

April 2018

Between Knowing and Learning: New Instructors' Experiences in Active Learning Classrooms

Andrea Phillipson

Queen's University, andrea.phillipson@queensu.ca

Annie Riel

Royal Military College of Canada and Queen's University, annie.riel@queensu.ca

Andy B. Leger

Queen's University, al7@queensu.ca

Follow this and additional works at: https://ir.lib.uwo.ca/cjsotl_rcacea



Part of the [Educational Methods Commons](#), [Other Education Commons](#), and the [University Extension Commons](#)

Recommended Citation

Phillipson, A., Riel, A., & Leger, A. B. (2018). Between Knowing and Learning: New Instructors' Experiences in Active Learning Classrooms. *The Canadian Journal for the Scholarship of Teaching and Learning*, 9 (1). Retrieved from https://ir.lib.uwo.ca/cjsotl_rcacea/vol9/iss1/4

Between Knowing and Learning: New Instructors' Experiences in Active Learning Classrooms

Abstract

Over the past 20 years, interest in the impact of space on teaching and learning has grown, and higher education institutions have responded by creating Active Learning Classrooms (ALCs)—spaces designed to promote active, student-centred learning. While ALC research has explored teaching methods, student experience, and student learning, less is known about how teaching in these spaces affects instructors. We contribute to this discussion by investigating teachers' educational development in these spaces. We asked new instructors to reflect on their ALC experiences, exploring their pre-course preparation and their perceptions about themselves, their students, and teaching and learning. Their reflections revealed key differences between knowing and learning: Although all participants knew about and were dedicated to student-centred pedagogy before teaching in the ALCs, teaching in these spaces prompted transformative learning through which they shifted both their behaviours and perceptions about student learning and about their own roles in the classroom.

Au cours des 20 dernières années, l'intérêt consacré à l'impact de l'espace sur l'enseignement et l'apprentissage a augmenté et les établissements d'enseignement supérieur ont répondu en créant des classes d'apprentissage actif (CAA) – des espaces consacrés à la promotion de l'apprentissage actif centré sur l'étudiant. Alors que la recherche portant sur les CAA a exploré les méthodes d'enseignement, l'expérience des étudiants et l'apprentissage des étudiants, on s'est moins intéressé à la question de savoir comment le fait d'enseigner dans ces espaces affectait les instructeurs. Nous contribuons à cette discussion en examinant le développement éducationnel des enseignants dans ces espaces. Nous avons demandé à de nouveaux instructeurs de réfléchir à leurs expériences en CAA, d'explorer leurs préparations avant les cours et leurs perceptions sur eux-mêmes, sur leurs étudiants et sur l'enseignement et l'apprentissage. Leurs réflexions ont révélé des différences majeures entre savoir et apprendre : bien que tous les participants aient été au courant, avant d'enseigner dans une classe d'apprentissage actif, de la pédagogie centrée sur l'apprenant et y aient été dévoués, l'enseignement dans ces espaces a engendré un apprentissage transformateur qui a abouti à un changement à la fois dans leurs comportements et dans leurs perceptions sur l'apprentissage des étudiants ainsi que sur leurs propres rôles dans la salle de classe.

Keywords

active learning classrooms, educational development, transformative learning

Cover Page Footnote

We gratefully acknowledge our respondents, who generously shared their experiences with us. Thank you also to our anonymous reviewers for your helpful comments.

[Teaching in an active learning classroom] was essential for learning how to teach according to an active learning strategy. This has been incredibly powerful to prepare me to teach the way I have no choice but to teach in [my upcoming tenure-track position]. So it has shown me how to ask better questions and how to encourage what you are saying about learning by realization and from internally instead of being told. This has changed everything for me. (Monica, novice instructor)

Over the past 20 years, researcher interest in the impact of space on teaching and learning has grown (Baepler & Walker, 2014; Beichner, 2014; Brooks, 2011; Granito & Santana, 2016; Jamieson, 2003; Temple, 2008), even to the point of prompting an annual “International Forum on Active Learning Classrooms” conference at the University of Minnesota (inaugurated in 2011) and warranting a journal dedicated solely to this issue, with the *Journal of Learning Spaces* launched in 2011. A driver for this interest is research that exposes the limitations of the conventional lecture. Although lectures can efficiently convey complex material to students, educators have expressed concerns about students’ passive listening resulting in poor retention of information and decreased opportunity to develop higher order skills (Armbruster, Patel, Johnson, & Weiss, 2009; Bonwell, 1996; Michael, 2006; Miller & Metz, 2014). Active learning, by contrast, requires that students do more than passively listen, and promotes the practice of higher order thinking (Miller & Metz, 2014). At its most advanced, active learning centres students at the heart of teaching and learning, with students independently exploring, generating, and applying ideas in the classroom, and research has consistently shown that such instructional methods improve students’ conceptual understanding (Beichner, Saul, Allain, Deardorff, & Abbott, 2000).

Shortly after Bonwell and Eison (1991) pioneered the term “active learning” in the early 1990s, North Carolina State University (NCSU) began creating classrooms specifically designed to engage students and promote active learning pedagogies. Classrooms constructed in the Student-Centered Active Learning Environment with Upside-down Pedagogies (SCALE-UP) project were equipped with round tables, computer outlets, large screens, and white boards around the walls. A key feature of SCALE-UP classrooms is the loss of a central focal point, as the instructor podium is located in the midst of the tables rather than at the front of the room. According to the NCSU website, more than 150 higher education institutions have adapted and adopted the SCALE-UP approach (NCSU, n.d.). Despite variations in the size and configurations of such classrooms, the SCALE-UP website informs that “the basic idea” remains the same: “[Y]ou give students something interesting to investigate. While they work in teams, the instructor is free to roam around the classroom—asking questions, sending one team to help another, or asking why someone else got a different answer” (NCSU, n.d.). Rather than having an inert teacher providing information to passive students, these spaces encourage a mobile instructor supporting student-driven activity.

ALC research from projects such as SCALE-UP (Beichner et al., 2007) has focused largely on teaching methods, student experience, and student learning. Some areas of investigation have included the relationship between learning spaces and student learning outcomes (Brooks, 2011), how space relates to students’ sense of identity (Gebre, Saroyan, & Aulls, 2015), and perceptions of faculty and students about the effectiveness of active learning in specially designed spaces (Florman, 2014). Findings demonstrate benefits for students, such as improved problem solving, attitudes, and conceptual understanding (Beichner et al., 2007; Brooks, 2011), as determined by

grade improvement, students' self-reports, or instructors' perceptions of student learning (Brooks, 2011). A small amount of scholarship pays some attention to preparing instructors to teach in these spaces (e.g., Florman, 2014; Hall-van den Elsen & Palaskas, 2014; de la Harpe & Mason, 2014; Wanless, 2016; Watson, 2017). For instance, Florman (2014) describes the professional development efforts undertaken at the University of Iowa with the implementation of the Transform, Interact, Learn, Engage (TILE) active learning classrooms (ALCs): all TILE classroom instructors participate in workshops focused on active learning pedagogies such as inquiry-guided learning, peer instruction, and in-class, team-based learning. While such literature detailing preparatory techniques is crucial for educational developers supporting instructors as they enter active learning spaces, an underexplored but important line of inquiry concerns what happens to teachers during and after their time in ALCs. The research is persuasive about the positive effects of ALCs on student experience and learning, but, as Hall-van den Elsen and Palaskas (2014) point out, there is a "paucity of research and evidence about the impact on teacher practice" of these spaces (p. 205).

The ALC Project at Queen's University

In 2014, Queen's University, a mid-size, research-intensive university in Canada, opened three diverse ALCs that differ in size, technology, and teaching and learning features (see Figures 1, 2, and 3).



Figure 1. Flexible learning classroom (capacity: 48)



Figure 2. Interactive classroom (capacity: 70)



Figure 3. Team-based classroom (capacity: 136)

Despite their differences, the three ALCs share particular traits directed towards promoting active learning. For instance, they challenge the traditional classroom emphasis on a single focal point at the front of the room: one classroom has no fixed furniture (figure 1), while the other two rooms have a teacher's podium located in the middle of the room (figures 2 and 3). The classrooms are also designed to encourage student-to-student collaboration, with students seated either in moveable chairs featuring tablet arm desks or at tables in groups. Furthermore, they invite students to engage with class material in multimodal ways, using the extensive whiteboards or the interactive computer displays provided at each table.

A primary goal of redesigning these classrooms was to evaluate how classroom spaces can facilitate changes in approaches to teaching and learning. The current paper emerged out of this larger project, which has also included investigations into student teamwork (Chen, 2015b), student learning (Chen, 2015a), and instructors' physical movements in teaching spaces (Chen, Leger, & Riel, 2016). Organized professional development for instructors was not part of the larger project's design, and while an Educational Developer was associated with the rooms and available to all instructors who wished to attend orientation workshops or book individual consultations, such sessions were not mandatory. Nonetheless, early feedback suggested that ALC teachers were adjusting their approaches to teaching in these rooms, prompting us to inquire further into teachers' experiences. While an emergent body of scholarship importantly focuses on professional

development to prepare instructors to use such classrooms (e.g., Carr & Fraser, 2014; de la Harpe & Mason, 2014; Hall-van den Elsen & Palaskas, 2014; Watson, 2017), our emphasis on instructor experience sheds light on the role of the spaces themselves in educational development.

For the purposes of this discussion, we favour Cheryl Amundsen and Mary Wilson's (2012) broad use of "educational development" to "describe actions, planned and undertaken by faculty members themselves or by others working with faculty, aimed at enhancing teaching" (p. 90), although we would expand this definition beyond faculty members to encompass all educators, such as graduate student teaching assistants. We like Amundsen and Wilson's inclusion of educators' own agency in this process, which is often lacking in definitions that centre the role of the professional educational developer. One such example is Felten, Kalish, Pingree, and Plank's (2007) oft-cited definition of educational development as "[t]he profession dedicated to helping colleges and universities function effectively as teaching and learning communities" (p. 93). This profession plays a role in our argument, but, as we elaborate below, our central focus is the classroom educator.

While gathering data for the larger ALC project, team members observed that a large proportion of instructors in the ALC classrooms were novice instructors. In the first term the ALCs opened, four of the seventeen instructors who requested to teach in the new spaces were graduate student Teaching Fellows responsible for their own courses, and a fifth graduate student Teaching Assistant requested to use an ALC for her tutorial. With approval from the institution's General Ethics Review Board, the ALC Project team had invited all ALC instructors from the first term to participate in focus groups, and four of eleven focus group participants were these graduate student instructors. Because these novice instructors had demonstrated such an interest in reflecting upon their experiences in the ALCs, and because there was no prior research to our knowledge investigating this specific population teaching in such spaces, we developed a subset of research questions specific to this group:

1. Do new instructors teaching in ALCs experience changes to their beliefs about teaching and learning? If so, what are these changes and how do they occur?
2. Do new instructors teaching in ALCs experience a change in their teaching styles? If so, what are these changes and how do they occur?
3. What role, if any, does reflective analysis play in new instructors' experiences teaching in ALCs?

Method

In our broader ALC project, the use of focus groups allowed for interactive discussion among a diverse range of participants and provided rich data for the small, subsidiary study about novice instructors' experiences. However, when two more graduate student Teaching Fellows requested to teach in the ALCs in the second term the rooms were open, they were recruited to the study, and all seven novice ALC instructors were invited to participate in semi-structured interviews that would allow individual respondents to elaborate on their specific teaching experiences in more depth. In all, 100% of the novice ALC instructors participated in the study, whether in focus groups, individual interviews, or both, as depicted in Table 1.

Table 1
Participant¹ Demographics

	Monica	Ivan	Amanda	Jeanie	John	Aimee	Marie
Role in the ALC	Teaching Fellow	Teaching Fellow	Teaching Fellow	Teaching Fellow	Teaching Fellow	Teaching Fellow	Teaching Assistant
Method of Data Collection	Focus group and interview	Focus group	Interview	Interview	Interview	Focus group	Focus group and interview
Discipline	Human Geography	Political Studies	Health Studies	Health Studies	Biomedical and Mechanical Engineering	French Studies	English Studies
Prior Teaching Experience	teaching assistant	teaching fellow	teaching fellow	teaching fellow	teaching fellow	teaching fellow	teaching assistant
Prior Formal Training in Higher Education Pedagogy	In process of obtaining a not-for-credit certificate in university teaching and learning	12-week for-credit course in teaching and learning in higher education	12-week for-credit course in teaching and learning in higher education	12-week for-credit course in teaching and learning in higher education	12-week for-credit course in teaching and learning in higher education	1-year graduate diploma in higher education	none

Since this subsidiary project was conceived after most participants had already taught in the rooms, there was no pre-ALC data collected; rather, respondents provided detailed answers to retrospective questions about their experiences before and during teaching in the ALCs and to more prospective questions focused on future teaching.

Retrospective questions:

¹ We use pseudonyms for our participants to personalize their experiences while maintaining their confidentiality.

1. How has teaching in this environment compared to teaching in a traditional classroom?
2. How did you plan your course coming into the ALC, and how did it evolve during the term?
3. To what extent did teaching in this space lead you to reflect on your teaching practices?
4. How did teaching in this space affect the amount of content you covered in your course?
5. In your estimation, did students learn more or better in this environment than in a traditional room?
6. What was the nature of your role as an instructor in this particular environment?

Prospective questions:

1. How has teaching in this space influenced your approach to teaching?
2. How has teaching in this space affected your interest in teaching and your willingness or desire to discuss teaching with others?
3. How do you foresee teaching in the future, and in particular, teaching in a traditional classroom?

Once the interview data was transcribed, two authors began independent thematic analysis, and compared emergent themes, returning to the transcripts for confirmation throughout this iterative coding process. The analysis revealed striking similarities among our respondents' experiences teaching in ALCs.

Theoretical Framework

To make sense of our participants' experiences teaching in the ALCs, we turned to Patricia Cranton's work on educators' learning, most fully developed in her 1996 book, *Professional Development as Transformative Learning*. Cranton opens her book with the claim, "Educators are learners" (p. 1) and argues throughout that we should apply the insights from adult education to educational development. In particular, she points to Jack Mezirow's (1991) classic theory of transformative learning. Mezirow's theory has evolved over time as he has added and clarified constructs (Kitchenham, 2008), but his basic premise has persisted. Influenced by Thomas Kuhn's (1962) notion of paradigms, Jürgen Habermas's (1971) typology of knowledge, and Paulo Friere's (1970) pioneering work on emancipatory education, Mezirow posits that adults come to learning experiences with a rich history of prior knowledge and social acculturation, and thus the most advanced kinds of learning are not simply about adding new knowledge to fill gaps. Rather, because past experience shapes the meaning that adults make of current experience and creates boundaries around how people perceive and comprehend new data, the most advanced learning happens when learners critically reflect on their assumptions and premises. In so doing, if they transform the way they interpret a new experience or even the habitual structure of assumptions that informs their meaning-making more broadly, their learning has become transformative.

Cranton (1996, 2006, see also Cranton & King, 2003) draws on Habermas's (1971) three kinds of knowledge—instrumental (or technical), communicative, and emancipatory—to argue that educator professional development (PD) too often focuses on the technical "how to" of teaching. This simplistic and reductive form of educators' education prevails even though knowledge about teaching is largely communicative and emancipatory, wrapped up in

understanding ourselves, others, and systems, and critical questioning about the function and purpose of education. What education research reveals, Cranton (1996) argues, is that learning from experience is critical, and yet professional preparation of teachers tends to decontextualize the lesson and separate learning from doing. For example, Cranton (1996) finds that text-based guides tend to be rule-based in a way that is not congruent with practice, which educators “rarely” describe “as being predictable, regulated, or explained by rules and principles” (p. 30). Workshops, possibly the most common PD activity, have notably more potential, since, according to Cranton, they provide opportunities to try out techniques and skills. Cranton (1996) argues that “[s]uch activities can stimulate emancipatory or transformative learning, especially when the workshop is held over time in an integrated-series format” (p. 33).

Cranton’s conceptions of educator education are especially germane to the current study, given that the majority of the respondents did have formal training in higher education pedagogy before teaching in the ALCs (see Table 1). Of particular note, four respondents previously participated in a 12-week course that has been the subject of a study by Andy Leger and Sue Fostaty Young (2014). When teaching this course, educational developers ask participants to “confront the assumptions, values, and beliefs that shape [course participants’] approaches to teaching, as well as the assumptions they hold of the nature of learning” (Leger & Fostaty Young, 2014, p. 1). Although the study’s authors saw participants as having changed their conceptions of teaching and learning throughout the course, participants themselves insisted that they had merely acquired the vocabulary to articulate their *a priori* beliefs and conceptions. The authors write, “It seemed that, to these participants, evidence of behavioural change was necessary for them to concede conceptual change” (p. 10). Participants did not see themselves as having questioned their assumptions to the point of transforming their meaning-making about teaching and learning. In other words, they did not imagine themselves to have learned in Mezirow’s transformative way that Cranton (1996) asserts is at the heart of educational development. Our study contributes to this literature about educational development for novice teachers, tracing how our respondents perceive teaching in ALCs to have affected their conceptions about teaching and learning.

Results

Becoming an ALC Teacher

By “becoming an ALC teacher,” we mean both that our participants underwent an application process to teach in the active learning spaces, and that, once accepted, almost all of them undertook a process of designing or redesigning their courses to suit the new teaching space. The application process prompted instructors to set up their courses purposefully to make the best use possible of the space, and they described feeling obliged and inspired to do something different here than they would in a traditional room, where they might just “rest on [their] laurels” (John). As Jeanie noted, “I think if I would have been teaching in a traditional class, I would imagine that I would have more of an opportunity to sit back on my heels and [think], ‘Okay, things are good,’ and the students would be like, ‘Okay.’ [They] wouldn’t have known anything different, right?”

Although Jeanie’s notion of sitting on her heels implies a kind of lethargy that attends teaching in traditional spaces, it became clear in respondents’ remarks that they were not lazy, but rather, uninspired by their former classrooms. The contrast of the ALCs in relation to traditional classrooms freed instructors to consider new ways of approaching course material, and they stressed the creativity they felt when they first saw the spaces:

You look around, and you want to make the best use of what is available there. You want to use the whiteboards in exciting new ways; you want to use the touch screens in ways that will really engage the students. It pushes educators to be creative in ways that traditional classrooms can shut you down. (Amanda)

I looked at the space and had to be creative and wanted to make use of it. I got creative about the things that I could do in the course and did not feel as constrained. (Ivan)

To “make the best use” of the rooms, almost all of the instructors designed or redesigned their courses purposefully to suit the rooms before they began teaching. This purposeful design included lesson plan changes, such as Amanda’s intentions to increase student engagement using classroom technology: “[I] loved the technology, [and had a] really excellent time dreaming up how to get students to be able to use the screen in a way where they could somehow explain what I just did with them.” This kind of student practice characterized the instructors’ plans. As Marie put it, “because it was called an active learning classroom, I had to learn what active learning was all about.” Noting that they “had to approach everything in a completely different fashion” (John), instructors described designing courses differently overall, such as with one instructor who intentionally chose to include less content than is typical in his discipline to be able to focus more on students’ disciplinary skills acquisition. In Jeanie’s words, the prospect of teaching in an ALC “influenced my teaching in terms of the way I constructed overall course content,” and she cited redesigning her course timelines to make space for activities that would emphasize the “practical application” of course content. The opportunity for transformative learning occurred when such well-intentioned efforts proved insufficient.

Questioning Assumptions

Following Mezirow (1991), Cranton (1996) argues that transformative learning for educators includes a purposeful reflection on assumptions that leads to a realization that these assumptions are faulty or somehow deficient. Although the participants in this study had shown a willingness to engage in reflection about the best teaching methods to employ in the ALCs, they were nonetheless prompted to probe even deeper once they began teaching in these spaces. Despite the preparation that the instructors had undertaken, and an attempt to, in Ivan’s words, “forecast” what teaching and learning would look like in the ALC, all of the instructors acknowledged experiencing a moment of recognition that they needed to shift their teaching practices once their courses began. Although two of the instructors described fairly minor changes, for others the shift was profound. Monica explained:

As soon as [the educational developer] presented the opportunity to teach in here as an active learning classroom, I [started] preparing and developing this course and writing out all these lecture notes. And then, very quickly [after I started teaching in the ALC], I learned that I need to think of what I want students to learn and what is the best active learning strategy for students to learn that in a different way.

Monica had seen herself as creating content that would suit the ALCs, but once she began teaching in that space, she had a realization: “I had prepared—I did not know what I was going to do with what I realize now was a bunch of lecture materials.” She shared that this approach simply did not

work to engage the students as she had imagined it would when she purposefully designed her course.

Jeanie recounted a similar epiphany, indicating a kinesthetic effect as she linked her realization about her role as a teacher to her embodied experience of teaching in the unique ALC space:

I had the insight in specifically being in the classroom. I sort of had this Aha! moment about half-way through October, where I kind of got over myself as an instructor being in the center of the class. Being in that kind of conspicuous place [in the middle of the interactive classroom]—it is really uncomfortable to have all the attention on you all the time, and it is not conducive to that kind of learning. Being in that classroom made me realize that teaching is not about the teacher, teaching is not about me. I realized that it's time to just not worry about what I am doing as much as what the students are doing.

Jeanie had gone into the ALC with knowledge about active learning and a desire to promote it in her classroom, and yet, when the classroom space prompted her to examine her assumptions, she realized that she was still teaching as though she was at the centre of what students do and how they learn.

Instructors described cultivating questions as their embodied experience of teaching in an ALC made deficiencies in their perspectives evident. Amanda wondered “how to prepare in a way that would allow me to depend less on the notes that I had in hand and trust my own knowledge.” Other questions were more fundamental:

I was occupying the space, and I am the leader of this group, but why I was doing [this] and what I was doing . . . [These] are the questions that I always had to think about. And then, how that impacts the students who are listening to me and participating in the things that I ask them to do. (Marie)

Monica asked, “What am I going to do? What can we do with the material? How else can students learn through doing, and learn through working together, and learn through moving around and trying things out and solving problems?”

Instructors were asking deep questions about what teaching and learning are because they were finding that their beliefs did not wholly match the embodied experience of teaching in the ALC space. Although Jeanie had already spent time thinking about and discussing active learning in a 12-week higher education course, she was nonetheless subject to an “aha! moment” in the classroom when she realized that she was not promoting it. Her admission reveals how difficult it is to move past a teacher-centred approach, even when one is motivated to do so, and she stressed, “I probably could have said before the course that teaching is not about you, but when you get up in front of a class in a more traditional set up it *is* about you. It is about every word you choose.” Jeanie suggests that even when instructors want to teach in a learner-centred way, if their teaching experience has been limited to traditional classrooms, they may not recognize how much the room itself dictates what teaching is.

In other words, traditional classrooms may not encourage instructors to examine their meaning perspectives—their habitual ways of understanding their experiences. This is a point that becomes clear in Monica’s description of thought processes that animate different forms of teaching:

I assume that if I had just been doing a conventional lecture-based teaching, the only thing there would have been to think about was: did I capture all the lecture material? Did I miss anything, did I miss time, the timing of my lecture? But because of my [ALC] experience, my reflection was much different. I had cause to think about the questions of whether the activities we had done in class were effective for driving home the message or the idea that I wanted students to leave the classroom with. So it gave me reason to evaluate my choices of activities, and then everything else.

Teaching in the ALCs revealed to instructors the need to evaluate their perspectives, and created a learning opportunity. As John put it, “Questioning my own preconceived notions about a certain kind of thought—I thought it was really brilliant, and it taught me a whole lot about thinking things in a new structure and with a new viewpoint.” In both Monica’s case, as she contemplated “everything” about her teaching, and John’s case, as he completely restructured his thinking, it was clear that the act of questioning assumptions about teaching and learning led to significant shifts in conceptions and behaviours, which we describe in the following sections.

Self-Directed Learning

Cranton (1996) emphasizes that transformative learning for adult educators is self-directed: they must come independently to the realization and desire to undertake a process of learning. Pondering questions about what learning is and how teaching can facilitate those processes, six of the seven respondents in this study detailed how they sought out information about teaching and learning from a variety of sources during the term. These included informal discussions, which all seven respondents reported having with colleagues, and which one instructor describes as a constant attempt to learn more about teaching:

I’d always want to talk to people about what I was doing. My mentors in teaching are people that I respect as educators and all the education development staff here at the [Centre for Teaching and Learning]. It was really great to get ideas from other people outside, from other disciplines, and just figure out how they would approach a high level concept. (John)

Many of the respondents noted seeking support from educational developers, specifically in terms of learning more about teaching and learning. Several kept a “fairly consistent connection” (Jeanie) with teaching and learning support staff, drawing upon “support throughout” to troubleshoot “if something is not working or you got an idea but you are not quite sure how to put it into action” (Ivan). Marie mentioned attending a workshop about active learning run by the Centre for Teaching and Learning. Others took their search for knowledge further, with one respondent even referring to her quest as an “obsession”: “I can’t get enough workshops. I read online. I read about educational materials online. I want to develop as an educator” (Jeanie). Another respondent noted specifically that she sought out educational scholarship when the ALC made her usual instructions for group work seem inadequate:

[The ALC] taught me to think about many kinds of group work that we could do . . . I would put them in a group before, and say, “Okay, you do this,” but it forced me, this room, to go and read in journals and search: how can we use group work? How better can we do that? (Aimee)

Similarly, Monica describes independently mining the library at the university’s Centre for Teaching and Learning: “I went there on my own, and I started finding active learning resources that are in there.” She found herself particularly motivated to grow her knowledge about teaching and learning theory and practice. Learning for adults is not merely about acquiring information (Mezirow, 1991); for these instructors, acquiring more information that they could operationalize in their daily practice was not only learning in itself, but also a manifestation of their desire for transformative learning. In accordance with Cranton’s (1996) description of “self-directed learning,” these instructors demonstrated independent motivation and desire to self-reflect and re-assess. And their actions reveal the nature of their transformation: these educators were beginning to see themselves as learners.

A Shift in Fundamental Beliefs and Behaviours: Teachers Transforming into Teacher-Learners

According to Cranton (1996), transformative learning for educators requires a revision of faulty assumptions (or, as she stresses, of “undeveloped” meaning perspectives) that results in a change of one’s “entire view of [one’s] practice” (p. 4) rather than simply a minor shift in teaching practice. Although the instructors in our study engaged in acquiring more knowledge about active learning, many of them had already encountered such information in the teaching and learning in higher education course that they had taken. We argue that what shifted for many of our participants during their time in the ALCs was their conception of self as educators. Namely, they came to see themselves as learners—specifically, learners about how students learn.

Those who had not explicitly done so before saw teaching and learning as a topic of its own, worthy of attention and intention. Monica credits teaching in an ALC with a new enthusiasm not only for teaching, but also for discussing it with others, noting that this was her “first . . . opportunity to get excited about teaching and for teaching to be the subject of really interesting conversations.” Marie similarly found that the ALC prompted her to think about what it might mean to learn how to be an educator in a targeted way:

[Teaching in the ALC] did make me start thinking about education in general. You hear about the education faculty and how they learn to be teachers. [. . .] I think that [taking an education course] would be very beneficial for somebody like myself, who is in a different discipline but is still expected to teach on a very strong level. Again, it just made me more aware of education in general, and what that means, what’s my role in that.

The respondents described teaching itself as a learning process, wherein one of the most salient lessons is about students’ potential. For John, the ALC provided an “entirely revolutionary” shift in perception “about how students could learn,” and other instructors expressed similar revelations. Marie noted the continuous nature of this work:

It was quite eye opening for me—the whole experience in general from last year, [and then] from last year to this year, too. I learned so much about students and about how they work, and I'm still learning. [. . .] It's fascinating to see what works and what doesn't work and potentially why and figure it out.

For Monica, her own learning about education is inextricably linked to her students' learning:

When it comes down to it, it's the students who . . . really benefit from this kind of active learning teaching and being in a room like [the ALC]. I do too! [. . .] To encourage them to just be their own thinkers, I think is really important from a teaching perspective. And however you decide to do that, or whatever room that you're able to do it in, fine. But I think for me, [the ALC] really did help in kind of solidifying that for me and helping me see the potential in students.

Even though she begins with the notion that the students are the primary beneficiaries of the active learning spaces, Monica's ultimate point reveals that she was, as John put it, "learning as much as the students," and in particular, about how students learn.

As participants in our study came to see themselves differently, they identified as educators dedicated to this kind of learner-centred practice. Monica's quotation evokes the importance of encouraging students to "be their own thinkers," a sentiment that all the study participants enacted within the classroom. John recounts adjusting his own behaviour to give students more responsibility for their learning. Rather than orchestrating the students' work by providing them "all the little bits to solve [a] problem," he made space for student enquiry, "let[ting] them attack the whole concept and [seeing] how they would go and approach [it], and then really address[ing] what they needed to know." Amanda, Marie, Aimee, and Monica all describe similar experiences with relinquishing responsibility to students, or, as John words it, "figuring out . . . how can I take the ownership off of me, [and] place the importance where it belongs—on those students." These instructors each shared stories of introducing jigsaw-style activities mid-way through the term, whereby students would take responsibility for teaching their classmates. And they all remarked upon the efficacy of this approach, as with Ivan noting that students "learned more about the content . . . because they had learned it in a different way . . . less about absorbing information from in lecture and more about discovering content on their own."

Several noted that, even though they would find it difficult to employ the same kinds of active learning strategies outside of the ALCs, they were dedicated to adapting these practices to traditional teaching spaces. Those who already had experience teaching outside of the ALCs at the time of their interviews described how they had already made such changes. Since John was teaching his course in two spaces concurrently, he had an immediate opportunity to see how teaching in an ALC influences teaching in a traditional classroom. He admitted, "I felt I was letting [the students] down almost every time I conducted a class [in the traditional classroom because it was] more heavy on lecturing and on content delivery as opposed to an exploration." John thus adjusted his lecture periods, adding active learning strategies such as think-pair-shares and other collaborative activities. Similarly, when Marie subsequently became the instructor for a 90-student course taught in a typical lecture hall, she had her large class break into groups for working periods, collaborate with her to create PowerPoint slides, and engage in other activities that would make it clear to students that they were co-creators rather than receptacles of knowledge.

The Risks and Freedom of Transformative Learning

One other important aspect of transformative learning for educators that Cranton (1996) explores is how this fundamental shift might seem frightening and risky. But she follows Mezirow in arguing that the shift is ultimately freeing, and our research revealed that new instructors teaching in the ALCs felt both the risk and the emancipatory potential of their transformative learning. In the 90-student course she taught after being in the ALC, Marie found herself relinquishing the control that comes with lecturing. She spoke about this shift in terms of safety:

[I began] shaping my teaching in that way to make it more dynamic and interesting instead of playing it safe all the time—just doing the same old things that I’m comfortable with, and that I know the students are comfortable with, too.

As Jeanie phrased it, teaching in this way is “kind of a risk,” but the ALCs encouraged the instructors to occupy space in ways that pushed them outside of their comfort zones, and that opened them up to new ways of being. Our respondents felt the risk was worthwhile because it freed them from former ways of thinking and being in the classroom that impeded their goals as educators. Consider Amanda’s experience:

[I’ve changed] to push myself to be less dependent on the—tied to the computer and the screen. [I] move around the room more than I used to. There is a lot of safety being behind the podium, or behind the desk or sitting in a chair in a seminar space. Now I do feel more comfortable: I’m more a bodily presence; I’m moving around the space more.

Although it made her feel safe, Amanda’s attachment to the podium restricted her: she was “tied” to it. After teaching in the ALC, Amanda felt freed to occupy teaching spaces in ways that were more consistent with the kinds of connections she wanted to forge with her students.

Discussion

We initiated this small, subsidiary study to investigate whether and how new instructors teaching in ALCs experience changes to their beliefs about and practices of teaching and learning, and what role reflection plays for them. After hearing from our respondents in the focus groups and interviews, we found that the answers to our research questions pointed to Patricia Cranton’s (1996, 2006) work on transformative learning in educational development: The respondents’ narratives indicated that they perceived teaching in the ALCs as a unique experience that shifted their behaviours and perceptions—both about student learning and about their own roles in the classroom. As Monica indicates in the epigraph to this article, the ALC allowed her to assimilate pedagogical theory about active learning—“what you are saying about learning”—through an organic “realization,” or, in other words, “internally instead of being told.”

Our respondents had come to occupy teacher-learner identities. What was the role that the ALCs played in this transformation? Brooks’s (2012) coining of the phrase “space and consequences” aptly captures the idea that learning spaces send messages to users, who in turn interpret the meaning of those messages. According to the participants of our study, teaching spaces have been integral in shaping their actions. As Marie put it, “The space [of a traditional classroom] physically held me more rigid in my ways. Even though I wanted to do more, I

couldn't." Traditional classrooms not only constrained what was possible to do, but also constrained the imaginary—instructors' ability to conceive what is possible in the first place. As Marie's quotation, and all of our participants' investment in teaching, indicates, these were highly motivated instructors who wanted to engage their students in deep approaches to learning, who "wanted to do more." But they did not always have a clear sense of what that more could be, or even know for sure when more was indicated. They simply were not challenged to examine their assumptions nearly as much in traditional classrooms; thus, the kind of self-reflection and self-directed learning that would enable a transformative learning experience about student-centred teaching was less likely to occur.

The instructors in this study viewed the classrooms as instrumental in their growth as educators, and they emphasized three main factors that set these rooms apart: first, in a "you have to live it to get it" way, respondents saw the room as a space of their own engaged, experiential learning; second, it was the physicality of the rooms themselves that facilitates this kind of learning; and finally, because there was an educational developer associated with these rooms, they sought support and found it helpful.

Learning by Doing

If, as Cranton (1996) stresses, educators are just as much adult learners as the students they teach, then it makes sense that the benefits of learning in an ALC might apply equally well to them. Nicola Carr and Kym Fraser (2014) note both anecdotal and research evidence indicating that simply changing the space in which instructors teach is not enough: beliefs and knowledge about pedagogy influence instructors' practices, and they may use the spaces in ways that "sustain their existing pedagogical practices" (p. 189). This issue is especially concerning in institutions where instructors are allocated to active learning spaces. Participants in this study, however, chose to teach in these spaces because their beliefs about teaching and learning were consistent with the student-centred pedagogy suggested by the rooms. But what they still needed to do was put their beliefs to work, and the ALCs afforded them a chance to do so.

Our findings suggest that even when educators' knowledge and beliefs correspond with active learning philosophies, they learn best by doing. Five of seven participants had completed formal instruction in education courses, learning explicitly about active learning and student-centred teaching; however, this learning, as important as it had been to all of them, had not been necessarily transformative. Aimee pointed out how crucial it was for her to enact those lessons in real time: "I knew about the shift," she said, "but I lived it here, and I could not have lived it [in a traditional classroom]." Respondents agreed that the kinds of teaching appropriate to the ALCs have to be "lived," and they discussed how any training of educators in the ALCs ought to build on this insight. In their opinion, effective ALC workshops for instructors would have to include participants using the space authentically, for instance, by having them work through activities in small groups and then report back to the rest of the workshop participants about what they had learned. In other words, as Aimee stressed, "Have them [teach the others] so they understand how the students would feel." Even Ivan, who had expressed a great deal of confidence coming into the ALC, and who had clearly employed learner-centred teaching and learning theory while planning his course, felt strongly about the experiential aspect of teaching in the ALCs:

To be perfectly honest, I don't think you know how to teach super effectively in here until you have been here. I think people need to come in and do it.

Consistent with the participants in Leger and Fostaty Young's (2014) study, these instructors needed to experience tangible evidence of change—needed to live it—to view their own learning about pedagogy as complete or transformative. It was their own altered behaviour, prompted by the embodied experience of being in an ALC, that led them to reflect upon and acknowledge a conceptual change.

Getting Physical

Every respondent noted how the physical environments of the ALCs had an effect on learning, with several attributing students' deeper approaches to the material to their physically active learning environment. Not only were students "buying that [active learning] role" (Marie) more readily in these spaces, but their physical movement both prepared them and enabled them to engage in thoughtful work. Monica found that students' physical approaches to the class material—getting up and writing on whiteboards, and moving between groups—was key to students spending time to develop more detailed answers to her questions, engaging in a form of inquiry that Ivan described as "less about absorbing information from a lecture and more about discovering content on their own." While none of the instructors expressed surprise that their students seemed to learn well in these ways, their own experiences of occupying that space caused something more of a revelation. Even as early career instructors, the respondents had previous teaching experience, and they brought expertise to their experiences in the ALCs. In other words, they all had knowledge about what might work for adult student learning, but since they had not necessarily thought of themselves as adult learners in the context of their teaching, they had not considered what would work best for them as educators. As Cranton (1996) noted, "Even new educators, who may benefit most from skills acquisition, also have many years of experience in educational systems (including being a learner) and learn through questioning their experiences" (p. 46). Since their own physicality was impossible to ignore in the ALCs, the familiar work of teaching was made strange to these instructors, and this new unfamiliarity with their own practice prompted their own deep approach to teaching as learning. Teachers' embodied experiences may deserve more attention in ALC literature specifically, as well as in educational development theory generally. Not all instructors will teach in an ALC, but if, as Cranton (1996) stressed, some of the most common modes of educational development fall short of activating the kind of transformative learning we might desire, future efforts might simulate the ALCs' ability to defamiliarize educators' own teaching practices through a more physical approach.

Supporting Adult Teacher-Learners

Support for the new instructors using ALCs came in both conceptual and material forms, with participants referencing the importance of two main factors: the semantic framing of the classrooms and their access to an educational developer in prompting and helping them through their transformative learning experiences. It was not only the space itself that invited different expectations and practices, but also the language used to describe the space that provided direction and some idea of what new practices could be and look like. Monica and Marie both stressed the helpfulness of the title "Active Learning Classroom" in impelling them to learn more about active learning specifically, both through independent research and through consulting with an educational developer. All of the instructors in this study had consulted at some point with the educational developer responsible for overseeing the ALCs, and five respondents noted that having

ongoing, easily accessible support—a “go-to person” (Marie)—was key to their own development. Carr and Fraser (2014) warn that sessional and contract educators’ limited access to educational developers may create “a ‘lost generation’ of academics who miss the boat of training and development of new pedagogical practices associated with next generation learning spaces” (p. 193). Because such support is available to educators of all levels and status at this university, and it was particularly visible to those using these rooms, our study participants all knew that they could reach out to an educational developer if they wished.

While the specifics of that contact differed among instructors, and even for each instructor at various points in time, the educational developer’s presence in itself was a key element to sustaining several of the respondents’ shifting priorities and approaches throughout the term in which they taught in the ALCs. While we can use the broad term “consultation” to capture the individualized support the educational developer offered, in truth that support encompassed diverse approaches including observing teaching, offering guidance on course design, dropping into classes in an informal manner, developing and sharing resources that responded to instructors’ specific challenges, and problem-solving in areas such as lesson planning and educational technology. What remained consistent across all of these forms of support, however, was the educational developer’s emphasis on student learning. By continually answering the educational developer’s question—“What do you want students to be able to do?”—the instructors in our study were able to refocus their attention on that key revelation that John and others articulate as realizing how much they had to learn about their students’ capabilities. Beyond providing this direction, the educational developer offered a slightly less tangible, but no less important, form of support that motivated and sustained the instructors. One objective of having a constant “point person” for the ALC instructors was to reinforce both their value and investment, sending a consistent message that their effort and risk were appreciated. Their frequent references to consultations with the educational developer suggest that participants felt comfortable reaching out and maintaining an ongoing dialogue about teaching and learning, and exploring their emerging teacher-selves in a supportive and appreciative environment.

Conclusion

As Cranton (1996) applies Jack Mezirow’s (1991) well-known theory of transformative learning to consider how educators learn about teaching, she reminds us unequivocally that “[e]ducators are learners” (p. 1). This is a point well worth remembering in discussions about the value of active learning spaces. Our research indicates that it is not only students’ engagement that can be enhanced by experiences in these classrooms, but also educators’. But while there is some argument to be made that the spaces themselves play an important role in transformative learning for educators, our research suggests that other factors may need to be in place to aid in new instructor development, such as educational development support. If this support had not been available to our respondents, it is conceivable that we would have seen different results.

After all, transformative learning is a difficult process that can open us up to potentially vexing revelations about ourselves and our ways of doing things (Cranton, 1996), and this difficulty may be even more pronounced for early career instructors. Susan Wilcox (2009) cites her own educational development practice, through which she has discovered that new university teachers struggle with exploring their emerging teacher-self insofar as this process “challenge[s] their barely formed identity as disciplinary experts” (p. 126). Thinking critically and deeply about one’s approach to teaching is not always inviting for those who have not yet established security

in their disciplinary roles, Wilcox warns. Our sample was perhaps atypical in that all participants were novice instructors who expressed desire and willingness to interrogate their own practices. While some of them attributed additional reflexivity to teaching in the ALCs, they mostly imagined themselves to be inclined to self-reflection. As Monica said, “Maybe I’m just an enthusiastic person and I would have done this anyway.” These participants were already self-professed converts when they began teaching in these rooms, and such willingness may be an essential precondition for their transformative experiences. Although this predisposition for critical reflection may make our respondents’ transformation seem inevitable, we argue that this characteristic of willing self-reflection makes our findings more striking. That is to say, even instructors who have knowledge about learner-centred teaching and who are open to self-reflection can fall into lecturing by rote in traditional classrooms. In other words, there is a key difference between *knowing* and *learning*.

Transformative learning transforms, and once these new instructors underwent their ALC-related educational development, they had come to understand themselves not only as dedicated teachers, but as teacher-learners. All of the instructors in our study expressed their intention to employ active learning approaches in the future, even in traditional teaching spaces. They acknowledged the challenges of adapting their practices to classrooms ill-suited to physical movement and creative expression, but they knew they would not find safety and comfort in primarily teacher-centred teaching as they may have done in the past. Their dedication to learning about teaching is further evident in their interest in teaching and learning scholarship, both in the scholarly teaching approach that they took and in their enthusiastic participation in this study. Having come to see themselves as learners of teaching, several of our participants subsequently became deeply involved in education and educational research, despite none having a degree in education. Monica directly credited her experience in the ALC with launching her into a tenure-track position at a small, liberal arts university that prioritizes undergraduate student engagement; Aimee accepted a teaching position at a university that features ALCs; Marie became an Educational Development Assistant in the Centre for Teaching and Learning at her university; Amanda took a post-doctoral fellowship in educational development; and John became a higher education assessment expert.

With such a small sample, we are not aiming for generalizations with our findings. However, we find that these individual narratives provide a compelling collective voice reminding us to pay attention to the nuances of teachers’ experiences in ALC research. We are also reminded that the small sample size reflects this particular university’s approach, which has been to renovate a modest number of spaces that instructors must request for their courses. Our findings are perhaps most relevant to institutions taking a similar approach, as compared to those that assign instructors to ALCs, particularly because the instructors who request ALCs are most likely to be predisposed to learner-centred pedagogies. As this university expands the availability of such teaching and learning spaces, the ALC Project Team will be looking for ways to engage other instructors in the process of transformation we have witnessed with the respondents in this study. After all, these new instructors’ experiences suggest that when we discuss the importance of such teaching and learning spaces for our campuses, we would do well to consider not only learners’ development, but also teachers’ development.

References

- Amundsen, C., & Wilson, M. (2012). Are we asking the right questions? A conceptual review of the educational development literature in higher education. *Review of Educational Research*, 82(1), 90-126. <https://doi.org/10.3102/0034654312438409>
- 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(3), 203-213. <https://doi.org/10.1187/cbe.09-03-0025>
- Baepler, P., & Walker, J. D. (2014). Active learning classrooms and educational alliances: Changing relationships to improve learning. *New Directions for Teaching and Learning*, 2014(137), 27-40. <https://doi.org/10.1002/tl.20083>
- Beichner, R. J. (2014). History and evolution of active learning spaces. *New Directions for Teaching and Learning*, 2014(137), 9-16. <https://doi.org/10.1002/tl.20081>
- Beichner, R. J., Saul, J. M., Allain, R. J., Deardorff, D. L., & Abbott, D. S. (2000). *Introduction to SCALE-UP: Student-Centered Activities for Large Enrollment University Physics*, Washington, DC: Fund for the Improvement of Postsecondary Education.
- Beichner, R. J., Saul, J. M., Abbott, D. S., Morse, J. J., Deardorff, D., Allain, R. J., ... & Risley, J. S. (2007). The student-centered activities for large enrollment undergraduate programs (SCALE-UP) project. *Research-Based Reform of University Physics*, 1(1), 2-39.
- Bonwell, C. C. (1996). Enhancing the lecture: Revitalizing a traditional format. *New Directions for Teaching and Learning*, 67, 31-44. <https://doi.org/10.1002/tl.37219966706>
- Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom*. 1991 ASHE-ERIC higher education reports. ERIC Clearinghouse on higher education, Washington, DC: The George Washington University.
- Brooks, D. C. (2011). Space matters: The impact of formal learning environments on student learning. *British Journal of Educational Technology*, 42(5), 719-726. <https://doi.org/10.1111/j.1467-8535.2010.01098.x>
- Brooks, D. C. (2012). Space and consequences: The impact of different formal learning spaces on instructor and student behavior. *Journal of Learning Spaces*, 1(2), 1-10.
- Carr, N., & Fraser, K. (2014). Factors that shape pedagogical practices in next generation learning spaces. In K. Fraser (Ed.), *The future of teaching and learning in next generation learning spaces* (pp. 175-198). Bingley, England: Emerald. <https://doi.org/10.1108/S1479-362820140000012013>
- Chen, V. (2015a). "There is no single right answer": The potential for active learning classrooms to facilitate actively open-minded thinking. *Collected Essays on Learning and Teaching*, 8, 171-180. <https://doi.org/10.22329/celt.v8i0.4235>
- Chen, V. (2015b). From distraction to contribution: A preliminary study on how peers outside the group can contribute to students' learning. *The Canadian Journal for the Scholarship of Teaching and Learning*, 6(3), 1-14. <https://doi.org/10.5206/cjsotl-rcacea.2015.3.8>
- Chen, V., Leger, A., & Riel, A. (2016). Standing to preach, moving to teach: What TAs learned from teaching in flexible and less-flexible spaces. *Collected Essays on Learning and Teaching*, 9, 187-198. <https://doi.org/10.22329/celt.v9i0.4439>
- Cranton, P. (1996). *Professional development as transformative learning. New perspectives for teachers of adults*. San Fransisco, CA: Jossey-Bass.

- Cranton, P. (2006). Fostering authentic relationships in the transformative classroom. *New Directions for Adult and Continuing Education*, 2006(109), 5-13. <https://doi.org/10.1002/ace.203>
- Cranton, P., & King, K. P. (2003). Transformative learning as a professional development goal. *New Directions for Adult and Continuing Education*, 2003(98), 31-38. <https://doi.org/10.1002/ace.97>
- de la Harpe, B., & Mason, T. (2014). A new approach to professional learning for academics teaching in next generation learning spaces. In K. Fraser (Ed.), *The future of teaching and learning in next generation learning spaces* (pp. 219-239). Bingley, England: Emerald. <https://doi.org/10.1108/S1479-362820140000012015>
- Felten, P., Kalish, A., Pingree, A., & Plank, K. (2007). Toward a scholarship of teaching and learning in educational development. In D. Robertson & L. Nilson (Eds.), *To improve the academy: Resources for faculty, instructional and organizational development*, Vol. 25 (pp. 93-108). San Francisco, CA: Jossey-Bass. <https://doi.org/10.1002/j.2334-4822.2007.tb00476.x>
- Florman, J. C. (2014). TILE at Iowa: Adoption and adaptation. *New Directions for Teaching and Learning*, 2014(137), 77-84. <https://doi.org/10.1002/tl.20088>
- Freire, P. (1970). *Pedagogy of the oppressed*. New York, NY: Herder and Herder.
- Gebre, E., Saroyan, A., & Aulls, M. W. (2015). Conceptions of effective teaching and perceived use of computer technologies in active learning classrooms. *International Journal of Teaching and Learning in Higher Education*, 27(2), 204-220.
- Granito, V. J., & Santana, M. E. (2016). Psychology of learning spaces: Impact on teaching and learning. *Journal of Learning Spaces*, 5(1), 1-8.
- Habermas, J. (1971). *Knowledge and human interests*. Boston, MA: Beacon Press.
- Hall-van den Elsen, C., & Palaskas, T. (2014). Transition to next generation learning spaces. In K. Fraser (Ed.), *The future of teaching and learning in next generation learning spaces* (pp.199-218). Bingley, England: Emerald. <https://doi.org/10.1108/S1479-362820140000012014>
- Jamieson, P. (2003). Designing more effective on-campus teaching and learning spaces: A role for academic developers. *International Journal for Academic Development*, 8(1-2), 119-133. <https://doi.org/10.1080/1360144042000277991>
- Kitchenham, A. (2008). The evolution of John Mezirow's transformative learning theory. *Journal of Transformative Education*, 6(2), 104-123. <https://doi.org/10.1177/1541344608322678>
- Kuhn, T. S. (1962). *The structure of scientific revolutions*. Chicago, IL: University of Chicago Press.
- Leger, A. B., & Fostaty Young, S. (2014). A graduate course on teaching and learning in higher education: Influences on conceptions of teaching and learning. *The Canadian Journal for the Scholarship of Teaching and Learning*, 5(1), 1-13. <https://doi.org/10.5206/cjsotl-rcacea.2014.1.3>
- Mezirow, J. (1991). *Transformative dimensions of adult learning*. San Fransisco, CA: Jossey-Bass.
- Michael, J. (2006). Where's the evidence that active learning works? *Advances in Physiology Education*, 30(4), 159-167. <https://doi.org/10.1152/advan.00053.2006>
- Miller, C. J., & Metz, M. J. (2014). A comparison of professional-level faculty and student perceptions of active learning: Its current use, effectiveness, and barriers. *Advances in Physiology Education*, 38(3), 246-252. <https://doi.org/10.1152/advan.00014.2014>

- North Carolina State University. (n.d.) *Frequently asked questions*. Retrieved from <http://scaleup.ncsu.edu/FAQs.html>
- Temple, P. (2008). Learning spaces in higher education: An under-researched topic. *London Review of Education*, 6(3), 229-241. <https://doi.org/10.1080/14748460802489363>
- Wanless, L. (2016). A learning studio that inspires active pedagogy. *Journal of Learning Spaces*, 5(2), 61-65.
- Watson, G. (2017, June). *Evaluating an instructor support model for active learning classrooms*. Paper presented at the meeting of the Society for Teaching and Learning in Higher Education, Halifax, NS.
- Wilcox, S. (2009). Transformative educational development scholarship: Beginning with ourselves. *International Journal for Academic Development*, 14(2), 123-132. <https://doi.org/10.1080/13601440902970007>