



Change Process of Two Postsecondary Teachers in the Early Adoption of an Active Learning Classroom

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OPEN ACCESS

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Specialty section:

This article was submitted to
Digital Education,
a section of the journal
Frontiers in ICT

Received: 28 December 2017

Accepted: 18 May 2018

Published: 19 June 2018

Citation:

Fournier St-Laurent S and
Poellhuber B (2018) Change Process
of Two Postsecondary Teachers in the
Early Adoption of an Active Learning
Classroom. *Front. ICT* 5:12.
doi: 10.3389/fict.2018.00012

There is a growing interest for specialized classrooms, termed active learning classrooms (ALC), which are designed to facilitate the use of active learning methods and information and communication technologies (ICT) by students. Thanks to pioneering studies such as SCALE-UP, there is a better understanding of the benefits of these classrooms and the pedagogy taking place in them. Teachers accustomed to traditional classes have to change many aspects of their pedagogy in order to reap the benefits of the ALCs, however. The purpose of this research is to gain a better understanding of the adoption process of an ALC by teachers and how its adoption modify teaching preferences and practices. Relying on an in-depth case study methodology founded on interviews and questionnaires about the adoption of innovations (CBAM), Approaches to Teaching Inventory, technopedagogical competencies and collaborative, competitive or individual teaching preferences, this article describes the cases of two teachers who used an ALC over a three-semester period. The results show that the teachers develop their courses quickly, with an emphasis on the active learning aspects of their pedagogy rather than on ICT integration, and that there are a lot of personal and management concerns. When the pedagogical changes are stabilized, the teachers retained their personal concerns about the innovation and were highly motivated to collaborate with other ALC users. Finally, apparently minor increases in student-centered teaching approaches result in significant pedagogical changes when they are studied qualitatively. These changes did not lead to a reduction in teacher-centered teaching approaches, suggesting that a significant portion of teacher-directed activities remain.

Keywords: active learning, active learning classroom, pedagogical change process, adoption, student-centered practices, cooperation

INTRODUCTION

Several postsecondary educational institutions in Quebec were inspired by the American project SCALE-UP (*student-centered activities for large enrollment undergraduate programs*; Beichner et al., 2007). SCALE-UP emerged from major changes that take place in STEM education in the United States. It aimed to improve student learning by integrating collaborative, hands-on learning activities with abundant use of information and communication technologies (ICT) in large

enrollment programs where the use of amphitheater is frequent. Even though the changes made to pedagogy were important, SCALE-UP became most famous for presenting a rationale, practical applications, and demonstrating positive impacts of a classroom layout adapted for collaborative work and ICT use: the active learning classroom (ALC).

A body of research specific to ALCs is emerging. The research methods often include groups of students in traditional settings as a control condition (Dori and Belcher, 2005; Beichner et al., 2007; Charles et al., 2011). With regard to the students, the results are encouraging: increased conceptual understanding (usually double), higher success rates (double to sextuple), higher attendance (80–90%), and other positive outcomes associated with motivation.

The results of SCALE-UP and similar projects (such as the TEAL project) showed that classroom layout goes hand-in-hand with pedagogy even though early research doesn't discriminate between the effects due to pedagogical changes and those due to room layout. Charles et al. (2013) focused on the relationship between the pedagogy and the type of classroom layout. They reported that the type of pedagogy used (traditional or active learning) may have a different impact when used in ALCs or traditional classrooms, with lecturing actually faring worse in an ALC than in a traditional classroom. The authors were also the first to explore the relationship between teachers' beliefs about their role and student learning in the ALC setting. Results suggest that both the teachers' beliefs and the pedagogical approaches used in an ALC can influence learning outcomes. To make the most of the potential advantages of an ALC, a pedagogical change process must take place for many teachers who are typically more used to lecturing. In a sense, ALC layout, technologies and tools offer different pedagogical affordances that teachers may or may not use to influence the students' learning and academic success.

While the pedagogical benefits of ALC are more documented, the implementation of ALCs are generally time-consuming and costly. The general objective of investing in these classrooms is to facilitate active learning and group collaboration using ICT. However, both pose particular challenges to teachers and represent innovations in pedagogical practices that takes a long time to implement. Beichner et al. (2007) describe the change process for departments in terms of years. The process of adopting an ALC is not only costly in terms of equipment, but in time and energy for teachers as well.

CEGEPs are postsecondary colleges exclusive to the province of Quebec in Canada. They offer general (2 years) and specialized (3 years) programs in an educational system where undergraduate degrees and secondary school are both 1 year shorter. In this network, Kingsbury (2012) reported the appearance of eight ALCs in 2012, with the number rising to over 30 in 2014 (CLAAC, 2014). The proliferation of ALCs in CEGEPs can be explained in part by the interest of these institutions for active learning and integration of ICT to improve student academic success. Nonetheless, the rapid appearance of ALCs combined with the possible link between learning outcome and teachers' approaches raise concerns as to how this innovation is adopted. Additionally, Brooks (2012) showed that classroom layout does induce changes in pedagogical practices,

with traditional classrooms generating more lectures and ALC generating more group activities. The CEGEP context offers a good opportunity to explore the impacts of ALCs' use of early adopters.

In this study, we seek to gain a better understanding of the adoption process of an ALC by teachers and how its adoption modify teaching preferences and practices. We rely on a "thick description" that provides interpretive depth (Spiegelberg, 1978). The study's objective is to describe the cases of two teachers (selected from a larger group) who made the most significant changes toward ALC-oriented pedagogy over a three to four semesters period.

CONCEPTUAL FRAMEWORK

This study takes place in a postsecondary education setting with recently acquired ALCs. In our attempt to better understand the adoption of the ALCs as an innovation, we selected key theoretical concepts from the teachers' perceptions, beliefs or practices linked to active learning and ICT integration. It should be noted that these concepts are linked to self-reported indicators, as we chose to avoid direct monitoring of practices at this stage. Additionally, we chose concepts that have already been adopted in education and are accompanied by validated instruments.

Preferences Regarding the Type of Instructional Methods and Teaching Approaches

Active learning is a broad term often presented in opposition to lectures or other types of "traditional instruction" (Prince, 2004). In practice, active learning refers to several instructional methods grounded in active pedagogies, such as problem-based learning (Barrows, 1996; Savery and Duffy, 1996), project-based learning (Blumenfeld et al., 1991), peer learning (Crouch and Mazur, 2001), and various collaborative and cooperative techniques (e.g., pause, jigsaw, pyramidal scripts—see Howden and Kopiec, 2000 as an example). Productive failure is a more recent method that could also qualifies as an active learning method: the initial failure part focusing on collaborative research and attempts to solve a problem (Kapur et al., 2010). Among these methods, two salient types emerge from the descriptions given by authors: student-centered learning and collaborative learning.

Student-Centred Learning

The difference between active learning and traditional instruction generally lies in the role of the students in these different situations. The role of students during lectures is mostly to receive the knowledge given by the teacher and take notes. While some students may be active and engaged in lectures, it is useful to contrast the relative passivity of listening to a speech with the active role required of students in instructional methods such as problem-based learning (where they have the responsibility to research new ideas, collect data, analyse problems, and more), cases studies, and cooperative learning. Students are also active in many other ways: they may act on the work of other students

(Macpherson, 2007), develop a product (Barron et al., 1998), attempt to solve a very difficult (or impossible) problem (Kapur, 2012). In summary, active learning is associated with the idea that the students are required to be more active, through the tasks they have to accomplish in the associated instructional methods.

When students take an active role, the role of the teacher changes accordingly. The teacher no longer acts as the main intermediary between the students and the material (Bonwell and Eison, 1991). Students may not have the required level of cognitive and metacognitive strategies to assume these new responsibilities, however, so the teacher has to guide them in choosing and applying the appropriate strategies (Hmelo-Silver, 2004; Gijbels et al., 2005). This is an important role in the context of active learning, with an effect on student performances (Yukselturk and Bulut, 2007).

Added to this list of new responsibilities is the need for instructional design that provides proper scaffolding and technical support for the students (Laffey et al., 1998). In problem-based learning, for example, students learn through ill-structured problems that have multiple acceptable or correct answers. They must explore many solutions (and much material) to find the one that seems best (Hmelo-Silver, 2004).

We can illustrate the shift in responsibilities of the teacher and the students with a gradient. This image can be found in the taxonomy of Chamberland et al. (2006): each instructional method has a relative position on a “control of learning” continuum ranging between a totally teacher-controlled point (teacher-centered) and a totally student-controlled point (student-centered). The teacher-controlled end refers to activities where the teacher has complete control over the activities, such as the pace of learning and the material shown to the students. Lectures are a good example of the teacher-centered method. At the other end, the students have more freedom to explore, determine the pace of learning and choose their strategies. Bonwell and Sutherland (1996) also presents a similar approach to describe the nuances of teaching methods associated with active learning.

The teacher- vs. student-centered opposition is also found in the Approaches to Teaching Inventory model (Trigwell et al., 2005) which is based on a list of strategies adopted by teachers at the university level. This inventory provided the basis for a short questionnaire with two scales: student-centered and teacher-centered. It offers a useful tool for appraising the relative position of the teacher’s approach on a continuum. It was used in one ALC study with six teachers (Charles et al., 2011). Even though the number of cases was small in this study, the students obtained higher conceptual gains as their teacher self-reported more student-centered approaches.

Collaborative Learning

Another central aspect of active learning is collaboration among the students, which typically ranges from teams of two people (e.g., in peer learning) up to 12 (Wilkerson, 1996). Collaboration and cooperation can be seen as learning in a team of students who are working toward a common goal, although it is sometimes useful to make a distinction between collaboration and cooperation, to take into account the potential

effects of specific roles, contributions and hierarchy among the team members (Dillenbourg, 1999; Kirschner, 2001). It can also be described through comparison with two other types of interactions that students have with each other: competition and individual work (absence of interaction).

Johnson et al. (1998) refer to the early work of Koffka, Lewin and Deutsch in the 1900s and 1940s to describe cooperation as the result of interdependence structures among students: cooperation occurs when one student’s success depends on the success of their teammates, through task, and reward structures. Slavin (1996) mentions a good example of reward structures in group contingency, where rewards are given to a group of students if every member reaches a specific goal. Another type of interaction—competition—results from negative interdependence or contexts where the success of one student depends on the failure of another (e.g., single winner in a tournament). Finally, students are likely to work individually when there is a lack of interdependence.

One aspect of the teacher’s role in an ALC is to design contexts in which students will work together efficiently. Interdependence offers a practical objective for instructional design, since the literature offers examples of task and reward structures that foster positive interdependence. The analysis of teachers’ beliefs about collaboration offers a general perspective on what motivates the choice of learning activities. It is an alternative to direct monitoring of changes in the number and quality of collaborative activities put in place by teachers.

Technopedagogical Competencies

ALCs usually offer a wide range of technologies, from laptops to systems designed to share multimedia content among groups of students. In this technology-rich environment, teachers are likely to design activities where students will use technology to learn. As was the case for active learning, to be used effectively, integrating technology demands some changes in pedagogy (Conseil Supérieur de l’éducation, 2000; OCDE, 2008).

There are several models to describe ICT integration by teachers. One popular model is Technological Pedagogical And Content Knowledge (TPACK). It places ICT integration at the intersection of three kinds of knowledge required of teachers: content, pedagogy, and technology. TPACK does not focus on adding technology to the teacher’s existing pedagogy, but rather on the harmonious merging of the three components of interest. TPACK is useful for illustrating the key components of an instructional strategy.

While many models focus on the pedagogical integration of ICT, the approach used here to describe ICT integration is through the pedagogical skills needed to integrate ICT, for example, those identified by the International Society for Technology in Education (ISTE) in 2008. This approach offers a broad view of the possible changes teachers may implement when using an ALC, without focusing on specific equipment or applications.

The work of the ISTE and the technological pedagogical skills suggested by the TPACK, among other references, inspired the development of a framework of technopedagogical competencies

for teachers in the Quebec college network (Bérubé and Poellhuber, 2005). This model is founded on a broad review of international models of ICT integration and professional development, followed by interviews and validation with local experts. The model identifies four areas where teachers have to develop technopedagogical competencies; (1) communication and collaboration; (2) informational competencies; (3) instructional design (lesson planning, implementation and evaluation); and (4) production of educational resources. This model is anchored in a socioconstructivist perspective that fits well with the use of an ALC.

Adoption of an Innovation

The previously identified scales give little information about the possible concerns, challenges, and motivation factors for pedagogical change. Adopting an ALC entails complex interactions between equipment, pedagogy, and classroom layout.

One model that is frequently used in the context of pedagogical and technology adoption is the concern-based adoption model (Hall et al., 2006; Hord et al., 2006; George et al., 2013). It rests on the idea that the adoption of an innovation is first a process of professional change for the teachers. Furthermore, the users' perceptions determine what can be done to help them adopt the innovation. A key aspect of CBAM is the profiles of user concerns about the innovation being studied. The "self" concerns refer to informational and personal stages, where users have general awareness about the innovation and perhaps some doubts or questions about the effects of the innovation on themselves. The "task" concerns are directly related to the management stage, where users may have issues with regard to organizing and scheduling. The "impact" concerns are related to the consequence, collaboration and refocusing stages, which respectively refer to interest in the possible impacts of the innovation on the students, interest in cooperating with other users in the use of the innovation, and focus on exploring new ways to use the innovation (or even replace it).

The CBAM also shares similarities with models of pedagogical ICT integration through its Level of Use (LoU) branching interview. By asking questions about the use of the innovation in a specific order, the interviewer can quickly determine whether a teacher is using the innovation (first branching), what kind of changes the teacher has made to use the innovation (second branching), whether collaboration is occurring with other users of the innovation to generate student-oriented changes (third branching), and whether major changes are planned (fourth branching). For example, using an innovation (positive for first branching) and making personal, teacher-oriented changes to use it is labeled "mechanical use." This means the teacher focuses most of their effort on short and day-to-day use of the innovation.

The CBAM can complement indicators related to the teacher's role in active learning and ITC integration, since it can explain the changes observed. In the previous example, the teacher operating at the level of mechanical use may also have management concerns and report improved ICT competency. He may therefore focus on using new technology and equipment

to alleviate management problems (e.g., distribution of material, time management, better monitoring of the students' work).

METHOD

The research team is composed of researchers, teachers, and pedagogy professors from Université de Montréal and five CEGEPs (postsecondary colleges with pre-university and technical programs). For the purpose of this article, a multi-case approach was used: each case was treated individually and compared with the other cases. The description of each case is based on the key aspects of ALC use proposed earlier (approaches to learning, teaching preferences, technopedagogical competencies, and adoption of an innovation). Data was collected each term, using questionnaires, and individual interviews with the teachers. The total project duration was four terms, although some of the teachers recruited in this study participated for only three consecutive semesters.

Teachers

Although the results of this article mainly focus on two teachers, they were selected from a group of 13 CEGEP teachers teaching five different subject matters (literature, mathematics, physics, biochemistry, and philosophy) in three different CEGEPs. The teachers were initially assigned to an ALC by the administrative service at their CEGEP (in one CEGEP, the classroom was reserved for a specific subject matter). All invited users agreed to participate in this study. To ensure at least minimal use of the classroom, all the teachers committed to use it for at least 50% of their classroom time. Activities done in a laboratory setting (physics, biology) were excluded from the calculation.

Classrooms

Each teacher used one of three classrooms, each located in a different CEGEP. The cases described in his study took place in two different classrooms. The classrooms contained seven to eight permanently fixed tables large enough to accommodate teams of up to six students and equipped with electric and media connections (electricity, VGA, and internet). Each team was allowed to use their own team projector or TV screen. One white board and at least two laptops were also available for each team. The teacher's desk was either located in the center of the class (in one case) or included in the ring-shaped disposition of the tables around the room. Interactive whiteboards linked to the teacher's desk were available in two classrooms. The teachers reported that they were mostly used to present material, however: the students rarely or never interacted with this equipment.

Questionnaire

All the teachers answered a questionnaire at the beginning of each semester and at the end of the project. The questionnaire examined four dimensions: teaching preferences, approaches to teaching, technopedagogical competencies, and adoption of an innovation. It was an adaptation of the Stages of Concern questionnaire, a CBAM tool that is used to determine the relative intensity of each of the seven stages of concern. The teachers

answered the questions based on their agreement with the items, using a Likert scale of 5 or 7 points.

The items for the scales on teaching preferences and approaches to teaching were only available in English, so they had to be translated to the native language of the teachers, French. This was done using a cultural transvalidation procedure where each question was translated into French by a professional translator. Another translator then did a back translation. The original and final questions in English were compared. The questionnaire was read by five teachers working at the same CEGEP as the participants, to ascertain the clarity of the questions. After minor adjustments, the questionnaire was distributed to nearly 900 teachers from the participating CEGEP. A total of 128 teachers answered. The data were then used to examine the reliability and factorial validity of the translated scales.

In addition to these dimensions, demographic questions (e.g., age, years of experience in education) and two open questions about the advantages and challenges of using an ALC were added to the questionnaire. The final version contains 127 questions and takes around 20 min to answer.

Approaches to Teaching

Active learning is linked to instructional methods in which students take an active role in researching, organizing and analyzing knowledge. Accordingly, the teachers take less responsibility in the dissemination of knowledge and greater responsibility in providing cognitive process support for the students. For the teachers, this shift in responsibilities can be depicted on a continuum between a teacher-centered approach to teaching and a student-centered approach to teaching. If teachers see their role predominantly as the source of knowledge, their position on the continuum is toward the teacher-centered end.

Trigwell and Prosser (2004) offered a practical tool for assessing teachers' approaches with regard to these two dimensions. The Approaches to Teaching Inventory questionnaire was first developed with 58 university professors. The inventory of strategies adopted by the professors and their underlying intentions were organized and validated on two scales: teacher-focused and student-centered. In a second article, more items were added to the inventory (Trigwell et al., 2005). The participants answered 22 items using a five-point Likert scale.

The questionnaire was translated to French and validated. The final version contained eight items in the teacher-focused scale ($\alpha = 0.733$) and nine items in the student-centered scale ($\alpha = 0.833$).

Teachers' Preference

As stated earlier, active learning is closely related to collaborative learning. The teacher's preferences in this regard can be useful in understanding the potential impact of ALC adoption. Slavin and other authors offer a model which clearly separates cooperation (working together), individual work, and competition (working against others) (Slavin, 1996). For this purpose, a questionnaire from Owens and Barnes (1992) was used to determine the teachers' preferences in these three dimensions. The original

questionnaire is composed of 33 items divided into the three dimensions of interest.

After validation, the final questionnaire contained seven items for the individual dimension ($\alpha = 0.65$), seven items for the competitive dimension ($\alpha = 0.73$), and nine items for the collaborative dimension ($\alpha = 0.82$).

Technopedagogical Competencies

For this project, we chose to address ICT integration by the teachers' appraisal of their own technopedagogical skills.

A questionnaire was developed and validated based on Bérubé and Poellhuber's model (2005) and used in a previous unpublished study. It allows teachers to report how they perceive their own pedagogical ICT integration skill. For this project, questions were added for the "collaboration" and "use of specialized resources" dimensions. Exploratory factorial analysis of the original 30 items during the validation phase of the questionnaire yielded three scales:

1. Choice of instructional methods (5 items, $\alpha = 0.788$).
2. Use of ICT for creation and collaboration in active learning (12 items, $\alpha = 0.895$).
3. Use of resources related to field of study (8 items, $\alpha = 0.846$).

CBAM

Two CBAM tools were used in this study. The Stages of Concern (SoC) questionnaire is composed of 35 statements aimed to determine the teacher's level of concern about using an ALC related to seven stages of concern: unconcerned, informational, personal, management, consequence, collaboration, and refocusing. ALC use was defined as the general use of the classroom, including active learning pedagogy, and ICT. The data were analyzed and presented as recommended in the SoC guide (George et al., 2013). The second CBAM tool, Level of Use, was used in the interviews.

Individual Interviews

At the end of each term, the teachers were invited to an interview. Questions were based on the CBAM Level of Use tool which, as the authors state, "breaks use and nonuse into several levels" (Hall et al., 2006). LoU gives indications about the extent to which the ALC is used by a teacher. The levels are (0) nonuse, (1) orientation and acquiring information about the innovation, (2) preparation for the first use, (3) mechanical use focusing on short-term efforts, (4A) routine use where few changes are made, (4B) refinement to increase the impact on students, (5) integration and collaboration with other users, and (6) renewal. One question was added to clarify the opportunities for collaboration for teachers within the project and with the researchers. Another assessed the perceived impact of the ALC on their own work and on student learning.

A qualitative analysis was conducted using two coding lists. The first was a list taken from the Levels of Use, which allowed the coding team to identify segments linked to one of the seven levels of the LoU tool. The second coding list was designed using a mixed approach (Miles and Huberman, 1994). Codes were first listed based on the main items of the project's conceptual

framework. New codes were added by two researchers who read the material after the first term. Each term, an inter-coder agreement was made on a sample composed of 20% of the transcripts to be coded. The coders were the same and the percentage of agreement was always between 82 and 89%.

Ethics

The project was conducted under an ethics certificate from the Université de Montréal's pluridisciplinary ethics committee (CPER-13-112-D) and from each of the colleges with participating teachers. This study was carried out in accordance with its recommendations with informed consent from all subjects. All subjects were encountered by researchers and gave written informed consent in accordance with the Canadian three council guidelines, both for the survey and the interviews.

RESULTS

For this case study, we selected two cases (1 and 2) whose numerical indicators over the course of the project showed the most changes toward student-centered approaches, collaborative preferences, and high technopedagogical competencies. During the selection process, priority was placed on cases with the most change in student-centeredness, since it was a factor of interest in two previous ALC studies. Interestingly, the two cases identified using this rule were also the two cases that showed the most change toward collaborative preferences and they were among the top four teachers in terms of positive change in their perception of their skills. **Table 1** shows the change in perception between the last semester and first semester for all thirteen cases.

For each case, we first present a summary of the teacher's numerical change indicators over the project. The SoC profile is also shown. The quantitative data are linked to segments of the interviews conducted with the teachers to highlight factors that contributed to their adoption of the ALC.

Case 1

Case 1 is the teacher who showed the greatest positive changes in the following scales: collaboration preferences, student-centered approach to teaching and technopedagogical competencies (see **Table 2**). When he joined the project, he was mid-career (10 to 20 years). He had some previous formal training in pedagogy (less than 15 university credits) and showed great interest in the use of technology with students in the ALC. He prepared and gave the same course for three terms in the ALC and usually had three to four groups of 30 to 40 students each semester.

During the semester prior to his participation in the study, he attended an activity given by another teacher in the ALC. At that time, he saw the difference between a simple group assignment, where the teacher gives work to students and then sits at his desk, and the active learning setting, where the teacher guides the students' cognitive processes and the team engagement. The importance of models as a source of inspiration was underlined several times during the interviews.

I did not have models to show me how this works and how we work in this kind of classroom. On the other hand, lecturers are the models we always have seen.

For this teacher, his early experiences in the ALC were influenced by a need he felt to plan something new and innovative for each class. This pressure quickly led to fatigue, frustration, and the accumulation of small failures.

I had the feeling that since I was there, I had to use every piece of equipment and that everything about my planning had to fit perfectly with the tools. Otherwise, I would have failed.

Each time I was, like, "I need to do something new." Of course, I was trying something that wasn't perfectly ready. So it was rarely a success.

This personal pressure to innovate and use the equipment was found in other cases. Many reasons were offered. For example, the cost of the classroom and the fact that it was made available for them in the context of a special project made them feel privileged. As such, they felt a certain level of performance was somehow expected of them. Another example given by the teachers was the perception that the students expected something special.

At some point during the semester, this teacher stopped creating new activities and concentrated on some models that worked well. He then began working to improve these.

So I repeated it four times and, as I said, there was no longer this pressure that I had to do something new. I think the students liked it and I found my place.

Approaches to Teaching

Despite a small 0.33 increase in the student-centered subscale on the ATI (4.78 to 5.11), this teacher is one of the two cases who showed the greatest increase for this indicator. His goal was primarily to reduce lectures by replacing them with collaborative activities. During the first semester, emphasis was placed on the variety of these activities, but this set a design pace that was difficult to maintain and led to activities that were less successful. Furthermore, with this level of variety, he felt that the students were getting lost in the instructions. Toward the end of the first semester, he chose fewer models of activities that he could then work to improve.

You need to create habits. Then the students know what to do and ask fewer questions.

A similar change was made with the classrooms. During the first semester, he maintained access to a traditional classroom in which lectures were sometimes offered. After the midterm, he decided to stay in the ALC, mainly for practical reasons: students occasionally ended up in the wrong classroom. The students reacted positively to this decision, saying the ALC was more comfortable, attractive, and fun.

Despite these positive comments from the students, he was uncomfortable giving lectures in the ALC. During the second semester, he shared his concerns with students.

TABLE 1 | Change in teachers's perceptions between the last and first semester of ALC use for all cases.

Indicator	1	2	3	4	5	6	7	8	9	10	11	12	13
APPROACHES TO TEACHING													
Teacher-centered	0.89	0.37	0.25	0.75	0.25	-0.13	0.87	1.50	-2.50	-1.00	-0.37	0.25	-1.00
Student-centered	0.33	0.33	0.33	-0.11	-0.11	-0.11	-0.11	-0.22	-0.55	-0.55	-0.56	-0.89	-1.00
TEACHING PREFERENCES													
Individual	-0.97	0.07	0	-1.17	-0.33	-0.83	0.50	-0.67	-0.67	-0.17	0.50	0.33	-0.84
Collaboration	0.57	0.86	-0.14	0.43	0.43	0.15	0.14	0.43	0.29	0	0	0.28	-0.43
Competition	0.53	0.29	0.14	-0.15	-0.29	0.28	-0.28	0.14	-0.85	1.14	1.43	0.86	-0.43
TECHNOPEDAGOGICAL COMPETENCIES													
Choice of methods	0.20	0	0	-0.80	-0.60	-0.20	0	0.20	0	-0.40	-1.40	0.20	0.40
Creation/Collaboration	0.83	0.95	0.33	-1.42	-0.49	-0.58	-0.64	0.25	0.08	0.34	-0.17	-0.75	-0.17
Resources	0.88	0.75	0.13	-0.38	-0.50	0	0.12	0	0	-0.75	0.75	-0.63	0.88

A negative value indicate a lower value at the final semester.

TABLE 2 | Case 1: Change indicators before and after three semesters.

Indicator	Before	After
APPROACHES TO TEACHING		
Teacher-centered	3.25	4.14
Student-centered	4.78	5.11
TEACHING PREFERENCES		
Individual	3.17	2.20
Collaboration	5.86	6.43
Competition	5.33	5.86
TECHNOPEDAGOGICAL COMPETENCIES		
Choice of methods	4.00	4.20
Creation/Collaboration	1.50	2.33
Resources	1.75	2.63
CBAM		
LoU	4B	4B

TABLE 3 | Case 2: Indicators of change before and after three semesters.

Indicator	Before	After
APPROACHES TO TEACHING		
Teacher-centered	3.88	4.25
Student-centered	4.11	4.44
TEACHING PREFERENCES		
Individual	3.60	3.67
Collaboration	4.57	5.43
Competition	3.57	3.86
TECHNOPEDAGOGICAL COMPETENCIES		
Choice of methods	3.40	3.40
Creation/Collaboration	1.55	2.50
Resources	2.75	3.50
CBAM		
LoU	3	4B

In fact, the students said no! It's not a problem. I explained to them that they looked less engaged during lectures and that they did not seem to know where to look. They said they were not.

He welcomed these comments and later mentioned that he was less nervous about giving short lectures in the ALC.

A notable challenge to his new role as teacher surfaced during the second semester. Once the students were actively engaged in teamwork, it was difficult to stop them in order to give further instructions or small, lecture-like interventions. Even when the students stopped, their attention was not focused on the teacher. He found the solution in a routine in which a short lecture was given at the beginning of an activity. Later, the students had access to complete instructions for the activity. The teacher visited each team to offer theoretical support or special instructions. These small adjustments to the activity design offered a new way to fulfill his role.

When you plan lectures, you can adjust as you go and fill the time easily. Now, there are more activities to plan and more

teamwork. There is less space. In fact, I believe it is a different way to plan courses.

The new routine eventually ended up giving his students more time to accomplish their learning tasks and more control over their learning. It is important to mention that he remained critical about the changes.

I see students take notes and pay attention when we discuss the solutions at the end. I see them take pictures. But I do not know how well they organize this information. Yes, we have more interactions, but have they improved their retention of what was discussed?

During the third semester, he reported fewer changes, but he occasionally engaged the students in a new routine where they work on a problem and present their solution to the group.

Teaching Preferences

For this teacher, the collaborative teaching preference rose from 5.86 to 6.43, the competitive preferences also rose from 5.33 to 5.86, and the individual preferences decreased from 3.17 to 2.20.

During the first term, this teacher often designed activities with a cooperative work component. Briefly, each team was assigned a portion of the material to be covered and was responsible for sharing their work with others. Dividing the labor in this way also helped him cover more material. This advantage was a strong incentive to favor collaboration.

I slowly discovered that to use this classroom efficiently, I had to make the most of the fact that students were divided into teams. I find it very interesting to divide the material between the teams and bring them together at the end.

With some activities well established at the end of the first term, he focused on team management. During the second term of the project, he questioned his system of randomly forming teams. This subject was covered during a meeting between the researchers and teachers: early results indicated that many students preferred to choose their own teammates. Other teachers also mentioned trouble forming perfectly balanced teams.

At the beginning of the course, it [random assignment] is fun because the students meet new people. Once they have worked together, they are reluctant to change because they have already established a team dynamic. When they sit together, it is because they want to work together. So at that point, I stop randomly assigning students to teams.

Early in the project, he mentioned problems with student engagement in group work. One problematic situation was students who disengaged from the work. In this case, he tried to find structures, offer support, and adjust instructions. The teams were also asked more often to present their work to the group.

Last term, the students received specific tasks in their team and it worked well. I don't know why, but this year, I did not distribute the tasks. I feel the students worked less.

Another problem observed was students who were so engaged that they did not stop when the teacher had to give a general message. As a solution, he designed activities with minimal interruptions.

Once it starts, if you had the bad idea of planning a small lecture to explain something...forget about it... too difficult. Eventually they listen, but you really have to take over.

From the beginning, this teacher saw the positive impacts of collaboration on his own work (saving time by dividing the work). He also dealt with challenges in team management by seeking alternatives and by changing his pedagogy. This type of positive experience with group work aligns with the corresponding increase in the preference for collaboration.

Technopedagogical Competencies

This teacher's personal perception of his skills showed the greatest change in the use of ICT for collaboration/creation (1.50 to 2.33) and specialized resources (1.75 to 2.63). The interviews revealed two salient contexts of ICT use: the use of videos and the collaborative tool Google Docs.

To explain the increase in the use of specialized resources and creation, it is relevant to mention that in the first semester, this teacher developed specialized videos so the students could review the course content before coming to class. These videos were initially part of a flipped class approach, but he did not formally pursue this idea in the following semesters. The flipped class approach was maintained for a limited number of activities. He concluded his first semester by saying that no other significant ICT integration was made other than having the students use computers to look for information on the web.

No, I did not make major changes. I abandoned the exploration of some technologies because I had no idea what the other teachers were doing with them.

During the second semester, he tried the Google Docs application, effectively replacing Microsoft Word in activities where students had to write texts which were later presented to the class. This application later played an increasing role in keeping traces of the students' work and as public notes to prepare for exams. Google Docs may have contributed significantly to his increase on the collaboration/creation scale. He also began to use specialized applications to manage time (e.g., public stopwatch), but all these changes took quite some time to develop and implement.

Give yourself some time. After two semesters, I begin to feel ready to try more complicated things. This is a lot of change and you have to give yourself a chance.

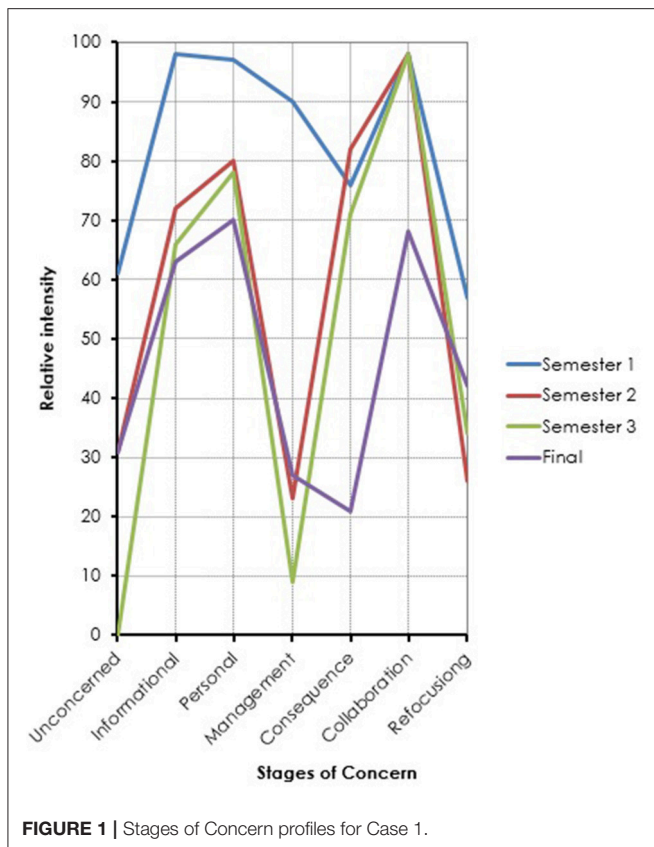
One observation that almost every teacher in this project made about ICT integration is the difficulty of effectively managing the computers and other electronic equipment. For this teacher, these difficulties can be mitigated by adopting a routine, which he tried to instill in his students.

Of course, if you use this place once, you will take a lot of time explaining to the students what they have to do, where to get the computer and how to install everything. But once they do it, they know what to do and there will be fewer problems the next time.

Unlike many other teachers, he did not report ICT issues as distractions.

No, not really. It is when I lecture that I notice students doing something else. They are openly on Facebook...and not embarrassed about it.

Except for developing videos, which replaced lectures on theoretical concepts, this teacher seemed to focus on other aspects of ALC use during the first semester. After establishing a routine, he began to replace some aspects of his activities with



new technology, such as Google Docs. The lack of major issues and the increase of the perceived skills suggest that further change is possible in the future.

Adoption of the Innovation

The SoC profiles in **Figure 1** show the relative levels of concern for Case 1 at the beginning of each semester and at the end of the project.

This teacher’s initial profile indicates relatively strong personal concerns that lasted for the duration of the project. The first semester is also characterized by a peak in the informational stage, meaning that this teacher was actively researching the innovation. In the first semester, management concerns were also high, but they quickly dropped afterwards.

In the second and third semester, the profiles are similar. One notable observation is the personal stage, which is higher than the informational stage. This represents a theoretical pattern called negative one-two split. According to the SoC guide, it indicates that this teacher may have personal doubts about the innovation that interfere with his interest in knowing more about it (George et al., 2013).

Of course, the authors also call for prudence in this kind of interpretation. This result was not supported by comments from the interview, as negative aspects of the ALC were always linked to management problems, such as lack of student preparation, time management, amount of effort to invest in course preparation. One exception was a comment presented

earlier about the way the students organize their notes and whether they remember what is discussed in class. We can see from the interview, however, that this teacher remained critical of his pedagogical choices and sought to improve student learning.

The peak observed in the collaboration stage can be linked to comments made in the interview about collaboration with other teachers. He showed interest in collaboration, but he could not find local colleagues to collaborate on the use of ALCs. In fact, the ALC in his institution was new and only a handful of teachers used it for more than one lesson. According to the SoC guidelines, a high informational stage and a high collaboration stage “suggests a desire to learn from what others know and are doing, rather than a concern for leading the collaboration.” This explanation is supported by previous comments about his interest in observing other teachers and learning how they use the ALC and ICT. This teacher also tried to reach others by giving oral communications about ALC use during the third semester. He was also visited by several colleagues who wanted to observe a typical lesson in the ALC. These actions may well have been the first step toward future collaboration.

Analysis of the interviews with regard to the LoU revealed that he stayed at level 4B throughout the project. This level corresponds to refinement: the teacher varies the use of the innovation to increase its impact on the students. He did not reach the next level because he did not collaborate with others to use the innovation.

In summary, Case 1 rapidly designed activities and video resources during the first semester. Afterwards he focused on improving teamwork effectiveness and integrated more ICT in his activities. Collaboration was a need that was not filled for this teacher. One possible way to help him is to provide him with examples of ALC use by other teachers.

Case 2

Case 2 is the teacher who demonstrated the greatest change in teaching preferences for the collaborative indicator (see **Table 3**). He was also among the teachers with the greatest changes in the technopedagogical competencies subscales. When he joined the project, he was in mid-career (10 to 20 years) in education. He had no academic base of pedagogy and showed great interest in the use of the ALC as a way to generate new experiences with his students. He prepared two courses over his three-semester experience and usually had three groups of 25 to 35 students. Prior to this project, this teacher designed another course in the same subject with the intention of using it in the ALC. Departmental assignments did not allow him to use his work. It should be noted that despite these efforts, he described himself as a teacher who mainly uses lectures in class. He also had several concerns about ICT use before the project.

When asked about the main advantages of the ALC, this teacher always made positive comments about the layout and the fact that his classroom is different. He refers to the ALC as a source of creativity for developing new activities for students.

Approaches to Teaching

As in Case 1, this teacher's results increased for both student-centered and teacher-centered scales. The small 0.33 increase in the student-centered scale was the highest increase observed.

During the first term, he focused on testing activities similar to those he had previously designed. He also planned new ones. Typical activities began with a lecture and were followed with a teamwork period where students gathered specific information and did calculations to answer a problem. In contrast with the ill-structured problems usually found with problem-based learning, his activities mostly required a single correct answer from the students.

After the first term, this teacher showed enthusiasm about the classroom. He reported that the ALC fostered new ideas and changed the teacher-student dynamic. Instead of the teacher trying to make the students do things, they began to raise questions themselves.

I could give the same activity in another classroom, but this one stimulates me. There is still work to do, but this place motivates me to design interesting activities. This year, I have done more and I have plenty of ideas for the future.

The boards on the walls are a notable example of equipment that allows for a different way of thinking about the tasks students will do.

So I would draw a graph in front of them. But in the ALC, they all have their own boards, so I like to project the image of a grid and they draw their own graph.

Once this base had been established after the first term, he focused on the design of his existing activities by replacing parts where he was still lecturing. The teacher also saw these improvements as a way to reduce the time the students spent listening. Listening is perceived to be more difficult for students in an ALC.

Students still have some trouble listening and I think there is still room to cut back on my lectures. I want to plan more teamwork.

More time allotted to collaborative learning meant that the students had more time for discussions. The perception of these discussions was generally positive:

The students look happy when they do these activities. They discuss and negotiate...why...how...how did you get the answer...this answer makes no sense...

He also reported that he let the students discuss a problem instead of readily giving the information, which is in line with the new role of teacher in an ALC.

I just said something to a group of students and the team at the next table piped up. I didn't say a word, just listened and heard them out.

During the second term, new ideas also came from the students. Their favorite movies, music, and hobbies became the starting points for new contexts for the problems to be solved.

He told me he liked that very much. So I spent 20 hours designing an activity on it. It took me so much time to research the subject that I didn't work on the actual design as much as I hoped.

He also mentioned an increasing interest in designing activities that look like games or allow students to study problems in fictional, yet entertaining contexts.

During the third term, he introduced music in some activities. This was an interesting change since in a traditional lecture setting, music would be seen as an auditory interference for the transmission of knowledge.

So I put on music to go with the subject of their activity. There was a calm sort of mood in the classroom. It was fun to put on a bit of music to enjoy the activities.

Teaching Preferences

The results for this indicator improved the most on the collaboration scale (4.57 to 5.43), with a small increase observed on the competitive scale (3.57 to 3.86). The relatively low score for the collaborative scale during the first semester (4.57, vs. 5.98 for the mean of the cases) may be explained by comments about the fact that in the new setting, the students interacted among themselves more and were less inclined to listen as they did before.

Students rapidly develop a sense of complicity among themselves and less with me.

There were problems with students who came to class unprepared and slowed the progress of their team. He felt that no matter what action was taken, they remained disengaged. This belief did not change during the project.

Despite these concerns, this teacher continued to dedicate more time to collaborative activities during the second semester. It should be noted, however, that the description of the activities revealed similar patterns. This observation will be further explored later.

This time I did more group work. I had a small script and I did many similar activities with it.

In general, this teacher mentioned many situations where collaborative work was beneficial. Both skilled and less skilled students seemed to enjoy a positive impact from the ALC. Teamwork was often associated with perceptions of increased engagement:

The students sometimes seem apart and not very active when they sit at a table. When we begin group work, they get close, they explain things to each other. I find this interesting.

Technopedagogical Competencies

As in Case 1, the Case 2 results show an increase in the use of resources (2.75 to 3.50) and creation/collaboration (1.55 to 2.50). There was no change in the choice of methods scale between the beginning and the end of the project.

The main discoveries this teacher made during the project were Google Docs and Google Spreadsheet. He had had the opportunity to use these resources in a professional context prior to the project. These online and collaborative tools greatly improved support, including support from other teams.

I go everywhere in Google Docs and I quickly get to know my students. If they are stuck, nothing stops them from looking at the work of other teams.

The use of Google's collaborative tools is probably the main reason for the perceived improvement of informational and communication skills, since they are the only collaborative ICT this teacher said he used in his courses. Other applications and equipment were considered, but not tried.

I do not think I used technology much. The students often used their computers to look for information. I did not take the time to use surveys and I stopped thinking about other tools. I am not too familiar with them because there is no way to give individual feedback to the students.

When designing activities, he also drew on many subject-matter resources that the students could use to solve problems in class. He was not afraid to explore new resources, even in front of the students:

Anyway, I am older than them. Naturally, they have more computer skills than I do. Sometimes, if I'm stuck, a student helps me. It makes them so proud!

Like many teachers in the project, he reported that ICTs were sometimes a source of distraction for students. It should be noted that the ALC layout made it more difficult for this teacher to notice disengaged students:

As for engagement, the problem in this classroom is that I cannot see everything. If a student is playing with his phone, it is harder to see.

Adoption of the Innovation

The SoC profiles in **Figure 2** show the relative levels of concern for Case 2 at the beginning of each semester and at the end of the project.

The SoC profiles in **Figure 2** show that personal concerns remained high relative to the other concerns. The profile at the beginning is similar to the model of nonusers proposed by the authors of the SoC guide, except for the relatively small increase in the collaboration and refocusing stages (George et al., 2013).

The high collaboration stage indicates an interest in coordinating and cooperating with other users of the innovation, while the refocusing stage is associated with exploring the more general benefits of the innovation and the possibility of replacing

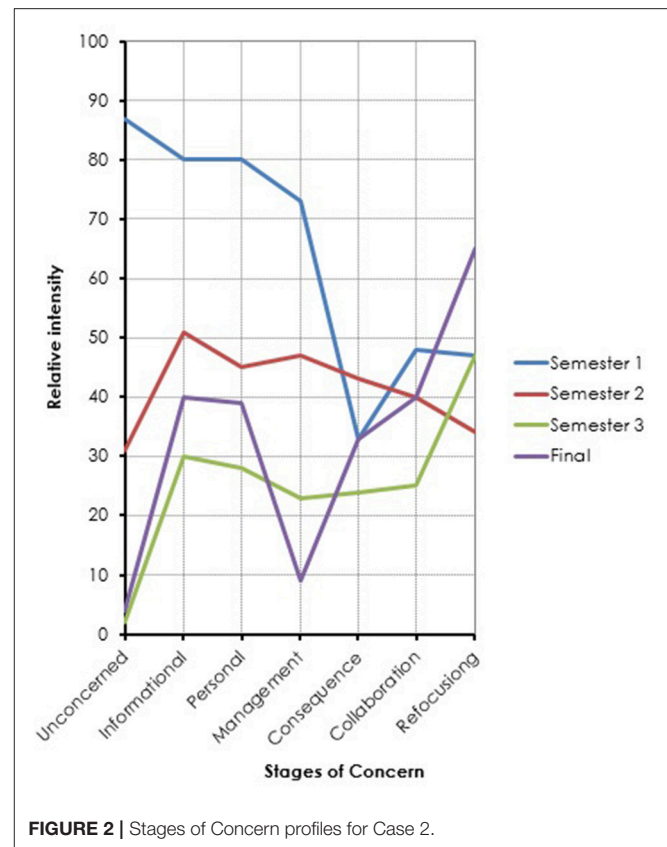


FIGURE 2 | Stages of Concern profiles for Case 2.

it or making major changes to it. While collaboration was encouraged in this project, we found the level of the refocusing stage surprising for a new user of the innovation. In the second term, the profile is similar to an intermediate state of adoption, although the informational stage is lower in the theoretical profile.

As users gain experience, they usually become less concerned about the personal impacts of the innovation, while in the later stages, consequence and collaboration increase. This change did not occur in the third semester and final profiles. Instead, this teacher's personal concerns remained relatively high and we see an increase in the refocusing stage. As shown in the SoC guide, this tailing up at the last stage may indicate resistance to the innovation.

To find signs of doubt that would explain the step rise for the refocusing stage, we can return to the teacher's collaborative preferences. They increased between the beginning and the end of the project and the reported amount of time dedicated to collaborative learning increased. However, the answers to questions about typical activities and possible changes in the way activities were designed revealed that no particular structure for collaboration had been put in place.

They do not have to work in teams. In fact, they can do the problems alone, but if they join a team, they must collaborate.

In short, this teacher was interested in collaboration and used it more often, but there were no design features in place to promote

collaboration. With regard to ICT use, plenty of resources were available to the students. He also used technologies himself, but with the exception of Google Docs, his activities were not designed so that students will use technology.

It should also be noted that this teacher invested a lot of effort in lesson design, including a course that could not be given in the ALC. Outside the context of the interview, he mentioned fears of losing access to the ALC once the research project ended. These factors may have contributed to his hesitation to invest further effort in development.

With regard to the LoU aspects of the interviews, the coded segments indicated a level 3 for the first semester and 4A for the remaining semesters. Level 3 refers to mechanical use: the user focuses on the short-term use of the innovation and changes are usually made to meet his needs rather than those of the students. In short, this teacher was probably in a survival state during the first semester. Level 4A is considered routine use: few changes are made and little effort is put into improving the use of the innovation to achieve impact for the students. The teacher's use of music and the students' interests is interesting—only two teachers in the project used ambient music—but in this case, it did not balance the lack of changes in the general activity model.

No! I think my activities and approaches work and I intend to use them again this semester.

In summary, Case 2 was inspired by the classroom and showed positive changes in student-centeredness and collaboration, including collaboration with ICT. He invested a lot of effort in the development of new activities during the first semester but did not explore his design options much. The high refocusing stage in the SoC profile may be explained by awareness of the need to make changes in the pedagogy. In this case, combined interest in collaboration and information could mean that he did not clearly see how these changes could be made. One way to help him would be to propose modifications to his existing activities or, as in Case 1, provide him with examples of ALC use by other teachers.

DISCUSSION

The two cases described in this study are those whose indicators progressed the most toward the idea of adopting student-centered approaches to teaching, collaborative preferences and technopedagogical competencies. The common aspects of this change can be found in the description of the cases.

Develop and Stabilize

In each participating institution, the ALCs were the only places specially designed to facilitate active pedagogies and the use of ICT. These were unique, special and often expensive places. The first semester of use for this innovation revealed a sense of performance for one teacher and a burst of creativity for the other. In both cases, the first semester was associated with a significant phase of development of new learning activities. Case 1 shows us a danger in this rapid expansion, that is, testing too many different teaching methods. This approach requires a lot of effort and the activities include many aspects

that the teacher had not had the opportunity to test before. In addition, the many changes in student tasks from one activity to another and the sheer variety of required learning tasks can become confusing for them. After discovering this problem, the teacher chose to focus on fewer types of activities that he repeated and refined. Creating routines seemed to offer some stability, for both the teacher and his students, which is seen in a drop in the management concern on the SoC subscale. It was from this stability that he initiated changes to create a better structure that fostered collaboration and explored new ICT technologies. For the other teacher, the design effort seems to have focused more on the diversity of problems and situations than on the use of different teaching methods. In both cases, informational, personal and collaboration concerns were high, indicating an open mind about ALC use by other teachers.

Development of Active Pedagogies Before ICT

The changes made in the ALC first focused on the use of more active learning methods. Apart from the use of computers to search for information, ICT use was limited on the student side during the first semester for Case 1. Case 2 also integrated Google Docs in the first semester, which Case 1 did in the second semester. Case 1 justified this limited integration of ICTs by the fact that using an ALC requires a lot of changes and that he needed to give himself some time. As both teachers have an interest in collaboration, the integration of ICTs could involve collaboration with other ALC users in the future.

Decrease of Lectures

Once the initial development phase is complete, teachers can improve activities to maximize the impact on the students or keep the business models already developed and use them more often in one semester. A feature that both these teachers shared was to focus on replacing lectures with known models. This feature is most evident in the third semester, where little change occurred in the overall form of activities. Rather than mentioning an interest in selecting teaching methods appropriate to the knowledge that students were supposed to learn, the teachers instead described their design efforts as a replacement for lectures. The absence or weak progression of indicators for the choice of methods supports this observation.

The relatively low level of the consequence stage in the SoC questionnaire results could mean that the teachers were so busy or concerned with the design of their activities or the development of their ICT resources (such as videos) that they were less concerned about the changes needed to maximize the impact on student learning. In short, after a considerable initial phase of development, the teachers seem to have continued their adoption of ALC by focusing on the proportion of learning activities in which active pedagogies were used. This strategy appears to have worked well to the extent that the teachers reported changes in their role as teachers, progressing toward a student-centered approach.

High Scores for Personal Concerns

We observed that personal concerns remain high in the various stages of concern. According to the SoC guide, the profile of a more experienced user shows a decrease in personal concerns, but the teachers mentioned the significant investment of time required to design the activities. Additionally, the use of active pedagogies limited their room for maneuver in what they could do in class. They also mentioned that students engaged in an activity were difficult to stop. In fact, both teachers developed activity models where they gave a presentation at the beginning of the course. Their rapid adoption of active methods and discovery of new limits to their role justify their uncertainties and personal doubts about the innovation.

High relative intensity in the early stages may also be related to concerns for collaboration. Case 1, in particular, revealed this link. He explained that he gained a better understanding of his role as a guide thanks to the example of another teacher. He also mentioned that he could integrate ICT if he saw ideas from other teachers. Unfortunately, neither case collaborated with other ALC users. The fact that the ALCs are new and the lack of a collaborative structure among the teachers in the participating institutions (e.g., community of practice) reduced the opportunities for collaboration. Another participant in the project also mentioned that she had the most time to interact with other ALC users during the teachers' strike days: a strike of a few days took place during the course of this study and it was at that moment that she had the most discussions about her practices.

Increase in the Teacher-Centered Approach

The increase in teacher-centered teaching approach scale scores seems difficult to explain, since the student-centered approach also increased. Although the teachers said they provided more time for teamwork activities, it should be noted that they both set aside time for lectures at the beginning of lessons and they both experienced a major change from their previous teaching approaches. Case 1 outlined his strategy for disseminating content to each team and voiced doubts about the students' ability to keep track of their discussions. Case 2 emphasized individual feedback as a limitation with ICT integration. Interestingly, both teachers had different scores for approaches to teaching based on the setting they were teaching in (Lindblom-Ylänne et al., 2006). A portion of their courses were less affected by the pedagogical changes and their indicators show that they did not fully adopt the innovation. The increase in teacher-centeredness may be related to the portion of their courses given in a traditional lecture format. Maintaining a teacher-centered role may be justified in some lessons that were less affected by the changes after three semesters.

Strengths and Limitations

Numerical indicators combined with interviews helped to clarify several lines of explanation related to the adoption of the ALC. Notably, the interviews showed that extensive changes can be made in pedagogy with small changes in the corresponding indicators.

Case selection is a limit in this study, in that quantitative results do not necessarily reveal users whose practices have evolved the most: there were no systematic observations in class. This study is also limited by the fact that the data are self-reported, so desirability phenomena may have come into play.

Although the descriptions of the two cases share several similarities, this study only describes the experience of two teachers who previously had limited experience with active pedagogies. They were also the first to use a classroom which was unique in their institution: a truly frontier experience for them. To participate in the project, the teachers had to use the ALC beyond a minimum threshold (50% of theoretical lessons), which could have influenced the innovation adoption process, especially during the first semester where several activities had to be implemented to attain the threshold.

CONCLUSION

The purpose of this article was to describe the adoption of an ALC by two teachers whose individual scores with regards to ALC use changed the most positively toward student-centeredness, collaboration and high technopedagogical competencies. These two cases were selected from a sample of 13 teachers offering courses in five different subject matters in three different institutions. Quantitative and qualitative data were used to describe the teachers' adoption process over a period of three semesters.

Both teachers were motivated to develop new activities during the first term, despite the efforts required. After some time, activity models were reused multiple times with the objective of transforming lectures into teamwork activities. Most of the pedagogical changes involved active learning, rather than ICT integration. While the teachers mentioned several uses of technologies, the students mostly used computers to look for information and Google Drive to collaborate. Elevated informational and personal concerns for the use of an ALC indicate that the teachers may not have been comfortable about the change in their role. The increase in teacher-centered approaches supports the idea that the change in the teacher's role is not straightforward. The interest in collaboration in this setting suggests that it would be useful for them to see concrete examples of ALC use in which a teacher assumes solely the role of guide. Teachers may also simply be given more time to adapt to what seem to be complex and demanding changes.

With regard to the results and limitations of this study, teachers who attempt to use an ALC for the first time could aim to develop a routine with their students by implementing a few activity models they are comfortable with. Observing and collaborating with other teachers should be encouraged. Institutions and professionals who collaborate with teachers can facilitate such collaboration. They may consider establishing a community of practice for ALC users (e.g., such as SALTISE in the CEGEP network) or contributing to digital collections of sample activities done in ALC settings.

This study adds to the emerging research on the impact of the ALC on teachers' pedagogy. While the cases share

some similarities related to the early phase of development and general priorities, there are differences in their adoption process, especially with the CBAM. Therefore, keeping a variety of indicators could be considered in future research. It could also be useful to verify whether the increase in teacher-approaches and the high level of personal concerns are specific to these cases or a common adoption stage for early ALC users with limited experience in active learning.

AUTHOR CONTRIBUTIONS

SF a doctoral student of BP was the co-researcher in the project. He supervised all the data collection, participated

in the research design and conducted the quantitative and qualitative data analysis. He wrote the largest part of the article. BP provided the intellectual leadership and designed all aspects of the study, supervising the research at each point. He also helped plan the article at a high level and validated its writing.

ACKNOWLEDGMENTS

This research received financial support from the PAREA program of the Quebec Ministry of Education (PA2013-012) and from an SSHRC partnership development grant (grant number 890-2012-0052).

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Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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