e- Learning and Digital Media

A Social Practice Approach to Understanding Teachers' Learning to Use Technology and Digital Literacies in the Classroom

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ABSTRACT Current educational policy in Mexico, as in many other parts of the world, leans heavily on teachers to use computers in their classrooms. This article explores under what conditions teachers are willing to learn about and use digital technology in their work. The authors' central premise is that incorporating technology into teaching is a complex process that includes redefining classroom relationships, re-interpreting the curriculum, and expanding the notion of academic literacy beyond written texts. Using a social practice framework, they present data from a collaborative experience between teachers and researchers who share knowledge and know-how about how to use computers for academic purposes and co-participate in the design of academic activities for their classrooms. This article shows that in order for teachers to use digital technology, they need to participate in viable transitional practices that allow them to foray into the new, take risks in a safe environment, and construct new approaches to what counts as academic work, classroom interaction, curriculum and evaluation.

For more than a decade, researchers have presented us with evidence that both quantifies and qualifies how much digital technology is now in schools and how little it is used (Bigum & Lankshear, 1997; Cuban, 2000; McFarlane, 2003; Jara, 2008). The standard explanation is that teachers do not use technology in their work because they the lack training to do so, because their schools do not provide specialised software needed for their academic subjects, or because they feel that they are not familiar enough with digital technology to teach young people how to use it when their students most likely know how to use it already (Leu et al, 1998). Here, Mexico is no exception and these same arguments are common in the press and in official documents as well (López Bonilla & Fragoso, 2010; Díaz Barriga, 2010).

However, the arrival in Mexico of desktop computers, Internet connectivity and projectors, followed by laptops and tablets in classrooms, has a particular history that helps us to understand how and why teachers use (or don't use) technology in the classroom and why they do what they do (Geertz, 1983). Hailed as the new educational 'must' by international agencies and national policy makers, computers and the Internet are promoted as the latest panacea to economic growth and prosperity, as defined by Felipe Calderón, the current president of Mexico:

> We live in a globalised world, the greatest strength that a country can have is knowledge; and, I insist, successful nations will not be the ones that have abundant natural resources or the largest population; it will be those that have the best citizens, the citizens most prepared to access

> information technology, the information society that we are living in now in the XXI century,
> and access it with success. (Calderón, 30 April 2010)

The above, when translated into concrete programmes, has resulted in ample financial resources being designated for purchasing and installing equipment. In 2011, for example, the Undersecretary of Basic Education was allotted 490,374,682 pesos for buying computers and related equipment.

Despite these major investments in equipment, little thought has been given to what to do with them once the machines are there.[1] While authorities in Mexico provide schools with the computers, they tend to lack any understanding of what digital literacies are about. Indeed, despite the availability of the significant funds referenced above, the office of the Undersecretary of Basic Education spent less than 500 pesos per teacher on professional development in all academic areas (http://goo.gl/nnjOe, in Guerrero, 2011). It seems to be assumed that teachers will somehow naturally transition to using these artefacts and, in fact, that using computers in their teaching is desirable because they will allow teachers to do what they have always done, only more efficiently - that is, transmit information to their students (Gómez, 2005, 2006; Solis, 2009).[2]

As such, teachers in Mexican classrooms are positioned in such a way with the computers as to be wondering what to do with them. One option is to use them to explain concepts to their students and replace the blackboard with colourful PowerPoint presentations (Guerrero, 2011). Another is to find exercises or other educational materials on the Internet and display them to students, asking each student to work individually or in pairs to complete specific tasks on a screen (Guerrero, 2009). Less common are those teachers who appropriate the affordances of digital technology or who try to work with the possibilities of digital literacies. The term 'digital literacies', in this sense, is taken to mean 'understanding digital and non digital formats, creating and communicating digital information, evaluating information, knowledge assembly, media literacy ... independent learning, social and moral literacy' and familiarity with digital culture (Lankshear & Knobel, 2008, pp. 29-30).

Along with the above, a challenge teachers in Mexico all face when they incorporate technology into their work is their repositioning with regard to their students. In some parts of the world, there is a large sector of young people who are technologically sophisticated, often more so than their teachers. In Mexico, where the distribution of technological know-how is a function of social class and economic power, this may or may not be the case. Only a third of those who use the Internet are young people, between the ages of 15 and 28, although this is the fasting-growing demographic of users in Mexico. Mobile phones are widespread, but only about 16.5% of these are Internet enabled, or 'smartphones' (http://mexico.cnn.com/tecnologia/2011/12/20/). This situation places teachers in an interesting position in relation to their students because, while it is possible that their students may be more familiar with technological devices and practices than their teachers, it is also very likely that they will be learning to use certain digital technologies together, creating opportunities for learning together, collaborating, exchanging knowledge and know-how, and co-participating in discovering how to use computers for academic purposes.

For many of the teachers we have worked with, using technology in their teaching also repositions them in their institutions, in relation to their students, and with respect to the tools digital technology offers (Lave, 2011). It often involves learning to use the computer itself, but this is only part of what they must learn. Lankshear and Knobel (2008, p. 2) distinguish between those teachers who see learning to use technology as the 'mastery of ideas and insist on careful evaluation of information and intelligent analysis and synthesis, from those that provide lists of specific skills and techniques that are seen as necessary for qualifying as digitally literate'. This distinction – between a focus on analytical thinking and a focus on technical skills – is important. Our own preference is for the former – focusing on the mastery of ideas and analytical processes – to which we also add that teaching with technology also implies redefining classroom relationships, re-interpreting the curriculum, and expanding the notion of academic literacy beyond written texts.

This is a complex agenda for teachers who find themselves in the centre of such an intricate web of meanings and relationships (Geertz, 1983). What they do or do not do with information, communication and design technology (ICD-T) [3] is situated at the crossroads between institutional dictates, the curriculum, teaching traditions, the computer and its associated social practices, and their own appropriation processes (Guerrero & Kalman, 2010, 2011). Teachers are put in the position of learning to do what they already do, 'in a process of changing their practice'

(Lave, 2011, p. 156) by trying to introduce new activities and teaching their students about digital literacies.

A Social Practice Approach to Professional Development

From our point of view, ICD-T is a powerful social and communicative tool for interacting with others, designing, and representing knowledge and meaning. It integrates multiple possibilities that range from colour, fonts and text processing to images, animation and hypertexts, as well as tools and services for instantaneous communication, real-time interaction, multiple sources, and social media environments. But to see it as a potential environment for learning instead of a vehicle for delivering assignments, registering attendance and projecting curricular content implies rethinking what we do at school and how to help teachers and students reposition themselves as co-learners (Sheehy, 2004).

Over the last five years, in the Laboratory of Education, Technology and Society (LETS) in the Department of Educational Research (DIE, for its initials in Spanish) at the Center for Research and Advanced Study of the National Polytechnical Institute (Cinvestav) in Mexico City, we have worked with five different groups of junior and senior high school teachers on creating academic activities based on learning principles derived from socio-cultural theory, participatory culture and gaming (Moll, 1990; Gee, 2003, 2007; Jenkins, 2009). We invite teachers to create activities for their classrooms that use ICD-T and to use social media to collaborate with each other, with us and eventually with their students (NLG, 1996; Kress, 2003; Albion, 2008; Kalantzis & Cope, 2010). Our emphasis is on the social and communicative aspects of technology, rather than on the operative ones.

These work groups have typically comprised an average of 10 participants, two graduate students, two research assistants and two researchers. The participating teachers have been volunteers, and in most cases, they have heard about our work groups from another teacher, or through a written invitation we send to their school principals. We begin each school year with a one-week intensive workshop we call 'Installation Week' where we explore different aspects of digital literacies, culture and practice; this includes six sessions that run from 9:00 in the morning to 3:00 in the afternoon. Over the school year this is followed up with five to six work sessions held at the DIE-Cinvestav campus during a work day (teachers are given permission to attend by their principals), along with visits to some of their classrooms.[4]

In our workshop, teachers explore what we call 'universal tools' - that is, software one might find on any computer in a cyber cafe (albeit in different versions), freeware available for download online, and communication options that ship free with most basic computers. These tools are available without cost and are programmes that students will be able to find and use as well.

A social practice approach implies inserting technology use into a larger frame of complex relationships, uses and purpose-oriented activity (Barton & Hamilton, 1998; Barton et al, 2000; Barton, 2012). In this case, the teachers with whom we work can be said to be learning to do something that they are already doing (Lave, 2011); that is, they are learning to teach content and strategies they already know using tools they may or may not be familiar with and by means of approaches that they may or may not have not tried to use before. In short, they are already working with established routines, practices, knowledge and know-how (Guerrero, 2011), and now educational and political authorities have called upon them to include what is potentially a powerful and complex set of tools and processes in their teaching repertoire. In this context, teachers must learn to teach with technology while they are already teaching.

Thus, current institutional demands puts teachers in a situation of 'performance before competence' (Cazden, 1997, p. 303); that is, they are expected to use technology in their teaching before they have full command of how to do so, or what it might mean. Our approach is to establish challenging proposals difficult enough to promote learning to use ICD-T effectively in participants' own teaching contexts, but familiar enough for them to feel comfortable trying to do so (Moll, 1990). Our role therefore is to provide guided assistance through the challenges they meet in a collaborative relationship, rather than an expert-novice one. We are committed to accompanying and supporting them as they integrate emerging knowledge with their existing know-how.

We try to accomplish this by building horizontal relationships with our teacher colleagues, asking them to help us rethink teaching practices and pedagogies. Through collaboration with others dedicated to the same cause, we aim to contribute to their simultaneous understanding of digital literacy practices with its use through participation with their colleagues and with students (Werscht & Stone, 1985). In Mexico, dominant teaching practices are steeped in a pedagogical tradition that has its historical roots in a view of learning centred on the accumulation of information. From this perspective, teaching requires strict control of procedures, content and sequence derived from the fragmentation of content, disintegration of knowledge and assessment of learning. Behaviourist psychology has provided a conceptual frame for schooling in this tradition, conceptualising learning as acquiring knowledge by means of mechanical repetition and passive reception (Rogoff et al, 2003).

Progressive pedagogies, in contrast, base their notions of learning in the classroom on the transformation of concepts such as knowledge, learning, social life and relationships among participants. Their underlying notion of learning is constructivist, whereby the learner is an active participant in the development, appropriation and structuring of knowledge. Socio-constructivist accounts emphasise the importance of interaction with others as an organic part of learning. Here, the teachers' main activity is to design situations where students interact, exchange points of view, experiment with new ideas, and participate in culturally valued activities. This implies that teachers create contexts where responsibilities, authority and knowledge are shared. The contextualisation of curricular content is key for learning concepts, understanding relationships and articulating ideas; in fact, this constitutes an important part of what is being learned (Simon, 1992). Letting go of some of the control historically assigned to teachers is an important and often difficult step for many of our participants, yet, at the same time, when they figure out how to do so successfully, it creates opportunities for really renovating aspects of classroom life in positive and satisfying ways for teachers and students alike.

Miguel Angel: a novice with 38 years' experience

For the purpose of this article, we examine one of our participating teacher's initial forays into using ICD-T and how he took it up in his teaching. Miguel Ángel [5], the teacher whose practices we reflect on here, makes an interesting case study because he is a veteran teacher with nearly 40 years in the classroom. When he began working with us in 2009, he had very little previous experience with the computer, Internet connectivity or social media.

Because Miguel Ángel works in a public high school in Mexico City, some background information is needed for readers unfamiliar with our school system. They may not know, for example, that each year when youngsters in Mexico City start high school in the fall, they immediately become part of the educated elite of their country.[6]

The current public high school system has its origin in the educational reforms of the 1970s that sought to provide educational opportunities for young people beyond the 9th-grade level. All students must take an entrance exam for high school and they are placed in schools according to their score and grade point average (GPA) from junior high. Securing a spot in a school administered and supervised by the National University also guarantees students subsequent enrolment in the Universidad Nacional Autónoma de México (UNAM [National Autonomous University of Mexico]) and, for this reason, it is extremely competitive. The UNAM receives more than 140,000 applications each year, but only accepts about 34,000 students, who are distributed across Colegio de Ciencias y Humanidades (CCH [School of Science and Humanities]) and Escuela Nacional Preparatoria (ENP [National Preparatory School]) programmes. CCH and ENP have six and nine campuses respectively; classes run from 7:00 a.m. to 10 p.m. five days a week, as well as on Saturday mornings. Class sizes tend to average 50 students (Galán, 2007). In 2011-2012 35,189 students were accepted into the UNAM's high schools, 54% were assigned to CCH campuses, while 46% were registered in the ENP schools (CCH, 2011).

Miguel Ángel has been a teacher at the CCH Plantel Oriente [Eastern City Campus] since it opened its doors in 1972. His students mostly come from surrounding working class neighbourhoods where, historically, parents make their living in the informal labor sector, or as

self-employed tradesmen or employees. Many of the students arriving at CCH-Oriente are the first of their families to continue their education beyond the 9th grade.[7]

The two courses that Miguel Ángel teaches are Reading and Analysis of Literary Texts I and II (*Lectura y Análisis de Textos Literarios [LATL] I y II*). Although they are presented in the curriculum as workshops (*talleres*), the official syllabus reads more like a theoretical course, and students are expected to become versed in literary traditions and movements. It heavily promotes academic literacies, and, in particular, specific ways of interpreting and thinking about written text (Heath & Mangiola, 1991; Burke & Hermerschmitdt, 2005; Street, 2005; Langer, 2011). The following is our translation of the opening lines of the course programme:

> The appropriation and analysis of literary texts requires knowledge of linguistic, literary and artistic paradigms that give meaning to the text and understanding of specific contexts. The reader must master different competencies that allow him to make the appropriate adjustments to their interpretation and recognise that not all interpretations are equally possible.

LATL is taught in the 10th grade and its structuralist and genre approach to the study of literature leaves little room for the discussion of the *meaning* of literary works or space for the collective construction of interpretations. The reader (or student in this case) is recognised as an active participant in the interpretation and analysis of texts, but only within the confines of the stipulated curricular agenda. Most of the work students are asked to do is oriented towards repeating what others say about the structure of novels and stories, the parts of the dramatic work, and the different metres of poetry.

Through his many years in the classroom, Miguel Ángel realised sometime ago that the distance between the curriculum and his students' experience and interests was great, so he made adaptations to what he required of them. One example of this is that each semester students are given the assignment to attend a cultural event (e.g. visit a museum, attend a concert, or go to a play, a book launch or a lecture). Students are then asked to comment on their experience, describe the locale where it was held and describe the programme. Miguel Ángel believes that this assignment gives the students the opportunity to visit important cultural spaces in the city, experience cultural events first hand, and to write a personal text in response. Miguel Ángel, sensitive to his students, and aware of certain aspects of their lives, introduced this assignment with the purpose of broadening his students' horizons and connecting the performing and fine arts with literature and theatre, in an attempt to make his course more relevant to their experience.

For teachers like Miguel Ángel to use ICD-T in their work, we posited that teachers would have to simultaneously develop an understanding of its possibilities and limitations, figure out what to use in their teaching, and learn how to use technological devices in meaningful ways. If they wanted students to use ICD-T for academic purposes, they would have to construct social knowledge related to different options for using computers in the classroom and develop skill and know-how regarding its use. In short, in order to do so effectively, they would have to transform their practice – the use of technology, skill and social knowledge, as defined by Scribner and Cole (1981) – and their thinking about teaching (Barton et al, 2000).

Our questions about how such a feat might occur centre on the risks and initiatives that Miguel Ángel took as a learner (Lave, 2011), and how his know-how developed over time. In particular, we were interested in how he reshaped his thinking about his teaching, and particularly in how he reshaped his approach to the curriculum and to his students, and how his understanding of his role in their learning changed. In the pages that follow, we examine what Miguel Ángel seems to learn with each new incursion into using ICD-T and how this shifted his ideas about an activity he has engaged in for almost 40 years. Our descriptions and analytical commentary are based on observational data from our work sessions, interviews with Miguel Ángel, visits to his classroom, and his students' work. We have selected four moments from our professional development project with Miguel Ángel, arranged in chronological order, from the first semester of the 2009-2010 school year:

- Installation Week;
- Expanding the structural analysis of a story to multimodal representation;
- Documenting personal experience;
- Crossing disciplinary forms of representation.

Moment 1: Installation Week, and thinking about what to do

When Miguel Ángel attended our initial Installation Week, he asked his colleagues and the research team countless questions about how to use the computer and the different programmes we were exploring. He seemed to want guidance each step along the way; when saving a file, he asked, 'Should we name the file?' When we were exploring different icons, he asked to be shown where they were on his screen; when he wanted to insert a figure, he asked, 'Where are the shapes?' His queries were directed at others, but at the same time, they seemed to be a self-narrative or meta-commentary, a way of guiding himself through procedures that were still unknown to him. Since we presented different tools and resources (e.g. video software, animations tools, YouTube, etc.) within the context of possible classroom learning situations, he tried to imagine how he might use them in his teaching and what he would ask his students to do. He was concerned about understanding the meaning of the different options we presented. When looking at YouTube, he enquired, 'What is the rating for?'

At the end of the Installation Week, Miguel Ángel expressed what he called a 'conflict' between using technology and relating it to the content of the curriculum that he was institutionally responsible for teaching. As a technology novice, he was trying to make room for new options in what for him was a long-standing way of doing things. Using technology required that he find its relevance for his practice. In the final session of our Installation Week, he explained:

> For me the most difficult thing is the relevance of using a specific resource in relation to learning and the course content. I even brought my programme [curriculum] - what can I do? I have some ideas about what I can do.

The challenge or 'conflict' for Miguel Ángel was figuring out how to link what he had learned about ICD-T with us to his courses. It was clear that he was struggling more with how to promote learning with these new resources than with learning how to use the machine. He states that he brought his copy of the course programme to the session as a reference for thinking about 'What can I do?', an action we interpret as evidence of an initiative to reinterpret the curriculum as well as of his attempt to construct the *potential possibilities* of the computer as a tool for his teaching .

Moment 2: expanding the structural analysis of a story to multimodal representation

Once back in his classroom, Miguel Ángel introduced an activity for analysing a story, one of the first items in the curriculum. In this particular activity, he asked students to use PowerPoint to present a literary work using images they selected and juxtaposed against selections from the text. Students were asked to present their slides to the class and make explicit why they chose their various selected pictures, colours, fonts, etc. The purpose of the assignment was to work with language and images, to construct an understanding of how they can relate to each other, and to recognise each medium as a carrier of meaning (Matthewman, 2004).[8]

Miguel Ángel organised his students into groups, and gave them a list of stories by Latin American authors from which they could choose a text to analyse and present. When he explained the activity to his students, he presented an example he had created during Installation Week as a way of modelling the activity. He also told his students that he wanted them to explore this particular software as well, and he explained to them

> [that] I was in a work group, that I was going to ask them to use PowerPoint; I mentioned that I was no expert, that I didn't know much and that surely they knew more than I did.

This was a first for Miguel Ángel, and it implied accepting a new position vis-à-vis his students. On the one hand he openly admitted to them that they might very well know more than he does about using this particular software, and he presented himself as a learner by commenting on his participation in a work group. One important change in Miguel Ángel's practice that begins here and will develop throughout the school year is his recognition of different modes of representation as valid for academic work; this is one of his initial attempts at designing an activity that is not restricted to writing a paper. In addition, he was surprised to find out that while at least one student in each team knew something about PowerPoint, not all of them did, and what they knew varied a great deal. He reported that one student team 'wanted to do their assignment on paper, because

they did not know how' to use the software. For us, this confirmed our initial hunch that in the classrooms of the teachers with whom we were working, it really would be a matter of teachers and students co-learning to use ICD-T.

When listening to projects presented by other teachers at our meeting, Miguel Ángel realised that perhaps some of his directions to his students were not clear, and that he had only vaguely defined his evaluation criteria. He mentioned during our September meeting: 'I didn't ask them [the students] to annotate their presentation, but now I am taking notes so I will know what I am going to ask them to do', and he wondered: 'What is an excellent presentation? What should I give preference to?' From this moment on, he began to focus on specific aspects of activity design such as purpose, evaluation, presentation, instructions and organisation – all phases on which he had been focusing throughout his 38-year career but that he was now rethinking.

Moment 3: documenting personal experience

Another important moment in Miguel Ángel's participation came when he incorporated students' out-of-school digital practices into an assignment. During one of our meetings, another teacher presented what she called a 'photo safari', an activity in which students were given the assignment of presenting a story with snapshots and without written text. Miguel Ángel adapted this idea to the assignment described earlier involving visits to a cultural event. This time he asked his students to take photographs with their mobile phones, use their pictures to illustrate their work, and create a chronological account of their activity (see Figure 1). He also changed the organisation of this assignment, accepting teamwork, when in the past each student was expected to work alone.
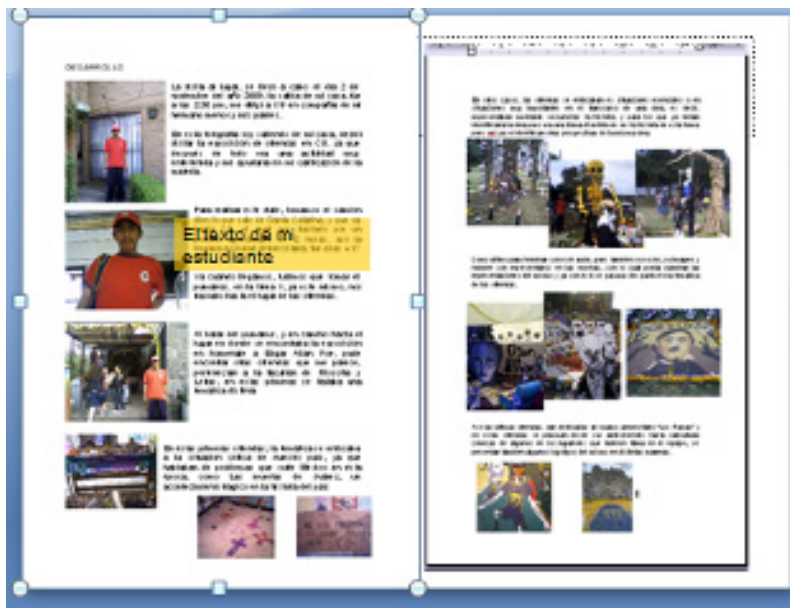

Figure 1. Student writing sample about his visit to a cultural event.

Miguel Ángel, open to change, considered this to be a successful adaptation of one colleague's ideas to his own teaching needs. The cultural event assignment became completely electronic in the sense that students did not have to print it out or present it in class; they sent it to their teacher via email. This, however, created a new problem for Miguel Ángel: his mail account quickly became overloaded with student work and he did not know how to organise it well. This reminded us of how successful transformation of teaching practice can, and often does, generate new problems to be resolved and reminded us yet again of how professional development itself is rarely a smooth trajectory.

Moment 4: crossing disciplinary forms of representation

As the school year progressed, Miguel Ángel developed a new approach to teaching two popular novels that integrated his beliefs about the importance of experience for his students, the use of multimodal forms of representation, and the literature curriculum. For this assignment, students need to choose between two novels set in Mexico City (*El Complot Mongol* by Rafael Bernal and *Batallas en el Desierto* by Jose Emilio Pacheco). For Miguel Ángel, these two novels deliberately opened the study of literature to a space that articulated the classroom with life beyond the school gates and created a situation in which students moved their knowledge, learning and know-how across contexts (Larson, 2005). In the past, students were required to read and summarise the book and identify its structural characteristics. In his revised or 'transformed' approach, Miguel Ángel organised students into groups, asked them to visit the neighbourhoods where the stories supposedly took place, and photograph the urban setting. Each group was asked to organise a retelling of the story using street maps of the city and their photographs, as well as other resources they considered relevant.

This revamped assignment combined new approaches for both the teacher and his students. The students, as readers, were asked to think about the contexts in which their focus novel took place as involving real spaces where events occur (Leander & Sheehy, 2004). This, in turn, led them to think about these spaces as social constructions and how all the places the characters inhabited (homes, bars, streets, schools) contributed to how they lived their fictional lives. At the same time, what and how they lived also transformed these locations for the students as readers and as inhabitants of the city (cf. Soja, 2004).

The reading of these novels and subsequent mapping invited students to rethink their approach to a literary text. As one student succinctly expressed it, these books 'are fictional works located in real places'. In their oral presentations, students explained their choices regarding images (see Figure 2) and their relation to the novel in terms of how they tried to locate the story in a real place:

> Student: The novel talks about Tabasco Street ... It's the street where he [the protagonist] runs to find Mariana's building, after Rosales tells him she has died. He doesn't believe it, so we used this image because it's the street where he runs to find the building where she lived.

Figure 2. Student photography sample locating fictional story in real location.

Designing an activity that integrates the use of maps and spatial representation, images and written language into a single product was an unusual invitation for Miguel Ángel to make and for his students to receive, especially since academic subjects and their correspondent modes of representation tend to be rigidly defined: the novels belong to the language arts, and maps belong to history and geography.

This activity is another example of how Miguel Ángel tried to create opportunities for experiences that would contribute to students overcoming certain social isolation that characterised their daily lives, and in this project using ICD-T played a large part. Academic literacy conceived as social practice posits that for readers to gain an understanding of what the text says, and to link the text with their life and the world around them, they must act on it in some way

(Heath & Mangiola, 1991; Street, 2005; Langer, 2011). Students' photo-documentation and design of maps, and their incorporation of multimodal resources (image, colour, letters, sizes, use of space, sound) gave them several opportunities for working with the novels (see Figure 3). In their oral presentations they linked what they had read, particularly those parts of the novels that dealt with issues such as discrimination, corruption, fairness and passion, to their own lives and knowledge of the world. It was notable how they used their understanding of the text to argue their own points of view:

> Student: In general, Mariana [Jim´s mother] is discriminated against for a variety of reasons. One of them ... well, now its common and widespread, but *then* people talked, she [Mariana] was a single mother and then people said a lot of things, that they [single mothers] were cheap, and went from bed to bed.

The above example illustrates the student's literate thinking beyond his commentary regarding the structure of the novel. His narrative shows his understanding of what the text means, how he connects it to his world and its historical shifts by contrasting 'then' and 'now', and identifies the basis of what could be considered gender discrimination and moral beliefs concerning sexual conduct. He uses the experience he had of walking through the neighbourhood where the book takes place and relating it to the maps and pictures he and his classmates collated to build meanings about the story by connecting it to the place, the people and moral considerations (cf. similar project outcomes in Heath & Mangiola, 1991; Langer, 2011).

Figure 3. Students' map and photographs of their focus novel.

For this particular assignment, instead of presenting a model, Miguel Ángel simply explained what he wanted his students to do. His thinking was that they had used presentation software – and thus were familiar with it – in a previous project and he preferred to leave the assignment open to interpretation. He linked his ideas and past activities related to experience and learning about the cultural landscape to the novels by inviting students to locate their focus story within the cityscape itself and design a multimodal way of representing their analyses of the meaning of the text by using maps and images. In a very real way, he expanded upon his colleague's photo safari project and transformed it to emphasise the analysis of the book students were required to read. By designing the project in this way, he gave students the opportunity to make decisions, organise their work and determine the depth of their analyses. When discussing the outcomes of this activity, he expressed his surprise with respect to the extent to which his students went beyond simply retelling the story, which is what he asked them to do, and instead made important observations about the relationship between the novel as a fictional work and several in-depth reflections about life in Mexican society, past and present. One of the most important initiatives in this particular activity that represented an important shift in Miguel Ángel's practice was that he crossed curricular lines by introducing maps as a mode of representation for communicating meaning about literature.

Indeed, Miguel Ángel was surprised by his students' reactions to his project. During our final interview with him, he used the expression *nunca me imaginé* (I never imagined) to refer to their work. By changing the participatory format for completing the assigned work, he opened up possibilities for students to speak in class when they usually do not do so. One of the events that surprised him most was that students who rarely spoke in class ('I did not know what their voices sounded like') participated extensively. By means of this project, Miguel Ángel reported further developing his understanding of multimodal representation and the use of ICD-T tools. Up until this time, he had used images to illustrate written text in presentation slides and in word-processed documents. Now, by soliciting animated maps from his students, he uncovered some of the affordances and the power of dynamic representation. For the first time, his students' work could only be properly presented on a screen, and he was aware that it would change significantly if printed out and handed in.

Miguel Ángel's Renewal

The above presentation of Miguel Ángel's first uses of technology reveals different aspects of his learning to teach (with technology) while teaching. Because he already had a solid understanding of curricular requirements and institutional expectations, his teaching experience served as an important resource for this new phase of his work. While he was willing to incorporate digital activities into his teaching, he was still very mindful of meeting the curricular requirements and looked for ways to use technology that helped him accomplish that. His incorporation of ICD-T became part of his formal teaching programme; he did not see these activities as 'extra' or as 'add-ons', but as truly new ways to teach the academic contents of his course. Furthermore, he had a stock of classroom activities that he had found successful in the past that he could draw from as a starting point for incorporating the use of technology into his teaching. However, Miguel Ángel did not simply create an electronic version of the activities he knew how to organise - he also introduced changes into several aspects of his practice concerning the curriculum, organisational features, his relationship to his students, his ideas about how knowledge can be represented, and his expectations about what can go on in the classroom. Some of these changes are subtle and minute (the inclusion of ICD-T for reporting a cultural activity) and others are much more obvious (introducing maps and multimodal representations into the study of literature), but all are important for understanding Miguel Angel's willingness and efforts to grow professionally. During the interview at the end of the school year, Miguel Angel described his experience in our project in terms of 'renewal':

> These resources are for young people; I am old already, I have been teaching for 38 years. When you get to this point, what you think about is how to get by, how to come up with assignments that require less work. For me, taking a close look at this [using technology in teaching] was completely new and it renewed me. I think now that maybe I am not so old. This was like a salve that came to my teaching.

During the school year, Manual took initiatives to change how he taught and took important risks. He subtly transformed the ways in which he organised activities, he looked at different aspects of his teaching, such as how he presented and evaluated student work. Each initiative was accompanied by a certain risk – especially given the dominance of traditionalist approaches to teaching in Mexico: letting students take charge of the activities could become chaotic, allowing students to use different forms of representation could end in losing sight of the academic purpose of a given assignment, using new forms of representation could result in students not reading or writing in the way that was expected of them in an academically oriented programme. For the most part, Miguel Ángel was surprised to find that each innovation, big or small, unlocked dimensions of teaching and learning that he had not been able to see before.

Table I summarises each of the moments previously presented and the initiatives and risks Miguel Ángel took.

Moment	Initiatives and risks
1 Installation	Ask questions, learn to use computer, think about activities in a new way.
2 Story Analysis	Position self as learner to students
	Focus on evaluation, instructions and organisation of the activity.
3 Photo Safari	Transformation of a standing activity to include different forms of representation, allow students to use mobile device as a camera.
	Following a colleague's advice.
4 Maps	Begins to use email as a way of receiving student work.
	Instead of model, explained what he wanted them to do, left assignment open.
	Connected his ideas about the importance of experience to reading and understanding novels.
	Gave students the opportunity to make decisions, organise work, determine depth of presentation.
	Crossed curricular lines, tried a new format for representing literary meaning.

Table I. Initiatives and risks.

As Miguel Ángel's work shows, risk taking can lead to important learning. His initiatives led to innovations, new approaches and new discoveries. In Table II, we present a glimpse of Miguel Ángel's learning in process as a summary of his development over the course of the school year. We believe that each of the different aspects of learning are closely related, but have separated them for the purpose of presentation and to emphasise the *range* of learning that accrued (see Table II).

Learning/Moment	About technology	About students	Representation	Expectations
1. Installation	How to use technology (operative) What do you use it for (conceptual)		Works with multimodal representation	Technology not really for him
2. Story analysis		Not all students have the same knowledge and know how regarding technology.	The placement of images and texts is intentioned. The inclusion of animation adds meaning to texts	Expected students to be more explicit about text image relations. Began to rethink how he gave instructions and how he evaluated.
3. Photo safari	Everyday uses with students (email). Problems with email overload. Students' knowledge and use of mobile phone used for academic purposes.	Students respond to opportunities of self-representation.	Personal experience and know how enrich textual meaning.	
4. Maps	Multimodal texts belong on the screen, once moved to print they are reduced.	Students integrated plot, analysis and critique by locating the story in its urban space, historical period, and by going to see for themselves.	Spatial representation adds a new analytical dimension. Never imagined a map could be used to tell a story.	Only expected description of plot, students presented detailed analysis. Students who had never participated spoke in class.

Table 2. Learning in progress.

The summary in Table II reveals how Miguel Ángel's knowledge about digital technology, its use for academic purposes, his understanding of representation, his expectations and his appreciation of

his students became more nuanced over the semester. His expectations about what his students should do and the relationship between multimodal representation, reading and writing shifted as he took risks and tried to introduce uses of the computer and the Internet that went beyond looking for information or typing up homework. He used it to communicate with his students, to find images and graphics and to enhance students' experience, but he also used it for design purposes, to create multimodal representations, and to reconsider the role of writing vis-à-vis other symbolic possibilities. It is clear to us that this was made possible through the different ways that Miguel Ángel learned to use the computer, not only in terms of operating it, but, more importantly, in the way he learned to think about how to develop learning activities and situations of use for his students set within his growing understanding of the important relationship between learning, participation and social practice.

This is not to say that he did not have some difficulties or disappointments along the way. All attempts at innovation are accompanied by false starts and unfulfilled expectations – this has certainly been a keen and important insight for us with respect to how we approach our professional development workshops. Miguel Ángel found it difficult for his students to explicitly explain why they chose certain images; receiving students' assignments via e-mail created new organisational needs; some assignments continued to be teacher directed. Accepting new types of cultural products from his students also pressed him to rethink issues of how to introduce such assignments, how to give clear instructions, how to 'socialise' projects (i.e. organise presentations, publish or distribute them), and how to best evaluate results. Some of what he did was precisely planned, and other work was grounded in trial and error. As an aside, we cannot emphasise enough how, within the context of Miguel Ángels's own learning, such errors – or missteps – are often as important as success because they allow the learner to think about what s/he could do differently or how to improve what they did on another occasion. We also found this to be the case with all the other participants within our programme.

Learning from Miguel Ángel

Learning to incorporate digital literacies for academic purposes into teaching practices is a complex, gradual process that requires a conceptual dimension of use that extends far past learning how to operate the machine or follow the menus of a given software program (Lankshear & Knobel, 2008). For teachers, it means appropriating digital practices and learning how to work with them while they are already teaching. It opens up a world of knowledge about and experience with multimodal representation, design and meaning making in relation to 'real world' social practices. Knowing how to operate the computer is not enough. In order for teachers to incorporate ICD-T into their teaching they must appropriate its affordances as well as the practical know-how involved in using it. It also means understanding how digital literacies fit with other literacies; as the examples from Miguel Ángel's experience illustrate, one does not substitute for the other. Reading and writing in a variety of formats and sources were articulated in the activities he designed.

While the tendency of many professional development programmes is to concentrate on computer and software operation, using them for teaching implies thinking about what to do within the context of a specific curriculum, set of students, and the institutional environment. Equally, introducing a new set of tools into the classroom – digital or otherwise – creates an opportunity for teachers to revisit the activities, procedures and routines they have constructed over the years and make them unfamiliar in such a way that opens them to scrutiny. This, in turn, can lead teachers to rethink some of what they require of students, how they organise or stage activities, how they relate activities to students' experiences and knowledge, and how they help students broaden their understandings. Not all changes are radical - many are subtle and nuanced, but each transformation is the result of teachers reconsidering their own practices within the context of doing something new, or slightly new. And, as Sheehy (2004, p. 94) points out, 'changing what goes on in the classroom can potentially change students' experience at school'; this entails changing what is validated in students' work, what gets talked about, who does the talking, how meaning is made and knowledge represented, what counts and what doesn't, and so on.

One of the most surprising results of Miguel Ángel's work with us over the 2009-2010 school year was how his view of his students, and his relationship to them, changed. From the beginning

he took a chance – he told his students that he was trying to learn to use technology in the classroom and that he would not always be sure about how to do everything he asked them to do. This in itself implied a new positioning for him. It meant moving from the familiar spot of know-all to the shakier grounds of I-know-some-and-you-know-some. He continually expressed how the students' work surprised him, and he was even a little awestruck by their ability to take on the complex project of mapping and solve the technological challenges that these projects presented.

In the process, he discovered the value of these activities and the new perspectives on content and learning they brought with them. During the interview, he noted: 'There was a change in my attitude because I saw the relevance and possibility that ICT opens when you use it.' As a result, he preserved his teacher identity, allowing himself to grow into the new practices and create 'new patterns of authority' with respect to how learning took place within his classroom (Hull & Greeno, 2006, p. 79). Similarly, he redefined the roles of reading and writing in academic work. While he did not abandon written assignments altogether, nor would we advocate he do so, he found that giving students a variety of different assignments made visible other academic uses of reading and writing. And, as his students engaged in more complex projects and played more of a role in designing end products, he found they became more committed to finding connections between their life worlds and their academic work. Indeed, an interesting question for further inquiry is how student engagement in multimodal projects might impact their academic writing as well.

Miguel Ángel's experience also demonstrates that age is not necessarily the determining factor in teachers' willingness to use or introduce digital technology into their classrooms. This coincides with a survey study reported by Johnson (2012), who noted:

> While one might assume that younger teachers would be more comfortable in using digital media, survey participants said that more senior teachers' experience in classroom management gave them the freedom to take chances and give up some control to students, letting them take the lead and teach themselves – and one another.

Given the findings reported in the literature discussed in the opening section of this article, an important question concerns what conditions contribute to teachers' willingness to learn about ICD-T and try new things in their teaching. Under what circumstances will teachers try to use the computer, its contents and its connectivity in innovative ways? This article suggests that some teachers may need to construct and participate in viable transitional practices that give them subsequent confidence to foray into the new. Our data strongly suggest that Miguel Ángel's teaching evolved and that the policies set in faraway places and by faraway people took on more meaning for him, or were interpreted in new and fresh ways within his teaching. While Miguel Ángel is simply one teacher among many participating in our professional development programme, our own experiences suggest that he is nonetheless quite typical of our participants. We believe that the approach used in our LETS programme – initial hands-on immersion and long-term accompaniment, coupled with an environment that promotes interaction with others (colleagues and researchers) – contributed to Miguel Ángel's teaching 'transformation' and discoveries across the school year, and holds much promise as a model for professional development in the area of teaching and digital technologies within Mexican schools.

Acknowledgements

Notes

[1] This seems to be widespread; see article by El País (Linde, 2011).

[2] In August 2009, at a press conference announcing a laptop distribution programme for teachers, the Secretary of Public Education noted that 'it is necessary to have better prepared teachers, more apt for transmitting knowledge, and one of the fundamental tools in technological progress is precisely the use of the Internet' (http://www.sep.gob.mx/wb/sep1/bol2130809). This programme assigned 1900 million pesos to the purchase of machines, and 0 (zero) pesos to professional development.

[3] In research literature and other publications, digital technology and connectivity are often summarised as Information and Communication Technology and referred to as ICT. However, this leaves out a very important part of digital culture – namely, the multiple tools, platforms, virtual spaces and resources that people use to make their own designs in a variety of representative modes. Furthermore, the 'C' is often forgotten, leaving out the powerful tools for exchange that connectivity offers. For this reason, we are suggesting here broadening the term to Information, Communication and Design Technology (ICD-T) as a way of putting the technology user back in the picture.

[4] One group was an exception to this composition and organisation: in the 2011-2012 school year we worked with a group of 18 teachers from a private K-12 school. In this case we did not have an Installation Week; instead, we held an initial organisational meeting, and held 6 workshops on their campus spread out over the school year. For the 2012-2013 school year, we will have a new group of teachers.

[5] A pseudonym chosen by the teacher.

[6] According to 2005 statistics, in Mexico only 47% of the young people between the ages of 14 and 25 successfully finished the ninth grade (http://cuentame.inegi.org.mx/poblacion/asistencia.aspx?tema=P; INEE, 2011).

[7] The area where CCH-Oriente is located is considered to be one of the poorest in the city; 72% of students' parents earned between approximately $3077 and $24,617 US dollars a year. In 2008, only 52% of parents had an education past 9th grade. (CCH, 2011, p. 32).

[8] PowerPoint has been criticised (http://goo.gl/P2MU3) for reducing thoughtful analysis to a list of bullets. However, we believe that this is not a built-in feature of the software but a characteristic of how it is used. In our Installation Week, newcomers to ICD-T learn to use it as a transitional tool for designing multimodal representations.

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