

# **Pedagogical Innovation: Between Social Reality and Technology**

*Anne M. Walder*

*Graduate School of Education and Information Studies,*

*University of California, Los Angeles*

*anne@walderpublications.ch*

*+41 78 724 11 25*

## **Abstract**

Pedagogical innovation often arises in response to the pressures faced by the modern university (Pelletier, 2009). However, despite it being at the heart of professorial practice, it is not easy for a professor to integrate an innovation into their teaching in a university that is strongly committed to research. This qualitative study explores the types of pedagogical innovation put forward by professors at the Université de Montréal and reveals seven distinctive pedagogical innovation categories. The results suggest that pedagogical innovation hinges on two aspects: social reality and technology.

**Keywords:** Pedagogical innovation, Higher Education, Professorial work

### **Professorial work in today's university**

A university professor's professorial tasks entail dispensing teaching, guiding students, research assignments and administrative responsibilities, and are evolving in line with today's students. In effect, the university in transformation (Loiola, 2010) and the new student profile mean that professors need to reflect upon their changing teaching practices (Rege Colet and Romainville, 2006). The researchers Saussez and Loiola (2008) recommend establishing links between knowledge studies, professors' beliefs, cultures and contexts. This reflection allows one to note that the concepts of learning and teaching are inextricably linked.

The profession of university professor proves to be a multifaceted role comprised of a multitude of teaching activities in which dynamism and originality coexist (Clark, 1987). The university route allows a student to absorb themselves in, and then conform to, the university culture and discipline. The professor, equipped with their own ideas about the act of teaching, which they have inadvertently developed through daily observation during their own time as a student, endeavours to become, often within a difficult setting, a good teacher and a "guardian of a society in which the degree prevails" (Côté and Allahar, 2007, p. 85) in order to perpetuate the student-customer university. Besides a growing workload and class registers overflowing with students who are heterogeneous and disengaged (*ibid*) or the opposite, highly motivated, professors find themselves torn between much-coveted research achievements and the qualities expected of a teacher. In effect, the profile of today's university students is characterised by the presence of adults motivated by a professional goal. The student is no longer who they once were, as higher education has shifted from the elite to the masses (Romainville, 2003). The students of yesterday, hungry for knowledge, have given way to adult learners who pursue a university education with an almost exclusively professional goal. Today, the student splits their time between their student activities, their professional activities and leisure. Whilst it is possible to be divided over the exclusively professional view, it is undeniable that the university student no longer accords the same priority to their studies.

Moreover, the globalisation of higher education, meaning the space in which universities deploy their training activities whilst preserving their own local reality (Lemasson, 1999), as well as the internationalisation of universities (CSÉ, 2005), which is accelerating in the East, particularly through Education Hubs (Gagnon, 2013), evoked by Walmsley (1970) and Morin (2006), encourages exchanges, and student mobility between universities and different countries and regions. This context leads to a multicultural (Gérin-Lajoie, 2002) student population that is simultaneously accompanied by a significant feminisation (Romainville, 2003) of university attendance. These factors involve two additional social variables that the teacher has to manage: gender and multiculturality.

Over time, professorial work has evolved alongside transformations taking place within the university institution. Rege Colet and Romainville (2006) identify three reasons for teaching practice change within an evolving university: a skills-based curriculum, a growing focus on the university's teaching function and a move towards more student-centred approaches, in accordance with Béchar'd's (2000) work. This results in certain learning approaches - problem-based, project-based and case studies - which herald a paradigm shift.

Whilst the Scholarship of Teaching and Learning (SoTL) (Boyer, 1990) proposes formalising teaching expertise, a question arises: what should be done with university teaching knowledge? The results of research studies converge on innovative pedagogical development against a multidimensional vision of higher education quality improvement (Grocia, 2010). The model of Frenay et al. (2010) is based on five aspects: mission and context (national, institutional and disciplinary); principles, values and codes of conduct; pedagogical development services; the expertise of the pedagogical advisor; and impact

assessment. Rege Colet and Berthiaume (2009) believe that teaching ability develops in relation to the disciplinary grounding of the pedagogical knowledge used and the research conducted. According to the authors, the professionalisation of teaching ability allows us to extract explicit knowledge that is shared within the professorial community from individual, implicit knowledge by using experience and research as a base.

In Quebec, university professors teach one or several subjects to undergraduate and postgraduate students, advise students on class, research and profession choice, involve themselves in and lead research in their field of specialisation, publish results, participate in professorial committees to devise curricula and conditions for awarding degrees, perform administrative tasks and represent the university as guest speakers. They may be asked to provide professional consultancy services to the government or private sector (Human Resources and Skills Development, 2013).

An ordinary professor who is solely dedicated to an academic career covets three university titles respectively: assistant professor, associate professor and full professor (Université de Montréal, 2013). Appointment to the rank of assistant professor, for a typical initial period of a maximum of three years, requires holding a doctorate in the discipline taught. In order to obtain a promotion to the rank of associate professor, the novice teacher will devote themselves to teaching, demonstrating their teaching abilities, and will contribute to the development of their discipline through research. The full professor must assert their contribution to developing their discipline and their standing, both within and outside the university. This generally entails a massive investment in research, in which they must become eminent. Nevertheless, whether they are novices or seasoned, professors contend with the same difficulties (Langevin, 2008; Demougeot-Lebel and Perret, 2011). Above all these professors classify teaching ability as being empirical and aspire to training that can be easily assimilated into their practice (Beney and Pentecouteau, 2008).

In 2008, a regional quantitative study looked at professorial work in order to paint a global picture, assess overall satisfaction, highlight the reality of the situation for women and understand the challenges expressed by the professors (Dyke and Deschenaux, 2008). In Canada, one thousand three hundred and twenty-eight (1,328) university professors from Quebec responded to a sixty-question survey. This survey allows us to identify several distinctive features of professorial work. Firstly, the survey (ibid) shows that professors are not all hired on the basis of equal requirement criteria - more than a third did not hold a doctorate when they were engaged and, for the remaining less than two thirds, not all of them had completed a postdoctoral internship. I note that the latter is most common amongst men, particularly when the internship is carried out abroad.

Professorial work implies a significant commitment on behalf of the professor, exceeding an average of fifty hours and thirty minutes (50.5) per week, especially for those starting out, who clock up over fifty-three hours (53.10) per week, on average. The act of dedicating so many hours to their work encourages some - twenty-five per cent (25%) - recently hired professors to reduce the number of children they wish to have (ibid).

Satisfaction levels proved to be relatively high as regards their professorial work. However, the professors criticised several aspects relating to working atmosphere or administrative decisions to varying extents from one university establishment to another. The results remind us of the great diversity of contexts in which professorial careers play out and that the institution variable remains crucial (ibid). It is alarming that this lack of satisfaction at work remains the main theme cited by more than half the participants who had already thought of leaving their professorial position.

A striking result lies in the pressure exerted by a hegemonic model in which subsidised research constitutes the cornerstone of a successful professorial career to the

detriment of the less widespread research fields that are essential for intellectual diversity (Ibid). Research activity plays a dominant role in the assessment of professorial work, according to seventy per cent (70%) of the professors interviewed. This is research funded by the federal or provincial granting councils in relation to which the professors lament unfair access, in terms of size and discipline criteria. I note, for example, that professors from major universities working in pure sciences are more likely to be funded. Research predominates to such an extent that a part of the teaching body interviewed would like to make it the sole component of a newly defined professorial role. This phenomenon is much more pronounced among young professors who have been socialised towards this model and are the most concerned with forging themselves a reputation in research. Furthermore, the study indicates that it is the highly qualified professors who obtain the most funding for their research (ibid). Thus, the results show that a professor's funding level is linked to their confidence in obtaining tenure.

The study reveals that an inequality ensues from the predominance of the research-focussed model - a relatively significant gap between men and women (ibid). Effectively, in this context, competition between professors inevitably becomes accentuated. In order to stand out from their competitors, professors must redouble their articles and subsidy applications. Some manage this without difficulty whilst others must compromise with significant consequences, which is the case for women with children, for example. Consequently, I note that no single mothers expressed confidence in obtaining tenure.

The study also reports the existence of a certain anger among professors towards university administrations, in particular regarding decisions taken to the benefit of a kind of commodification of the university institution (Ibid). Finally, the survey shows that professors would like teaching conditions to be improved, colleagues to be hired to relieve their workload and to better respond to teaching needs.

In a context in which concerns about professorial work clearly lead to reflection on the current model that encourages research predominance and promotes university commodification, pedagogical innovation appears to be one of the solutions employed in the face of the pressures exerted upon universities (Pelletier, 2009). However, pedagogical innovation is only rewarded in establishments that prioritise student learning (Hannan, 2005). Consequently, it is not evident for a professor to dare to make changes to institute pedagogical innovation into their teaching and the latter's choice serves as a point of departure. Therefore, I have tried to explore the pedagogical innovations put forward by professors within the framework of a university strongly committed to research in order to identify the different types of pedagogical innovation used by the participants and to try to respond to the following research question: What types of pedagogical innovation do professors in a research university propose?

### **Pedagogical innovation at the heart of professorial practice**

Pedagogy denotes the art of educational science and encompasses teaching methods and practices, as well as the skills required to convey understanding, knowledge or know-how. Lovat (2003) explains this concept as: "a highly complex blend of theoretical understanding and practical skill" (p.11). Thus, it is a "reflection applied as methodically as possible to educational matters" (Durkheim, 1938, p.10). According to Durkheim, "pedagogy is a practical theory", which falls under both theory and practice in the sense that its aim is firstly to reflect on education systems and procedures in order to assess their value, and then to enlighten and direct educators' actions.

In its literal meaning, the term 'innovation' evokes, in its positive sense, an adjustment, improvement, development, study/pilot project, experiment, or even modernisation, reform or renewal and is often associated with pure science or technology and

is frequently generalised to mean technological progress. Schumpeter (1942) perceives innovation as ‘creative destruction’, a process understood as ‘the fundamental element of capitalism’.

Nevertheless, in education, innovation assumes many other forms. Pedagogical innovation, also called scholastic innovation, in education or in training, is: “an intentional, measurable and sustainable improvement that is unlikely to happen frequently” (Huberman, 1973, p. 7). It entails implementing, securing acceptance of and widely using a change that must survive without losing its initial characteristics. It corresponds to a change defined as, “an intentional action that aims to introduce something original into a given context, and it is pedagogical as it seeks to substantially improve student learning in a situation of interaction and interactivity.” (Béchar, 2000, p. 3), “In a university context, pedagogical innovations are often described as everything which is not lecturing, the method still used by the overwhelming majority of professors.” (Béchar and Pelletier, 2001, p. 133).

For the purpose of this research, I have taken pedagogical innovation to be any teaching that is delivered in ways other than the traditional practice of the lecture. I believe that a pedagogical innovation can be equated with any new action that aims to improve student learning.

Pedagogical innovation in a university context is characterised by an intentional action that aims to improve university students’ learning in a sustainable manner. The technological, financial and social changes of today’s university, brought about by economic demands, the institution or policies, require greater performance from the professor, which is assessed by their peers’ and students’ qualitative criteria.

Pedagogical innovations integrated into higher education teaching and their effect on student success has been the subject of precious few studies. Articles on the effects of pedagogical innovation refer us to the works of St-Pierre et al. (2006) who ask what characterises innovative training contexts in higher education and the impact of this innovation on students and teachers. From their review the authors identify six innovative learning characteristics that they define together with their bibliographic references: student-centred teaching (Van Driel et al., 1997, and Bédard et al., 2007), learning contextualisation (Frenay and Bédard, 2004), reducing disciplinary boundaries (Hannan and Silver, 2000), assessment consistent with the spirit of innovation (Tardif, 2004 and 2006), a curricular focus on knowledge transfer (Lynch, 2001) and collegiality among professors (Béchar, 2001).

Between the change in student profile, which proves to be one of the reasons persuading professors to use pedagogical innovations in their teaching (Béchar, 2000) and the need to adapt to the new technologies, imposed by institutions and unavoidable in the light of economic demands, that are invading today’s university, and to keep up with their rapid evolution that causes concern among university institution actors in terms of new generation technologies (Web 2.0) (Amemado, 2010), pedagogical innovation within professorial practice seems to be at the heart of current concerns.

However, as early as 1997-99, one study conducted an in-depth exploration of pedagogical innovation in higher education (Hannan and Silver, 2000). This was a qualitative study carried out among 221 professors practicing in 15 English universities. The researchers focussed specifically on the institutional culture and on the innovators, in two phases. The first concentrated on pedagogical innovators’ experience, i.e. the professors who were involved in introducing teaching and learning methods that were new to their situation into the universities where this innovation had been clearly integrated. The second phase entailed in-depth case studies within specific universities in order to assess the impact of the structure, processes and the institutional culture in general as the context for the innovation. In effect,

innovation does not only depend on teachers, but also on a context of innovation (St-Pierre, 2008).

The researchers, Hannan and Silver (2000), defined and scrutinised the pedagogical innovations existing in higher education and how frequently they were used. They discerned eleven types of pedagogical innovation: 1) computer usage (Internet, Intranet, computer-assisted and computer-based learning, and communication technologies), 2) personal communication and problem solving skills, 3) team projects, and collaborative and cooperative learning, 4) student oral presentations (individual and group), 5) interactive lectures and tutorials, 6) work-based learning, 7) problem-based learning, 8) educational resource-based learning, 9) open and distance learning, 10) peer mentoring or assessment and 11) others (student-directed learning, logbooks, portfolios, reflexive practice).

Of the eleven types of pedagogical innovation, the first, second and third types share the highest incidence almost equally. I have previously noted that the main reasons prompting professors to innovate are to test student learning or student change (*ibid*). Consequently, it appears that professors wish to improve student learning through the use of computers, by developing students' personal skills and through group project, cooperation and collaborative learning.

### **Methodology**

When seeking to make adjustments during the progress of the research and to progressively construct the object of the survey itself, the qualitative approach proves to be the most relevant. It was employed for its ability to describe, in detail, several important aspects of the social life pertaining to lived culture and experience and its capacity to allow the researcher to understand the internal point of view (Pires, 1997).

In order to understand pedagogical innovation and disciplinary culture in higher education, data collection took place at the Université de Montréal, a Canadian, francophone institution that is strongly committed to research. Individual semi-structured interviews and a group interview were conducted. When devising the individual interview guide, I drew inspiration from Annex E of Hannan, A. and Silver, H.'s research (2000, p. 157) with Professor Dr Silver's permission. The group interview guide was devised in line with the results previously collected during the individual interviews.

The criteria used to select participants entailed being a professor recipient of an excellence in teaching award at least once over the past nine years. 49 professors matching the criteria have been solicited and 37 have agreed to participate. The first two persons, considered as test interviews, are excluded from the results. Individual semi-structured interviews were conducted with 5 assistant, 14 associate and 13 full professors, all recipients of an excellence in teaching award and one group interview with five of the same professors. Empirical saturation (Glaser and Strauss 1967, p. 67) was reached on the 32nd interview. According to Becher's (1989) classification, 14 professors came from Hard-Applied sciences (e.g. Medicine), 6 from Soft-Applied sciences (e.g. Education), 6 from Hard-Pure sciences (e.g. Chemistry) and 6 from Soft-Pure sciences (e.g. Political Science).

The complete interview transcript amounted to 450 pages of verbatim. I constructed theories empirically, based on the professors' discourses and used the grounded theory analysis method (Paillé, 1994). A grounded theory is developed and validated simultaneously, through a method of constant comparison between the reality observed and the emerging analysis (Glaser and Strauss, 1967). Thus, the theory ensures that the result is, as it should be, "firmly grounded in empirical data" (Paillé, 1994, p. 150).

This iterative process of progressively theorising a phenomenon involves six fundamental steps (coding, categorisation, connection, integration, modelling and

theorisation) (Ibid). Like three competing activity flows, the qualitative analysis of the data collected using the grounded theory process takes place in three main stages (Van der Maren, 1996) that are non-linear (Huberman and Miles, 1991).

During the first stage, *open coding*, data extraction consists of analysing the 'raw' material gathered with the aim of teasing out the substantive categories. It is comprised of two fundamental steps: coding and categorisation. I labelled all the elements of the initial corpus by categorising the elements of the professors' discourses. The segments of verbatim retained represent a set of substantive categories (Glaser and Strauss, 1967), which take up the professors' discourses unmodified. Consequently, the important and recurring aspects were extracted. Open coding revealed 557 substantive categories.

The second phase, *axial coding*, consists of establishing links and a hierarchy between the substantive categories, which corresponds to Paillé's (1994) fundamental step of connection. I established relationships between the categories by using the "*paradigmatic model indicating the main dimensions of an action category: its causes, context, structural conditions, and the actions and interactions that it encompasses and their consequences.*" (Laperrière, 1997, pp. 319-320). This analytical phase involves three conditions. These are internal and horizontal recurrence and their degree of congruence with the 'draft theory' (Fourez, 1988) of the research, which aimed to shed light on the types of pedagogical innovation used by professors in a university strongly committed to research. Axial coding allowed 50 themes, the formal categories, to be identified. As calculated by QDA Miner software, the 70% required to guarantee coding validity was achieved or exceeded for 25% of the material with an overlap criterion of 75% and Krippendorff's Alpha statistical method (Krippendorff, 2004) to correct the chance factor.

The formal categories were constructed through the links revealed between the substantive categories and their organisation into a hierarchy within the perspective of the project. All this occurs within a process of comparative and constant data analysis, a kind of continuous shuttling back and forth between the substantive categories taken directly from the lecturers' discourses and those elaborated by the researcher. Thus, the cross-cutting recurrence of substantive categories, such as those formulated above, allowed us to isolate certain focal points and to allocate the pedagogical innovation types to the appropriate formal titles in order to elucidate the meaning conveyed by several portions of text taken from the interviewed professors' discourses. Then, the grounded theory started to take shape and crystallised further in the identification of properties, whether this was a set of elements, or characteristics peculiar to a formal category.

The third phase, selective coding, followed Paillé's (1994) fundamental stages of integration, modelling and theorisation and sought "*the final integration of the theory as regards a central category, a narrative thread that goes to the heart of the phenomenon and summarises it in a few sentences.*" (Laperrière, 1997, pp. 320-321). This is the ordered reconstruction of the discourse that highlighted different forms for reconstructing the experience of pedagogical innovation, according to the interviewed professors. All the remarks were delimited, then the dynamic of the phenomenon under study was reproduced and theorised through meticulous reconstruction. This third phase was carried out against a backdrop of theoretical sampling and continuous comparison throughout all the stages. This process results in an empirically grounded theory of a phenomenon thus validated by the facts. These theorisation operations were performed manually.

### **Seven categories: on the frontier between social and technical pedagogical innovations**

Extracting the data collected during the individual interviews allowed me to structure the analysis around 51 substantive categories in relation to the pedagogical innovation types and to sort them into seven formal categories, called *pedagogical innovation categories* as

each of them displays differences and distinctive features. These are the pedagogical innovation types related to the concept of teaching, pedagogical approaches, tools, support schemes, interdisciplinarity, interculturality and professionalisation. The proposed taxonomy differs from that of Hannan and Silver (2000), as it aims to be conceptual, signifying that I am closer to the idea and meaning than to the practice or description. Thus, I can observe three additional categories that previously did not exist in their classification. These relate to the professor's concept of teaching, interdisciplinarity and interculturality.

However, I observe that the respondents do not use the innovation types equally. In other words, some participants use certain pedagogical innovation categories more than others. Unlike the results of Hannan and Silver's (2000) research in which computer usage shared the highest incidence with communication and problem-solving personal skills, and group projects and collaborative and cooperative learning almost equally, the results are spread across four major pillars.

First, with 25% are *Tools*, closely followed by support schemes at 21%. *Professionalisation* obtained 20% and *pedagogical approaches* 19%. Far behind these came the concept of teaching (9%), interdisciplinarity (5%) and interculturality (1%). Evidently, *Tools*, *Support schemes*, *Professionalisation* and *Pedagogical approaches* are evoked by the largest number of participants and could form the foundations of the pedagogical innovations proposed by the professors interviewed.

The analysis allows us to observe that the pedagogical innovation types hinge on two major aspects. These are firstly the social aspect represented by *support schemes*, *professionalisation*, *concept of teaching*, *interdisciplinary* and *interculturality*, which add up to 56% and is visually represented and defined in Table 1. Secondly the technical aspect, totalling 44% between *tools* and *pedagogical approaches*, in Table 2.

Pedagogical innovation categories	Substantive categories	Definitions	Frequency <sup>1</sup>	Instances <sup>2</sup>
Support schemes	Cooperation	The professor uses student cooperation through team, pair or class group activities.	47	19
	Discussion forum		2	2
	Pedagogical leader	The professor organises online discussion fora for their students. Pedagogical leaders are resource people for pedagogical issues. They guide professors towards sustainable change that also needs pedagogical guidance.	1	1
	Group meal		2	2
	Individual or group meeting		7	5
	Feedback	The professor organises group meetings over a meal with their students (current and former).	10	2
	Professor support	The professor organises individual or small group meetings with their students.	2	1
	Videoconferencing	The professor uses feedback with their students. This is constructive correction with the possibility of improving the student's work.	3	2
	Student supervision		4	3
	Debates		2	1
Peer assessment	The professor provides psychological, social and administrative support to their students.	1	1	
	Former student		1	1

<sup>1</sup> Frequency is the number of segments coded as relating to the substantive categories.

<sup>2</sup> One instance is one interviewed professor participating in the research. Here, this column shows the number of instances (professors) who have one or more segments coded to the substantive categories.



	mentoring	The professor gives their classes by videoconference. The professor supervises their students. This is academic support. The professor organises debates for their students. The professor uses peer assessment. This entails asking the student to assess the work of their peers. The professor organises the mentoring of students by former students.		
Professionalisation	Support schemes		82	40
	Scientific articles	The professor assists a student who they are not supervising to draft their first scientific article.	5	3
	Scientific symposia	The professor organises scientific symposia in which the students can participate and practise presenting their research results.	6	5
	Patient as care partner	The professor considers the patient to be a care partner who, assisted by the care team (doctors, nurse, etc.) will develop the skills necessary to treat themselves.	3	1
	Creating a laboratory	The professor creates a laboratory to place their students in real situations.	1	1
	Practice	The professor organises practical exercises in a laboratory.	3	2
	Evoking the reality of the world of work	The professor will question and immerse themselves to capture the reality of the world of work in order to take it away and integrate it into their teaching.	37	18
	Simulations	The professor organises a specific simulation to place their students in real situations.	7	5
	Role plays	The professor uses role plays in which each participant has their own social or symbolic place.	3	2
	Doctorate prof. integration classes	The professor offers professional integration assistance for doctoral students in their classes.	1	1
Concept of teaching	Professionalisation		60	38
	Taking the students as a starting point	The professor will ascertain the students' prior knowledge and beliefs in order to construct their teaching.	10	6
	Surprise	The professor seeks to surprise their students to get their interest and keep their attention.	7	5
	Continuous class attendance	The professor requires continuous class attendance.	3	2
	Learning to learn		3	2
	Teacher caricature	The professor seeks to teach the student how to best learn.	1	1
	Reiterating the message every 10-15 minutes	The professor asks each student to make a caricature portrait of himself and his teaching.	2	1

		The professor adapts to the television clips to which today's students are accustomed and repeats the message every 10 to 15 minutes during their lesson.		
Interdisciplinarity	Interdisciplinary	Concept of teaching	26	17
		Concerns the relationship between the disciplines or sciences. Interdisciplinary teaching. Interdisciplinary curricula. Inviting professors from another discipline to come and participate in a class.	21	10
		Interdisciplinarity	21	10
Interculturality	Mixed programmes (UdeM & another campus)	The professor gives classes to foreign students remotely, abroad, and in person at the university in the student's mother tongue.	6	2
		Interculturality	6	2

**Table 1 – Social dimension: List of the five pedagogical innovation categories by frequency and instance**

Pedagogical innovation categories	Substantive categories	Definitions	Frequency <sup>3</sup>	Instances <sup>4</sup>
Pedagogical approaches	Research-Action	The professor uses the Research-Action research approach and scientific research method (Lewin, 1951).	1	1
	Skill-based approach	The professor uses the skill-based approach which uses the skills needed in a field as a starting point for designing and developing a curriculum, scenario or pedagogical activity.	19	9
	Problem-based approach	The professor uses the problem-based approach in which the learners, grouped into teams, work together to solve a problem.	20	12
	Programme-based approach	The professor uses the programme-based approach which entails organising resources by grouping them around common characteristics and shared needs presented by the target populations.	5	2
			8	5
	Project-based approach	The professor uses the project-based approach in which the student is contractually linked to developing their knowledge.	1	1
	LS assessment approach	The professor uses the learning situation and assessment approach.	1	1
	Reflexive approaches	The professor uses reflexive approaches in order to guide the student in giving feedback on experience, relying on their reflection and self-awareness.	9	6
Virtual project-based approach	The professor uses the virtual project-based approach. Identical to the project-based			

<sup>3</sup> Frequency is the number of segments coded as relating to the substantive categories.

<sup>4</sup> One instance is one interviewed professor participating in the research. Here, this column shows the number of instances (professors) who have one or more segments coded to the substantive categories.

		approach, except project realisation remains virtual.		
		Pedagogical approaches	64	37
Tools	Web databases	The professor makes the information available in a database that students can consult on the web.	7	4
	Clickers		12	6
	Online lessons	The professor uses clickers in order to evaluate student learning.	18	8
	Video clips	The professor publishes their teaching online.	10	8
	Conceptual maps	Their lessons are available to students remotely on the Internet.	10	4
		The professor creates and/or uses video clips or digital simulations.		
	Slides	The professor uses conceptual maps to help students to create a representation of concepts and the relationships that connect them. This means symbolising knowledge structures in the same way that humans store them in their memory.	7	4
	Quebec pedagogical manual		5	2
	3D modelling		1	1
	PowerPoint	The professor uses slides presenting specific case studies.	5	3
	StudiUM	The professor writes a Quebec pedagogical manual for their discipline.	4	2
		The professor creates 3D models for their students in order to avoid using cadavers.		
	Clinical case studies	The professor uses Microsoft PowerPoint presentation software allowing information to be presented visually.	2	1
			2	1
	Wikis	The professor uses the university learning portal, a digital collaboration environment that provides professors, course leaders and students with a teaching and learning tool for face-to-face or entirely online lessons in order to support the following activities: dissemination of documentary resources; discussions and collaboration; group work; assessment and marking.	1	1
Note-taking exercise books		5	4	
Software (IT)	The professor uses clinical case studies which are short presentations of patients' clinical cases.			
	The professor invites their students to create wikis, a website with pages that can be modified by visitors to allow the collaborative writing and illustration of the digital documents it contains.			
	The professor creates an exercise book for their lessons with gap texts. The student must attend the class to complete it.			
	The professor introduces new software (IT) into their teaching.			
	Tools	89	49	

Table 2 – Technical dimension: List of the two pedagogical innovation categories by frequency and instance

Below, I set out the analysis of these pedagogical innovation types from the perspective of the social and then the technical dimension.

## **The social dimension of pedagogical innovation: five categories**

### **Category 1: Support schemes**

The first category covers types of pedagogical innovation through support schemes recounted in the professors' discourses. These are, in particular: *Cooperation*, the *Discussion forum*, the *Pedagogical leader*, the *Group meal* or the *Individual or group meeting*, *Feedback*, *Professor support*, *Videoconferencing*, *Student supervision*, *Debates*, *Peer assessment* and *Former student mentoring*.

This category covers several aspects of the support a student receives. On the one hand there is the support the professor gives personally or for a specific need. Then, there is more formal student supervision. Feedback subtly bestows additional support on students. Support is also given through professor-student and inter-peer interaction at individual or group meetings and during group meals, and by the organisation of discussion forums and videoconferencing to foster and promote cooperation in all its forms. A new role was created entitled 'Pedagogical leader' to guide collaborative pedagogical practices. This pedagogical innovation category allows us to combat dropout rates, particularly at the postgraduate level, and to relieve the teaching burden for large class cohorts.

For example, *Cooperation*<sup>5</sup> is highlighted as an important pedagogical innovation that professors employ in order to encourage professor-student and inter-peer interaction through *Individual or group meetings*, during *Group meals* and by organising *Discussion forums* and *Videoconferencing* to foster and promote cooperation in all its forms. One of the professors explained that he has used it to foster mutual assistance between students and to reduce the abandonment rate at masters and doctorate level:

*"Students take a long time to complete a master's degree or doctorate. The students find themselves alone, at home, writing, and lose motivation or can't progress. I organised voluntary informal meetings with all my students. We eat together from midday to two o'clock and we discuss whatever they want. What is interesting is that there are people with similar interests who don't know each other. They can start discussions. We start in one group and end up in smaller groups. They have to present something each week, bring a page with them. Apart from one person, the students who did that have completed the programme. This really helped them, very quickly. It allowed them to motivate one another, to not feel isolated and for the majority, to complete the programme."*

### **Category 2: Professionalisation**

The second category covers pedagogical innovations contained in the professors' discourses that target professionalisation. These are pedagogical innovations that aim to improve student learning and broaden it for professional purposes. This category includes *Scientific articles*, *Scientific symposia*, the *Patient as care partner*, *Creating a laboratory*, *Practice*, *Evoking the reality of the world of work*, *Simulations*, *Role plays* and *Doctorate prof. integration classes*. This pedagogical innovation category hinges on the notion of integrating the reality of the world of work into teaching itself or even putting students into real situations from their future profession. Thus, by organising simulations and role plays to

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<sup>5</sup> Without this being defined as an approach and consequently the reason why it has not been classified in the *Pedagogical Approaches* category.

prepare students for their practical future, certain professors bring a concrete reality to the content delivered. Through this profession-focussed pedagogical innovation the university builds a bridge to the world of work.

I retain, in particular, the idea of exploring and capturing the reality of the world of work to integrate it into their teaching as a pedagogical innovation. This entails putting students in real situations from their future professions, which has the effect of assisting “*transfer and interaction*” (St-Pierre, 2008, p. 39). For example, in medicine, one of the professors explained that the patient is considered to be a care partner who, assisted by the care team (doctors, nurses, etc.), will develop the skills necessary to treat themselves (*Patient as care partner*):

*“Since 2010, we have been innovating by integrating patients, or those close to them, into teaching as co-teachers alongside our healthcare professional teachers. These inter-professional training classes are given to over 1,300 students from 10 healthcare and social sciences programmes. The innovation is teaching with these patients, who are teaching partners. It is a major innovation for us to teach together with patients.”*

### **Category 3: concept of teaching**

The third category encompasses pedagogical innovation related to the professor’s concept of teaching. Here I have pedagogical innovation types in relation to the way in which the teacher conceives of their own teaching. It comprises the sub-themes: *Taking the students as a starting point*, *Surprise*, *Continuous class attendance*, *Learning to learn*, *Teacher caricature*, and *Reiterating the message every 10 to 15 minutes*.

The pedagogical innovation category reflects a will to make the learning accessible and adapted to the students. It seeks to arouse and hold student interest and engagement and emphasises a preference for class attendance. This category highlights the importance of helping students to know how to learn. In effect, the professors recount pedagogical innovations that are directly related to their own concept of the act of teaching. This means how they hope, want or think about their teaching as regards the pedagogical innovation. There is a marked desire to assess, and then take students’ prior knowledge into account when preparing and imparting their teaching. For example, one professor explains:

*“Being in the moment and taking the doctoral student’s experience as a starting point rather than my lesson plan. Trying not to think about it in advance. Instead of planning what I am going to teach and what I am going to talk about I will let them talk about their doctoral thesis and then I will pick up on their doctoral thesis. That is what I call grounding myself, taking them as a starting point, it’s a bit like a grounded theory in Strauss’ sense. I want an inductive report on the doctoral student’s needs and based on that, the following week, I will compile all my work. From experience to theory and not the other way round! This is what I call day-to-day pedagogical innovation.”*

Further, another participant believes that *Surprise* is an innovation as it is used for pedagogical purposes and he states:

*“In the exam I ask my students to summarise their text in 140 characters, the length of a tweet. This is pedagogic as I want them to get used to summarising in different formats, but it also surprises them. In my discipline they always expect it to be very long. What I show them is they*

*must be able to present an argument for different narrative purposes, sometimes in 1 hour, in 15 minutes or in 30 seconds. It is an innovation insofar as I tell myself that I have to draw their attention to the importance of a concern to be sensitive to the narrative purpose and the way to do it; it's 140 characters. It's arbitrary. It's to arouse their curiosity as regards something that they are used to, but that they don't associate with the discipline."*

In this case, Surprise, understood like an electric shock, is used to engage students' various senses in order to attract their attention, keep their interest during classes and to 'scar' them so that they retain the information transmitted in the long-term.

#### **Category 4: Interdisciplinarity**

The fourth category encompasses pedagogical innovation arising from the professors' discourses that is related to *Interdisciplinarity*. Ten professors believe that integrating interdisciplinarity into their teaching constitutes a pedagogical innovation. This category inspires professors who seek to break down boundaries in order to share and complement their knowledge. It prepares students for the reality of a world in which all disciplines and specificities coexist.

This could mean, for example, opening up their class to speakers from other disciplines with the aim of demonstrating the global nature of the links between the disciplines, as one professor explains:

*"My innovation is inviting colleagues to my classes. For mathematics teacher training, to offer an interdisciplinary perspective on maths, I said to myself that when talking about interdisciplinarity it would be more interesting if an expert from another field were to come and speak about how maths is used in their field. I invited people from the arts to demonstrate the links between the arts and maths. Also from French, from the social world, from history, geography, citizenship, etc. and their relationship with maths. It was really interesting."*

#### **Category 5: Interculturality**

The fifth category is comprised of the pedagogical innovations expressed in the professors' discourses that are related to interculturality that can assume more or less intense forms and often constitutes an enriching experience, both for the student and the professor. By removing the language barrier that can, despite everything, be an obstacle to exchanges, these meetings also provide the occasion for self-reflection and learning about others.

Interdisciplinarity occurs, for example, through *Mixed programmes* remotely and in situ in the country of origin and at the Université de Montréal, offered in the students' mother tongue:

*"The doctoral class is a special group from Latin America. They are not ordinary students. They are studying here for two sessions. They do it here in Spanish, in their language. It is practical for them. It is partially a remote programme, partially in situ, and afterwards they return to their country. For them, it is also a cultural change as in their country a doctorate is done in one way, but they are enrolled here, so the doctorate has certain stages and summarisation exams. The experience of being here is enriching: it allows them to establish a research network, so it is good for them."*

These programmes entail professor-student interaction and in this case interculturality is based on dialogue, mutual respect and care to best preserve the cultural identity of each person.

### **The technical dimension of pedagogical innovation: two categories**

#### **Category 6: Tools**

The sixth category consists of pedagogical innovations found in the professors' discourses that are made possible by tools, primarily related to technology. Here I find *Web databases, Clickers, Online lessons, Video clips, Conceptual maps, Slides, the Creation of pedagogical manuals, 3D modelling, PowerPoint presentations, university learning portals (StudiUM), Clinical case studies, Wikis, Note-taking exercise books and Software*. The tools pedagogical innovation category allows professors to better present, classify and arrange lesson content. It helps students to conceptualise information and encourages class attendance. Finally, it gives them the opportunity to assess knowledge comprehension in real time.

Professors explained that they use *Clickers* in order to assess their students' learning. A clicker is a small device similar to a television remote control that students use to respond, in real-time, to multiple-choice questions posed by the teacher. One of the six participants described the advantages of this pedagogical innovation as follows:

*"That's when I discovered clickers and I found them interesting. I said to myself: It's a way of at least getting everyone to think. It's anonymous, but they see the response they give versus the group, they can assess themselves"*.

Less technological, the creation of exercise books with gap texts means that students must attend class to gradually complete the exercise book, but there is more to it than this, as the professor explains:

*"I have developed exercise books. This is an excellent class management tool. Instead of giving comprehensive notes to the students I give the macrostructure of my class with, for example, various definitions of class management with three different approaches: firstly, secondly and thirdly. Everything that I have just said is there, but the names of the approaches aren't. The students fill them in. The great advantage of this is that they are always busy during the classes. They have to pay attention. They don't have the time to chat or play on their computers. Research studies have shown that quality or in-depth processing during a learning situation makes coding, memorisation and the ability to reuse the information in transfer situations far superior to when we listen distractedly. Each time in the teaching evaluation comments the majority of students say: 'These books are really fantastic! This method of taking notes is really very good, we like it a lot, he should patent it!' whilst it is quite simple an idea really!"*

The latter innovation shares the wish of the other, previously described participants who wanted to encourage student class attendance, whether through 'cunning' in the present case or obligation as before. From these intersecting aims it seems to become apparent that the participants consider it essential to preserve a tripartite relational dimension brought about by the in-class presence of the teacher, the student and their peers.

### **Category 7: Pedagogical approaches**

The seventh category comprises pedagogical innovations are determined by the pedagogical approaches adopted. These are: the *Research-Action research approach*, the *Skill-based approach*, the *Problem-based approach*, the *Programme-based approach*, the *Project-based approach*, the *Learning simulation and assessment approach*, the *Reflexive approach* and finally the *Virtual project-based approach*. The pedagogical innovation category proves to be a springboard for encouraging student competency development: their social skills, sense of initiative and problem-solving ability. It consists of recognised teaching methods, which have been proven, and can be used as bolthole for professors seeking to achieve a specific pedagogical aim.

The professors employ numerous pedagogical approaches, but the one that was mentioned most frequently by the professors, the *Skill-based approach*, takes the skills needed as a starting point for curriculum or pedagogical activity design and development. According to the participants, this approach demands a tremendous amount of preparation and commitment. Some professors experienced difficulty in adapting from objective-based teaching to skill-based teaching, whilst other participants were more comfortable with this method. This approach entails immense challenges and its introduction necessitates managing huge projects as it is integrated by programme. One of the participants also recounted students experiencing difficulties in adapting to this approach:

*“Our students are not used to learning in this way. We had to innovate. The students were very anxious. They were mentally distressed and then experienced cognitive dissonance. So, we made adjustments to our programme so that they could internalise the skills-based approach and active pedagogy learning strategies. We guide our students a little more in this way of learning. It takes them quite a while to understand why they don’t have a lecture with a professor who unpacks all the content in front of them, for them. In the end our students are currently very well received in practice environments.”*

### **Pedagogical innovation on the cusp of the social and the technical**

The professors no longer merely wish to improve student learning, they also wish to prepare students for their future profession and guide them in facing the outside world. The pedagogical innovation types fall into seven pedagogical innovation categories. Nevertheless, professors employ two or more pedagogical innovation types simultaneously. Pedagogical innovation mixing is the norm and is often applied in one class, within one and the same pedagogical activity, and sometimes in a curriculum. For example, the use of clickers in a group of four students during a pedagogical activity brings about interaction between the tool and the support scheme through cooperation. Thus, the professors themselves assemble their innovative teaching by using types of pedagogical innovation as ingredients to be mixed to obtain the specific recipe sought.

In conclusion, I recall that the pedagogical innovation types hinge on two major aspects which interact. These are firstly the social aspect and secondly the technical aspect. In this way the social aspect would translate professors’ desire to impart in-depth learning to students and to promote academic persistence with the aim of preparing students for their future profession. Within this process professors mobilise everything possible to develop students’ social skills, abilities, sense of initiative and creativity, and guide them towards discovery. They also confront them with the reality of the world of work so that they are exposed to the object of their studies as early as possible. Then, the technical aspect would be a palette of teaching methods, and didactic and technological instruments at the service of professors seeking to achieve their pedagogical goals. This reflection suggests that



pedagogical innovation in higher education is a fragile balance between social reality and technology.

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Walmsley, N. (1970). *Canadian universities and international development*. Ottawa: Association of Universities and Colleges of Canada.

### **Author Biography**

Anne M. Walder ([anne@walderpublications.ch](mailto:anne@walderpublications.ch)) is a Postdoctoral Scholar at the Graduate School of Education and Information Studies of the University of California, Los Angeles – UCLA, United States. Following a Doctorate of Business Administration in communication, she was awarded a Ph.D. in Education from the University of Montreal. Specialised in andragogy and teaching and learning in higher education, her research interests focus on pedagogical innovation, and in particular the professor-student pedagogical relations in this context, disciplinary cultures, supervision of Ph.D. students, research training, cooperative learning, pedagogical communication and Adult education.