, POGIL has been used to enhance student collaboration and interaction within science inquiry in the large class. Involving 7,826 undergraduate students in 21 studies, Walker and Warfa (2017) conducted a meta-analysis on the effectiveness of POGIL in science courses and found increased learning outcomes and student retention in the course. In large chemistry lecture sessions, students who attended group learning sessions achieved higher average test scores than those who did not participate in group learning (Lewis & Lewis 2005). Lewis and Lewis (2008) also investigated the effectiveness and equity associated with POGIL pedagogy in a large chemistry class. Compared to traditional lecture-based pedagogy, POGIL implemented pedagogy significantly improved overall academic performance of students and interaction between students; however, the achievement gaps between higher and lower achieving students remained elusive.

A more recent study provides another example. Using design-based research in a large-enrollment introductory biology course, Chang and her colleagues employed a mixed-methods study design involving 245 undergraduate non-science majors (Chang & Brickman 2018). The results revealed that both higher- and lower-scoring students increased their individual test scores with the help of scaffolding group-based inquiries. However, the benefits were co-mediated by group performance and individual perceptions of collaboration. Both higher and lower scorers improved individual test scores when in groups with lower levels of assignment completion and performance than those in groups with higher levels.

Contradictory results were found between students’ perceptions of the collaborative learning and actual learning performance by Chang and colleagues (Chang & Brickman 2018). Positive interdependence and promotive interaction (i.e., interactive behaviors that enhances each other’s learning) were consistently associated with improved learning for only higher scoring students. In addition, results demonstrated that while social loafing (i.e., free-riding, sucker effect) did not negatively affect overall group performance, it did influence the individual’s perceptions on group work involvement and individual performance within groups. Both higher and lower
scoring students reported social loafing issues and expressed negative perceptions on the necessity or effectiveness of collaborative learning for individual learning. If SCL-focused group work is going to be used effectively in large class contexts, more research is needed to further explore how to apply SCL principles effectively in group settings, particularly in large lecture sessions.

**Engineering education**

Shared and scaffolded knowledge construction (Vygotsky 1978) is a hallmark of SCL, as it allows individual sense-making as well as more extensive levels of understanding while exchanging ideas with peers. In alignment with industry expectations for professionalism, the Accreditation Board for Engineering and Technology (ABET) established standards focusing on critical thinking, communication and demonstrating other professional skills. To achieve the ABET standards, engineering schools (i.e., Arizona State University, Cornell University, Oxford University, University of Virginia, and Virginia Tech) require taking courses to acquire learning experiences from liberal arts traditions, addressing ethics, professionalization and broader societal contexts. Non-technical courses aim to provide a gateway for engineering experiences that influence incoming students’ sense of belonging in engineering by involving students in collaborative learning with authentic cases (Chen 2013). Such engineering courses were redesigned to emphasize student-centered strategies (e.g., contextualized, collaboration, active engagement) that enhance students’ critical thinking, effective communication and collaboration.

Missingham and Matthews (2014) explored group work to provide an authentic learning context in a first-year mechanical engineering course in Australia. Case studies were used to facilitate both individual and team-level learning, thereby supporting critical analysis and reasoning. Discussions supported reflective thinking while students synthesized and evaluated solutions for real-world problems. Students were encouraged to suggest modifications to the course, empowering them as learners in a negotiated context (Hill et al. 2007). Students also engaged in peer instruction to class members, during which they assumed additional responsibilities for sharing content and perspectives. Results from the study which included various assessments and reflections by students, tutors and instructors indicated that the approach was generally successful. The peer collaborative learning experiences provided students with an authentic learning context and enhanced the students’ sense of ownership in learning. While noting challenges in implementation in a traditional university setting (i.e., the influence of individually different communication skills or self-regulated learning skills), the researchers encouraged further exploration and refinement of the approach to facilitate authentic SCL, incorporating more principles associated with SCL (see Table 13.1).

Chang and Foley (2018) provide another example of research to explore various factors that inform undergraduate engineering students’ motivation to learn in diverse groups. The study investigated 380 first-year students that enrolled in a mandatory introductory engineering course at a large research-intensive university in the US. This non-technical introductory course was required for graduation by all undergraduate engineers. The course was structured in two parts with a large lecture and smaller face-to-face discussion sections. The latter were designed with a series of individual and group-based activities that included hands-on activities and project-based learning to engage students in the course. The students typically worked through this process in 10–15 minutes.

Chang and Foley (2018) used discussion section observations as the primary means of data collection. Undergraduate teaching assistants (UTAs) observed the discussion sections and facilitated group work as needed while a teaching fellow was present. The semi-structured protocol focused on examining student behaviors and responses to assignments in order to understand the
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first-year students’ individual and group engagement in course activities. Observation prompts included questions on individual student’s engagement during both individual activities (e.g., a student’s participation level in the class-wide discussion and group discussion) and group engagement (e.g., group interaction patterns, equitable participation of each group member in the activity, gender and diversity composition of group members), as well as suggestions based on the observation of the day (e.g., how to improve student engagement in today’s class). After identifying common themes and issues, the UTAs proposed strategies for promoting students’ course engagement.

Applying thematic analysis, Chang and Foley (2018) reported that both the content of and insufficient support during project-based group work demotivated and disengaged students’ learning. Although extensively designed with project-based learning as the foundation, data indicated that activities lacked authentic contexts, feedback and real-time support for group work. The UTAs also observed that some students lacked motivation to complete established group projects that lacked authentic contexts and topics.

The findings from Chang and Foley (2018) indicated a need to make the project-based group work more related to the students’ lived experience and relevant to individually different engineering majors. A major challenge identified in the data was that the course was designed with project-based learning formats and asked students to present individual or group activities without providing sufficient support to complete group work. The time spent during discussion sections was often underutilized by the first-year students; the UTAs routinely noted that the less structured group work made many students disengaged during the course. Formative feedback and group-project scaffolding were rarely provided while dysfunctional group dynamics were ignored without providing students with autonomy to create or change group members. The researchers suggested the re-design of the course to emphasize students’ autonomy by offering students options to choose their own topics for the projects or group members with whom they will work. Additionally, the researchers also indicated that making the topic relevant to the students is critical as well as providing timely and appropriate feedback for effective group work.

Computing education

The availability of computing courses to educate a scientifically literate populace in computational thinking and problem-solving skills is steadily increasing (von Hellens et al. 2011). Because programming skills require learning-by-doing strategies and collaborative working skills, computing fields have largely adopted active learning strategies. Pair-programming strategies, for example, have been used to increase student engagement in learning to program (Salleh et al. 2011). Pair-programming strategies involve SCL principles including active engagement, interactive learning experiences, and reflection experiences. Similar to the authentic programming environments where professional programmers collaboratively produce a final outcome, students perform programming in pairs. Two students work in tandem at one computer while completing programming assignments. Peers scaffold each other by assigning and switching roles as the driver, who controls the mouse and keyboard, while the navigator makes suggestions, points out errors, and asks questions. By scaffolding, revising, and asking questions to the partner, students are able to reflect individuals’ and peers’ programming performance. The instructors, on the other hand, provide guidelines to complete assignments and ensure rotating roles every 20 minutes to prevent social loafing issues during collaborative learning.

Researchers indicate that pair-programming enhances students’ confidence and performance in programming and increases the quality of the programming outcome (e.g., Simon & Hanks 2008; Williams et al. 2002). Pair-programming experiences also provide students with opportunities to
prepare for future work experiences by emulating future real-world working environments for programmers, which require intensive collaborative programming.

To enhance the SCL experience, focusing on real-world programming problems as well as opportunities to provide more just-in-time scaffold could improve the learning experience. For example, computing fields have strived to increase the number of teaching assistants to provide sufficient and appropriate support. Attempts have also been made to train peer learners and teaching assistants to scaffold undergraduate students’ learning. The apprenticeship model has been adapted to enable novice students to learn programming from advanced or expert learners (teaching assistants) who have already mastered the parts of programming the novices are about to learn. By applying an apprenticeship model, the dropout rates of students in computer science courses were decreased (Bareiss & Radley 2010; Vihavainen et al. 2011).

Problem-based learning in medical education

Medical educators have also embraced SCL principles through problem-based learning (PBL). In a traditional PBL approach (Barrows 1996), medical students are presented a case and then work together, with little or no faculty guidance, to propose solutions. While in traditional PBL students are fully driving the learning process—a key principle of SCL—adaptations to PBL have introduced another SCL principle: scaffolding for student support. Rather than providing a clinical problem and leaving students on their own to find the answers, many medical educators have moved toward a more supported model of PBL, including various resource scaffolds ranging from people to places to traditional texts online (Hannafin & Hill 2008) as well as specific tools to provide support (Tawfik & Kolodner 2016).

Several questions have arisen from a shift to faculty-supported PBL. For example, Frambaugh et al. (2014) explored the influence of cultural backgrounds on students’ participation in small-group PBL contexts. They conducted a comparative case study in three medical schools around the globe, in East Asia, the Middle East, and Western Europe. Results reported that cultural factors may have some impact on students’ willingness to communicate openly in the small groups, including not offering their opinions or asking questions. The researchers concluded that SCL approaches may work cross-culturally but could result in different outcomes. More research is needed to fully explore strategies for enhancing the small group learning experience for all students.

Further exploration is also needed to better understand how to scaffold the PBL process in a cross-cultural context. Wang et al. (2016) explored techniques to provide scaffolding for students in PBL contexts. Wang et al. explored the impact of integrating coaching psychology techniques into PBL interactions at a Chinese medical school. Data was gathered over a four-month period using observations and interviews. Results indicated that coaching psychology techniques were beneficial for supporting the PBL process. The researchers proposed a model based on the data which they indicated needs further research to fully explore the complex outcomes of medical school (e.g., dispositions, reasoning and problem-solving skills, and empathy that the proposed model may support). Doing this research, particularly mixed methods (Wang et al. 2016), across cultural contexts may also provide additional insights into the value of the scaffolding the model may provide.

Medical educators may benefit from looking at studies in other disciplines to inform PBL practices. In a recent study, Haruehansawasin and Kiattikomol (2018) explored scaffolding strategies in PBL contexts for low-achieving students in vocational education. Results indicate that specific types of scaffolding (e.g., collaborative approaches, worksheets) had an impact on
performance as measured by test scores. While the majority of medical students may not be considered “low-achieving” in the overall academic context, they may be “low-achieving” in PBL settings where they are less familiar with learning strategies and techniques. More research is needed to see if the strategies used in this context would be applicable and useful for medical students.

**Continuing challenges**

As SCL has become a more widely accepted pedagogical approach for learning, there has been growth in both advocacy and concern. One challenge has been the inconsistent definitions and interpretations in research and practice. The alignment of learners’ needs, course content based on the learning goals, instructional beliefs and corresponding instructional strategies is critical to implement SCL but remains inconclusive. While seemingly widely accepted and adapted in classrooms across contexts, empirical studies regarding the effects of SCL have been scarce.

SCL has considerable promise in contemporary college-level education, including science and engineering disciplines. Providing undergraduate students with more opportunities to interact with students rather than solely with the instructor and to build autonomous learning abilities and skills have been reported to promote student learning achievement in promoting higher-order thinking (National Research Council 2015). To substantially improve students’ science learning (e.g., scientific reasoning, problem-solving, critical thinking), numerous calls have suggested to embed student-centered, active learning strategies (i.e., project-based, case-based or problem-based learning) in science and engineering lectures (Allen & Tanner 2005; Handelsman et al. 2004; National Research Council 2015). Yet in reality, science introductory courses are often offered in an industrial size classroom and fail to teach fundamental scientific concepts (Andrews, Leonard, Colgrove & Kalinowski 2011; McConnell et al. 2006). Teaching in a large classroom setting results in lack of instructors’ cultivation of active constructive learning (Andrews et al. 2011), limited opportunities to provide just-in-time support (Chang & Hannafin 2014), lack of student participation in lectures, closed-end rather than open-end questions, limited students’ prior knowledge and failure to challenge misconceptions.

Incorporating project-based learning represents a promising student-centered method to engage students throughout the learning process in HE settings. As Helle et al. (2006) framed, project-based learning involves the following learning process: problem-solving process, production of concrete artifacts, learner control of learning process, contextualization of learning by providing authentic learning contexts, multiple forms of learning (e.g., visual, verbal, abstract, concrete), and adoption of motivational orientations of representation. While project-based learning has been implemented extensively in colleges, evidence suggests it often fails to fully engage learners (Woods 2010) due to students’ diverse prior knowledge level on the subject and motivation, and unsuccessful collaboration due to social loafing issues (Gülbahar & Tinnaz 2006; Lee & Tsai 2004). Students need to do more than simply complete a project; they should be posing questions, making predictions, designing investigations, collecting and analyzing data, using technology, making products and sharing ideas (Ayas & Zeniuk 2001; Hannafin & Land 1997) during project-based learning. Providing such opportunities should help students to fully engage in the group work process while strengthening contextualized academic skills and knowledge (Bruce-Davis & Chancey 2012).

In addition, contextual differences (e.g., institutional, departmental), pedagogical differences, and student perceptions that are misaligned with SCL strategies principles (e.g., SCL means I can do whatever I want as a learner) have been reported as possible factors inhibiting the
expected results of SCL to promote student learning. Woodbury and Gess-Newsome (2002), for example, addressed the lack of consideration of cultural context of the learning environments and the misguidance and misunderstanding on the roles of teachers and students in SCL environments as potential factors affecting the adoption of SCL. Faculty's perceived norms toward student-centered teaching, class size, layout of the classroom and the levels of student readiness on SCL has also influenced SCL adoption (Henderson & Dancy 2007; Hora & Anderson 2012). Based on the common challenges described earlier, we discuss implications for future research and practice of SCL in science, engineering, computing, and medical education.

Implications

The move toward SCL has ebbed and flowed since the turn of the 20th century. The ideas of educational theorists such as Dewey (1938), Montessori (1912), Piaget (1985) and Vygotsky (1978) were early precursors to what became key principles of and strategies for SCL. While there is evidence that more educators may be seeking ways to move away from the dominate teacher-directed pedagogical model (e.g., Freire 2018; Geven & Attard 2012), challenges remain from research and practice perspectives.

Implications for future research

Conducting SCL research that can provide stronger and more persuasive evidence across diverse educational disciplines will broaden understandings of the opportunities and challenges of a SCL approach. Each discipline has its own inherited and evolved instructional approach based on a particular theoretical foundation. Engineering education has applied a project-based learning approach to educate future engineers who could apply acquired knowledge into collaborative design and development of scientific solutions that can satisfy societal needs (Mills & Treagust 2003). Computing education has adapted collaborative learning (e.g., pair-programming) approach to provide authentic learning experiences (Salleh, Mendes & Grundy 2011). Medical education employed problem-based learning approach to focus on developing knowledge and skills that require medical doctors to examine and diagnose patients within apprenticeship (Barrows 1996). Most disciplines and even classrooms are unique, providing an environment that is ripe with potential for research related to SCL.

To suggest, apply, and validate an appropriate instructional strategy, understandings of the unique needs and goals of the disciplinary contexts are important. In an applied setting, a design-based research approach allows the researcher(s) to situate the research within the context by using domain-specific theoretical guidelines (Cobb et al. 2003; McKenney & Reeves 2018). Rather than exploring controlled or laboratory simulated learning environments, conducting research in authentic contexts provides an extension of understanding of the context and enables the researcher(s) to propose and validate the effectiveness of an instructional approach. Further, by tracking its effectiveness longitudinally through multiple iterations, research-proven findings will be strengthened, thus providing insights into how to further strengthen the effectiveness of SCL.

In addition, to examine the effectiveness of a student-centered approach within contextually varied theoretical approaches, multiple variables need to measure appropriate methodologies and methods. Self-report, for example, has been utilized extensively to identify individual needs and to document the changes in students’ performance for a short period of time. However, used in isolation, the accuracy of self-report measures has been questioned; further, the relationships
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between self-reports with participation and performance has proven inconclusive. Comparing 408 undergraduate students’ self-reported, self-regulated learning strategies and their actions in reality, Foerst and her colleagues found discrepancies between self-regulated learning (SRL) knowledge and action (Foerst et al. 2017). Multiple research methods and measures (i.e., focus group interviews, peer evaluations or direct observations of actual practices) enable researchers to corroborate self-report-based measures and calibrate the influence of the instruction on both students and instructors (Veenman 2011). Measuring the interaction between and among students and instructors can also strengthen the evidence. Mixed-method strategies have been suggested to promote in-depth understanding of the phenomena by utilizing multiple measures and methodologies (Creswell 2014).

Finally, scholars have started exploring other possible theoretical foundations that may be useful for SCL approaches. Tangney (2014) completed a study with university faculty in art and design, seeking to clarify their understanding of SCL, and how to apply it in their education contexts. Results from Tangney’s study indicate a broader and more humanistic conception of SCL, encompassing personal growth for learners. Tangney’s results also indicate an inclusion of consciousness raising in the understanding of the goals of SCL. Further exploration of humanism as a theoretical lens for SCL is needed to fully understand the implications and potential applications in varied learning environments (e.g., higher education, corporate settings).

Tangney’s (2014) results also addressed implications for the use of social justice or critical pedagogy theories (Freire 2018) as a foundation for SCL. For example, consciousness raising and resistance to the “norm” is a long-standing goal of critical pedagogy (Kirylo 2013). Further, critical pedagogy seeks to overcome oppressive structures typically found in traditional learning environments (Duncan-Andrade & Morrell 2008; Hooks 1994; McLaren & Kincheloe 2007). A core tenet of SCL is to change traditional structures and empower students, making critical pedagogy a potential lens to extend the work. By exploring other theoretical foundations such as humanism and critical pedagogy, SCL may expand its applications within and across contexts.

Implications for practice

In practice, as with any pedagogical strategy, how to assess the impact of SCL on student learning remains elusive. Traditional measures of learning such as tests and exams limit our understanding of the impact that SCL has on student learning. We need to continue to develop alternative ways of assessment (e.g., projects, rubrics) so as to garner a richer understanding of the impact of SCL strategies and techniques on student learning. Expanding the research and providing more examples of application-in-practice of SCL approaches will certainly enhance our understanding of and ability to use SCL strategies. That said, how these efforts might influence practitioners to explore SCL approaches is not as clear.

The impact of authentic context on student learning also needs to be further examined. In SCL, we assume that authentic learning environment would encourage learners to explore a resource with all the complexity and uncertainty of the real world. The learners would have a role in “selecting which information is relevant, and finding a solution which suits their needs” (Herrington & Oliver 1995, p. 257). Yet, the depth of application or real-world context has remained in question, as the extent of real-world contexts, and ways those contexts are defined for each individual, were not clearly described (Barab et al. 2000).

Finally, SCL practices have found success in several international contexts, but more research needs to be conducted to generalize its effects. Brough (2012) explored the implementation of
SCL principles into a primary school context in Australia. Findings suggested successful implementation when projects were contextually relevant. Conner (2013) also explored the implementation of an SCL approach in a primary school in New Zealand. Results revealed that the SCL approach to be relevant and engaging. Teachers also found that by incrementally involving students in the process that they were more comfortable adapting to a SCL approach. While the studies from Australia and New Zealand reported successful implementation of SCL approaches, Jordan et al.’s (2014) exploration of SCL approaches in Iraq were somewhat mixed. While the teachers expressed an interest in adopting SCL practices, as in Polly and Hannafin’s (2011) study with teachers, the shift in conceptualization of roles and responsibilities was difficult for some participants. As recognized by Shipton (2011), shifts in conceptualizations in teaching and learning are important to the success of SCL approaches. More research is needed to develop successful strategies to implement SCL in various cultural contexts.

Conclusion

The literature reviewed in this chapter indicates that interest in SCL has grown significantly in HE settings across disciplines, yet how best to expand knowledge and application of SCL approaches and strategies in practice remains an elusive goal. One possible solution may be to target practitioners who epistemologically sit in the “middle,” neither teacher centered nor open-ended (Hannafin et al. 2011; Song et al. 2007), but rather practitioners (e.g., instructors, instructional designers) who are interested in exploring new strategies for learning. These practitioners may be willing to try some of the well-honed SCL approaches with their students. They may even be willing to expand or extend the strategies to better fit their context. By approaching the middle, rather than “preaching to the choir” or “converting the unbelievers,” more SCL approaches may get into various learning contexts.

References

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