7 Educational ethnography in blended learning environments

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1. Introduction

Digital ethnography, online ethnography, Virtual Ethnography (herein VE), or netnography, is a modern, expanded face of ethnographic research and a post positivist research approach (see the introduction by Dooly & Moore, this volume). It consists of adapted versions of more traditional ethnographic methods (see chapters by Corona, this volume; Nussbaum, this volume; Unamuno & Patiño, this volume) that aim to investigate the construction of communities, cultures, learning and teaching processes as they take place/are created through Computer-Mediated Communication (CMC), and increasingly, in digital or mobile mediated communication. This approach has been recently applied successfully to different educational arenas, including language teacher communities (Kulavuz-Onal & Vásquez, 2013) and plurilingual speakers' practices in online communities (Androutsopoulos, 2008). However, applications of this approach to formal educational environments are scarce, principally because it is limited to online data collection.

At the same time, it is an inarguable fact that there has been an educational transformation in many current language teaching practices as teachers learn to

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integrate the use of CMC technology into their lessons (see also the chapter by Dooly, this volume). Most of these online practices are based on the premise that people learn by interacting with the social and material environment and by receiving support or 'scaffolding' (Bruner, 1986; Vygotsky, 1978) from more knowledgeable others. In blended learning environments, especially where the language learning integrates telecollaborative interaction, these teaching approaches emphasize the fundamental role of language in mediating human social and cognitive (intellectual) development and the potential of CMC for promoting authentic interaction (Dooly, 2013). This seems almost inevitable given today's interconnectedness on a global scale so that social interaction has, nowadays, acquired much larger dimensions than simply talking with a fellow student in a seat across the aisle.

Additionally, there is a growing realization that technology can have an important role in sensitive pedagogical approaches for ethno-linguistically diverse student profiles (Darling, 2005; Hefflin, 2002; Johnson, 2005). "New technological tools can help promote a learning environment that not only accommodates to, but makes use of learners' differences" (Dooly, 2010, p. 7). This includes "the means of presenting information in manifold formats and multiple media; giving students varied ways to express and demonstrate what they have learned and providing multifarious entry points to engage student interest and motivate learning (Dooly, 2010, p. 7). However, there is a need for much more research into technology-enhanced language learning, in particular when working within plurilingual environments. "Unfortunately, these theories and practices are not widely understood nor implemented by teachers working with minority language students" (Dooly, 2010, p. 8).

> "The use of technology should be looked at holistically, not as a separate component of teaching. The aforementioned aim of fomenting research and wide-spread publication of innovative teaching approaches for minority language groups can also have an effect on local teaching practices as well. Most teachers are well-intentioned but at times their best efforts may be thwarted by lack of knowledge on how to achieve theoretically sound goals" (Dooly, 2010, p. 8).

This is where digital ethnography can play an important role. Traditionally, as other chapters in this volume show, ethnographic research is an approach that facilitates holistic analyses of interactional phenomena. This approach endeavors to investigate focal phenomena as part of a complete system created via the interaction between its constitutive individual parts in specific circumstances and conditions, leading to a unique and context-bound understanding of what is happening (Noblit, 1984; see also Taylor & Bogdan, 2000). In this sense, ethnographic research offers an in-depth understanding of the lived experience of a population in order to devise appropriate courses of action about a phenomenon (Beckmann & Langer, 2005; Elliot & Jankel-Elliott, 2002). Along these lines, immersive fieldwork in classrooms has been referred to as 'school' or 'educational' ethnography (Erickson, 1973; see also Nussbaum, this volume; Unamuno & Patiño, this volume).

For researchers interested in understanding the complexity of blended learning environments (language teaching environments that combine face-to-face lessons with CMC interactional activities), the abovementioned changes bring up new questions. For instance, in an era of multimodal education, where the field of study moves beyond the physical classroom, how can traditional ethnographic methods (i.e. prolonged engagement and deep immersion) be pursued and applied in online settings in order to enable an in-depth understanding of learners' subjective experiences across both physical and virtual settings? How can the researcher optimally combine in-class and online data taken from blended learning environments? How should the researcher collect and categorize data that are so different in nature (visual, textual, imagery, etc.)?

This chapter aims to answer some of the questions that emerge when carrying out educational ethnography in a blended learning environment. We will first outline how VE has been developed and applied by other researchers. Then, to better illustrate the approach, we will describe a doctoral research project that implemented VE, combined with Grounded Theory case studies, to trace learning in teacher education across classroom and online environments (i.e. through telecollaboration with U.S.-based peers; see also Dooly, this volume). The student-teachers, all of whom were plurilingual, were using English as a lingua franca to

carry out the exchanges. In particular, the chapter links the research questions with the methods that were used to collect multimodal data, as well as the data sampling schemes employed. It discusses the challenges met, their solutions, and the contributions of the NVIVO program to the accomplishment of the research (see chapter by Antoniadou, this volume, for more details about the use of NVIVO).

2. A brief overview of the development of virtual ethnography

Green, Skukauskaite, and Baker (2012, p. 310) state that "in education, ethnographers enter a classroom, school, family group or community setting to identify insider knowledge by asking questions" that relate to what is taking place, by whom, what counts as knowledge and knowledge construction, what roles and relationships are discernible, what contextual factors have an impact on how knowledge is constructed, and how do individual and group actions promote or constrain "ways of knowing, being and doing" (Green et al., 2012, p. 310) of the members? These authors argue that ethnography should be regarded not as a method but as a "logic-in-use" approach, based on the premise that ethnography is applied as a "non-linear system, guided by an iterative, recursive and abductive logic" (Green et al., 2012, p. 309). This means that educational ethnographers do not have predefined steps or fieldwork methods. This is especially important to bear in mind when dealing with complex environments like blended learning contexts. Educational ethnography can be especially useful for researchers who are interested in an emic (see Dooly & Moore, this volume; Nussbaum, this volume), data-driven approach that helps explain precise details of the language learning process. In recent years, transferral of this approach to online and mobile interaction in learning environments has become more commonplace.

The methodological approach of virtual ethnography has been broadened and reformulated through new proposals such as digital ethnography, ethnography on/of/through the Internet, connective ethnography, networked ethnography, cyberethnography, etc. Each of these maintains its own dialogue with the

established tradition of ethnography and formulates its relation to this tradition in different ways. (Domínguez Figaredo et al., 2007, para. 1).

A key aspect of understanding what VE implies is the recognition that this type of study is "potentially global in its geographical extent" (Greschke, 2007, para. 1) while at the same time endeavors to uncover, describe and understand what is constituted in the relationships at local (and 'glocal') levels, facilitated through virtual (or digital) dimensions. This implies that online research should move beyond merely capturing single-source onscreen data (e.g. textchat transcripts, blogs or forum posts, email exchanges), which, till now, has made up a large part of the online corpora in most studies on CMC in order to understand interrelated communicative patterns between different sites (both online and offline). As Androutsopoulos (2008) has pointed out, trying to understand interactants' discourse practices by relying exclusively on single-source onscreen log data does not really provide the researcher much perspective into the discursive bridging practices that individuals might use, not only between on and offline interaction but between different online sites and within multiple virtual communities.

This same author has identified two emergent types of VE. The first identified type of VE focuses on the integration (and penetration) of communication technologies in everyday life and the impact this may have on social and cultural practices. This type of VE is considered to be 'blended ethnography' as it combines data derived from both on and offline ethnography. This type of VE is exemplified in the case study included in this chapter. The second type of VE identified by Androutsopoulos (2008) consists of understanding emergent communication patterns across various CMC sites, thereby consisting only of online ethnography, or as the author explains, it is concerned with the "systematic observation [of] the dynamics of communication and semiotic production within web environments" (para. 10).

Indeed, the VE approach has been around long enough for a general framework to emerge (Hines, 2000). In this framework, four of the main aspects that constitute VE are:

- VE provides a means of understanding the ways in which CMC becomes socially meaningful in everyday life and in learning processes.

- VE looks at field connections, not just field sites.

- There are no clear-cut boundaries between what is 'virtual' and what is 'real'.

- In VE, social media is understood as both sociocultural practices and sociocultural artifacts.

This framework also highlights aspects that pertain to the VE researcher, such as:

- VE researchers may need to be sufficiently adaptable to gather data both 'virtually' and 'physically'.

- Due to the way in which participants engage with the virtual communities, data collection will probably be intermittent, rather than long term immersion.

- Virtual engagement adds a reflexive dimension to data and analysis (the online site is both a place of continuing activity and fixed, already existent information).

Given that the 'work fields' or potential sites of VE research are 'pluri-local' and expansive (in particular through the reproduction of resources through linking to other sites), some important questions for the researcher emerge:

- How does the researcher determine the boundaries of the fieldwork?

- How does the researcher establish the parameters of exponential links (how many links between sites must a researcher observe and map)?

- What is the rationale for selection of what is included or excluded?

- What does it mean for the virtual ethnographer to 'be there' and be part of the community?

- Can the virtual ethnographer say they know enough about the community by only participating 'virtually'?

- How much of the behavior in the community is available to the researcher and how much that is available is actually monitored? (This refers back to the framework of intermittent participation and the merge between on and offline participation).

- Linked to the point above, should the 'physically-grounded' aspects of the subjects' lives be taken into account (Greschke, 2007)? If yes, how can this be managed?

Inevitably, there are also some emergent ethical issues to be considered when carrying out VE (see Dooly, Moore, & Vallejo, this volume, on research ethics) which are pertinent to online or digital data collection. The question of whether 'publicly' displayed resources require participants' permission to be used as data (and how to obtain this permission in a global virtual community) is still under debate in the VE community. Even more divisive is the question of whether it is ethical to become a member of a community in order to gather data (known as 'lurking' online), especially when dealing with more 'sensitive' virtual communities (for instance, a LGBTQ+ community or teenager sex education communities). Nonetheless, some general guidelines have been created by the Association of Internet Researchers (AoIR)[3]. In particular, it is suggested that anyone engaging in VE should make their purpose visible and transparent from the beginning (e.g. a post in the forum, an information card in virtual worlds) that not only states that the researcher is gathering data but also provides a link so that other members of the virtual community can find out more about the study and, ideally, provide their consent. Admittedly this is not a foolproof system, but it does indicate a willingness to be upfront with the rest of the community members.

3. See http://aoir.org

Anonymizing data is another rather thorny issue with VE. Different from data gathered in face-to-face environments (which is generally based on oral communication), changing the name of the participants does not easily erase the 'traces' of their interactions online, as is evidenced by the ease in which search engines can locate entire texts based on partial phrases pertaining to them. Some VE researchers prefer to paraphrase participants' interactions in order to avoid this possibility, although this inevitably blurs the lines even further between 'authentic' data and data which have been 're-interpreted' by the VE researcher.

Despite these issues and questions which are still under debate, the authors of this chapter fully endorse this type of research, especially as language learning processes increasingly move from offline to online environments (including blended learning environments as in the case presented below). As with any field of research, technology advances require the researcher to re-think current investigative practices. In VE, this is especially pertinent and brings an added dimension of reflexivity to such studies, along with exciting innovative research practices.

3. An ethnographic multiple-case study tracing teacher learning across classroom and online activity

Empirically illustrating the above, the following sections describe one example of VE application that was used to achieve a holistic understanding of the learning processes and outcomes in a blended learning environment. This study used telecollaboration alongside university instruction and school placement aiming at creating enhanced opportunities for student-teachers of English as a foreign language in primary education to develop: (1) domain knowledge and reflective skills, (2) collaborative learning, and (3) an experiential understanding of CMC for language education. The student-teachers' exchanges involved English as a lingua franca.

The virtual exchange took place across two semesters. In the first semester, the student-teachers in Catalonia had to design a seven-session teaching sequence in

telecollaboration with seven classroom and 14 U.S.-based peers (with whom they were paired outside classroom hours). In the second semester, the same student-teachers had to collaboratively create a one-session podcast-based unit around a linguistic phenomenon of their choice. In the first semester, the interaction took place via synchronous MSN and Skype, and asynchronous email communication. In the second semester, the interaction took place via synchronous Second Life and MSN communication, offering the student-teachers knowledge and practice of different communication modalities and their affordances and shortcomings. Alongside university and virtual collaborations, the student-teachers in Catalonia were doing their placements in primary schools, where they observed and worked with experienced school teachers. At these same schools, the Catalonia-based student-teachers had to implement the teaching plans that they had collaboratively created with their virtual and classroom peers and tutors and reflect on the process and outcomes in wiki journals.

The overall research objective was to understand the ways in which task-based telecollaboration interacted with face-to-face collaboration and school placements, and discern the ways in which integrated telecollaboration can be used to enhance the learning output of conventional face-to-face Initial Teacher Education courses.

Looking to optimize data collection and research output, we integrated and framed the main methods of VE, i.e. prolonged engagement, deep immersion and participant observation within the wider scope and practice of multiple-case study research (Yin, 2003), with the analytical richness of data-driven Grounded Theory (GT) methods (Charmaz, 2006; Glaser & Strauss, 1967).

4. At the nexus of multiple-case study, ethnographic and grounded theory methods

Case study research aims at providing "an up-close and in-depth empirical investigation of a particular contemporary phenomenon within its real life context, using multiple sources of evidence" (Robson, 1993, p. 146; also Yin,

2003). There are different instantiations of case study research: (1) individual or single case studies, and (2) set of individual or multiple-case studies (Robson, 1993; Yin, 2003). Multiple-case studies usually involve three to five cases, allowing comparison and contrast between cases, i.e. different presentations/ manifestations of a phenomenon, and are said to produce better understandings and more robust interpretations than single case studies. Overall, the case study method provides tools for a holistic approach to phenomena, such as documents, quantitative and qualitative measurements in the form of open-ended questionnaires and interviews, archival records and physical artifacts (Yin, 2003). Single or multiple-case studies can be descriptive, responding to a 'what is happening' question; and exploratory and/or explanatory, providing answers to 'how/why did it happen' types of questions.

The methodological bricolage described herein was based on common philosophical assumptions between the research approaches, abiding to the interpretive paradigm (Halaweh, Fidler, & McRobb, 2008), and aiming at grounded theory-building (Eisenhardt, 1989) on teacher learning in blended environments. That is, we sought to understand learning processes and outcomes by interpreting the underlying meaning-making processes (Halaweh et al., 2008) and through the eyes of the participants. We approached the task not with pre-determined ideas of what constitutes learning, which is characteristic of positivist paradigms using quantitative measurements to confirm or reject theories (theory-testing). We sought to unravel the characteristics of the learning trajectories and outcomes of three out of the seven student-teachers, as they themselves experienced their learning process, and analyze various other related phenomena.

Case study research shares scope and techniques with ethnography, including fieldwork (direct and participant-observation), interviews and questionnaires, allowing the researcher to build a holistic account of an event, process, subject or practice; ethnography may often be classified as a type of descriptive case study research method. However, ethnography's defining feature is prolonged participant observation and the social relationship that is developed between participant and observer. This approach to data collection may or may not be

complemented with interviews or other qualitative data, and findings cannot be generalized to other contexts. Through this type of prolonged and deep immersion into the research context, the researcher collects 'naturalistic unstructured data' (Flick, 2002), which are later coded in order to reveal the underlying components that make up human behavior and culture. The researcher him/herself becomes an instrument in the process of interpreting data, not without allowing possibilities for bias (Cohen & Manion, 1989).

Similar to ethnography, the GT method presents a set of techniques and strategies for compiling and analyzing data to understand significant aspects of the phenomenon under investigation (Charmaz, 2006; Strauss & Corbin, 1998). In GT, the researcher is participant-observer of the phenomenon in its naturalistic environment. S/he collects naturalistic 'unstructured' data, which s/he analyses as the collection process progresses, isolating themes and continuously verifying their importance with more data from participants. As an essentially data-driven method, GT does not develop from preconceived hypotheses but from the data itself, in which the participants indicate what is important for understanding the phenomenon. As its name suggests, the goal of GT is to develop middle-range theory to explain human behavior and processes (Charmaz, 2006). The researcher engages in extensive coding to represent the phenomenon being researched. While coding and categorizing, the researcher keeps memos and notes to explicate and complete coded categories. In turn, this memo-taking links the processes of coding data and writing first drafts of papers (Charmaz, 2006). GT aims at generating theory grounded on data. To do so, the researcher selects coded events from the larger corpus that help him/her develop theoretical concepts and accounts of the phenomenon s/he is researching (Strauss & Corbin, 1998). This process is called theoretical sampling or sampling for theory construction. A characteristic of the GT approach to qualitative research is that the researcher delays the literature review in order to maintain as clear a mind as possible while reading the data. This also marks an important difference with positivistic studies, where literature review is the first step in designing the research and serves as the basis for setting research objectives and methodologies for reaching them.

5. Discourse analysis

Discourse Analysis (DA) is a general approach to analyzing written and verbal 'texts', looking to make connections between these texts and their meanings (Lemke, 2012). Taking language-in-use or talk-in-interaction as the fundamental symbolic tool in the development of cognition, we were particularly interested in unraveling the relations between discourse/language-in-use and developing cognition over time, and across people and tools. To this end, we used a DA approach from Linguistic Anthropology of Education (Agha & Wortham, 2005; Wortham, 2006) that took into account the temporal and spatial dimension of the interaction (face-to-face and online modes) in order to conceptualize and identify the linguistic and conceptual resources that student-teachers explored, transferred and used across the different sites they were working in over the course of the academic year, as well as the different positioning associated with each use (Wortham, 2006). This approach recasts a type of frame analysis (Tannen, 1993) approach, which was adapted to the needs of our research context and coding process, and was driven by the following questions:

- What are the student-teachers doing in this interaction and in what spatial arrangements? What knowledge/skill are they working on?
- How far along the learning process are they doing this?
- What resources are they using from other sites, e.g. classroom content, school experience?
- Do these interactions relate to the gains that the student teachers report at the end of the year?

Coding along these lines allowed us to trace professional learning, i.e. development of teacher discourse and thinking across online and face-to-face sites over time. We will now move on to describe the multiple sources of evidence that we used for interpretation and triangulation purposes, as well as the data collection and analytical procedures used for capturing 'learning in the making'.

6. Multimodal data collection: methods used and types of data collected

6.1. Questionnaires and focal group interviews

Focal group interviews with the participants (see Canals, this volume) took place face-to-face at the very beginning of the research project in order to encourage a first meeting between the participants (student-teachers based in Catalonia) and enable them to share learning experiences and concerns regarding the online collaboration. The group interviews allowed the student-teachers to recall, reflect, and synthesize past learning experiences, clarify weaknesses, goals and set expectations from the course. These group interviews were recorded, transcribed and included in the analysis (see chapter by Moore & Llompart, this volume). Research-wise, they were used as focal process-oriented data, marking the beginning stage of development and serving as baseline for comparison with end-of-year learning gains. Open-ended questionnaires (see Canals, this volume) were used to document goals and expectations from this course. Student-teachers were also asked to rank their teaching competences on a summarized version of the European Portfolio of Student-Teacher of Languages (Newby et al., 2007).

6.2. Participant observation in the classroom and online

6.2.1. Classroom observation

All the face-to-face sessions at the university, in the first and second semesters, were video and audio-recorded on a weekly basis. In this research, participant-observation as it took place in the classroom can be described as including a moderate level of participation, concerned with maintaining a balance between 'insider' and 'outsider' roles, and allowing a good combination of involvement and necessary detachment in order to remain objective (DeWalt & DeWalt, 2002; Schwartz & Schwartz, 1955). It was made clear to the participants that the researcher was not participating in their assessment of the course. Therefore, she was able to observe the process as it was constructed naturally between the university tutor and student-teachers. Over time and through daily interaction, a

relationship of trust was developed between the researcher and the participants. It is particularly important to develop a relationship of trust with the participants, especially in educational contexts. Given the workload that the participants have in these settings, it is important to respect the ethical issues involved and join participants in their interests and pursuits. In this setting, the shared interest was a genuine effort towards learning and improving teaching practice, even beyond academic achievement.

6.2.2. Online observation

In the first semester, the participants carried out the online exchange in out-of-class time, mainly at home. Participant observation could not be carried out without intruding on the participants' privacy. Recalling the definition of VE as adaptation of traditional ethnographic methods, student-teachers were asked to save and email their online interactions with their U.S.-based partners to their tutor and to the researcher. These transcripts were taken as 'natural protocols' of students' efforts in making sense of and structuring their physical and social environment (Roth, 1996).

Online observation took place during the initial Second Life meetings (platform used for telecollaboration in the second semester). Since this platform/tool was an entirely new 'locality' for the student-teachers, online observation provided the researcher with insights into the students' emotional state and familiarity with various aspects of technology, which were in turn useful for tracing digital development at the end of the course (this was relevant to the research objectives). The researcher, also present in Second Life, documented important aspects of this process in fieldnotes. The participants also documented their perspective of important aspects of this process in narrative form (described below).

6.3. Semi-structured interviews

Once themes began to emerge from reading the classroom and online data, the researcher followed up with semi-structured interviews with participants,

seeking to corroborate the value of and further investigate these themes (in line with the GT methodology, as described above).

6.4. Narratives

The participants were asked to write online wiki narratives, later downloaded by the researcher. This data type facilitated a reconstruction of events by the participants themselves and helped the researcher establish a deeper understanding of the topics of interest, as well as triangulate findings (Jangu, 2012). Other types of self-reporting resources included:

- Minutes of the tutorial sessions documenting main occurrences and relevance to their learning process. These notes were contrasted with the researcher's own fieldnotes, and were used as triangulation data offering further insight into the student-teachers' own perceptions of experience.

- School journals. Student-teachers kept a diary of their placement experiences at the primary schools, throughout the placement. These documentations provided data about the student-teachers' interaction with the school environment and the ways they associated this practical teaching experience (co-teaching with expert teachers, observing them teach) with what they were learning at the university and online.

- Self-reflections and evaluations. These were several wiki texts consisting of: (1) self-reflections on the student-teachers' own teaching practice, implementing the materials they had collaboratively created with classroom and virtual peers and tutors; (2) students' evaluations of their learning experience (for this latter, the student-teachers had to reflect on the contributions of online chats and university sessions to their teacher education); and (3) reflections on development of teaching competence, based on the same summarized version of the European Portfolio of Student-Teacher of Languages, given at the beginning of the course. The student-teachers were writing these wiki texts from the beginning to the end of the year.

7. Data sampling

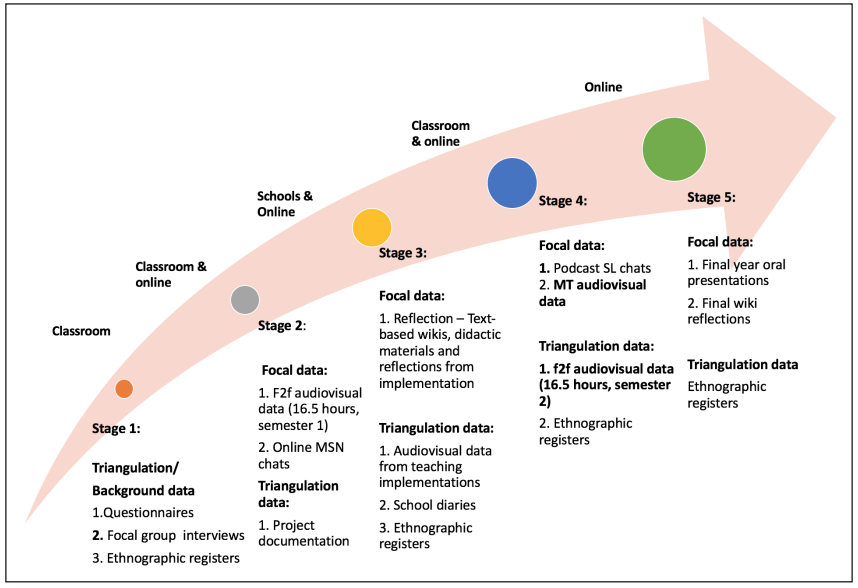
Quality ethnographic multiple-case study research is also a matter of selecting good and information-rich cases, otherwise referred to as information-oriented data-sampling (Yin, 2003; see also Dörnyei, 2007). Literature suggests choosing subjects that offer rich insights into unique or exemplary, unusual or particularly revealing sets of circumstances (Fenno, 1986), and not focusing on typical cases representing the phenomenon at hand. In this research project, we chose to focus on the learning trajectory of three out of the seven student-teachers who participated in the course. The three had very different profiles as learners (explained in more detail below). With this selection, we wanted to understand how a significant number of agents with different motivations in regards to teaching and CMC perceived the learning affordances of the task and learning environment and used them to construct knowledge. Such polarity between cases permits analytic generalization (Yin, 2003) about the learning affordances of this hybrid environment, since it provides evidence on the ways this environment can benefit subjects of various competency levels and motivations. For these three student-teachers, we had full data to reveal and triangulate their learning trajectory and output, and thus reliably carry out the research objectives.

In this research project, the key case was a student-teacher who presented exemplary performance and consistency throughout the course, responding to the tutor's intentions and objectives. We wanted thus to study the circumstances surrounding this performance in order to draw conclusions about aspects of effective telecollaboration for teacher learning. Our second case was considered critical because of this student-teacher's language barrier. She was considered a weak student, with compromised proficiency in the target language, yet she was tech-savvy, and increasingly motivated by the constant support she was receiving in this learning environment. Her performance across sites illustrated unique learning processes, developing professional identity and skill through imitation of the tutor's discourse and the learning practices she came across in the classroom and online. The third case was particularly

revelatory of how engagement in this type of hybrid learning environment can work in odd circumstances. This student-teacher had a limited-level of digital proficiency, mainly because of personal aversion towards technology. In combination with a compromised English language proficiency, she initially felt very uncomfortable about engaging in online collaboration.

Apart from selecting cases, data sampling also involved distinguishing focal from triangulation data. Triangulation meant using data collected from different 'overlapping' sources and methods (Guba & Lincoln, 1994), and contrasting them with the findings from the focal data in order to determine their validity. Figure 1 below illustrates the progression and constant accumulation of data across multimodal settings. As this figure shows, each stage of data collection gradually generated more information, which facilitated a sequential understanding of the teacher learning process.

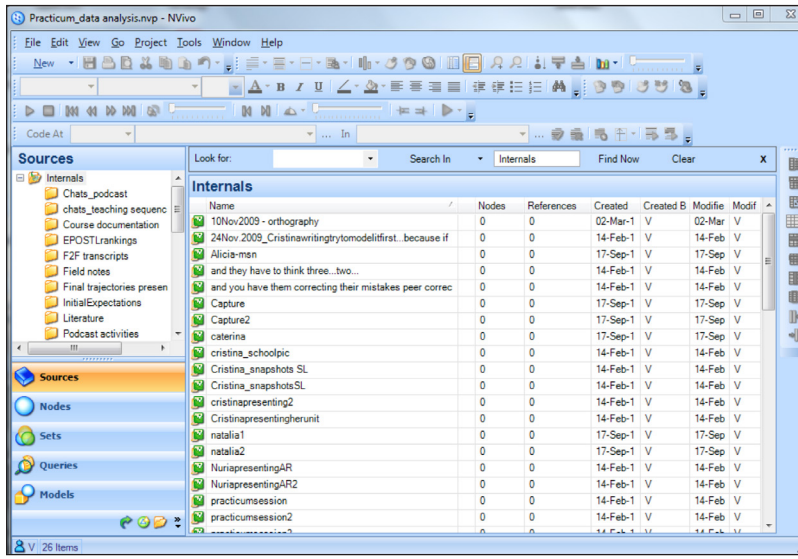
Figure 1. Representation of the data collection process and outcomes



8. Data analysis: NVIVO8-assisted data management, coding and interpretation of findings

All data, focal and triangulation, were stored in the 'Internals' folder of NVIVO8 (Figure 2). Literature, which we used to theoretically substantiate this research, was linked, pasted or summarized in the 'Externals' folder. The original files were either physically stored on the computer's 'documents' folder, or available via websites outside NVIVO. In the case of small-sized articles, these were imported as PDFs in the 'Internals' folder (Figure 2).

Figure 2. Storing data in NVIVO8



8.1. Data analysis

With the research questions on the side as a reminder of research objectives/questions, the researcher began the data analysis process by coding the focal data, e.g. classroom and online interactions, and text reflections. Coding is the analytical process that facilitates categorization of large amounts of "raw/

unstructured data" into good coding schemes aiming to provide the analyst with a 'storyline' that allows him/her to answer his/her research questions (Strauss & Corbin, 1998). In this research, coding helped reveal the relationships between learning activity at university, online and school, and outcomes reported by the student-teachers at the end of the course.

Our coding was topic-oriented and aimed at tracing all interactions around the same topic (e.g. lesson planning, assessment). Also, the researcher was coding interactions that took place at different temporal and spatial arrangements. Pointing that out in our codes was important to our research objectives. To do so, the researcher used the -ing suffix to denote process and the -ed suffix for outcomes to signify outcome. One example of coded outcome is 'Learned terminology for setting linguistic objectives', and an example of coded process is 'Designing realistic objectives for four year-olds'. This coding method allowed emphasis on the temporal relationships between different data extracts, and also traced temporal and topic relationships between codes in order to establish a network of interactional episodes from which the student-teachers discernibly drew on to construct meaning around the topic/skill learned (Barab, Hay, & Yagamata-Lynch, 2001; Roth, 1996).

Following the coding stages of GT methodology, data analysis consisted of three cycles of coding; namely open, axial and theoretical. These coding stages aim at gradually focusing the analysis on relevant chunks of data for answering the research questions. Open codes result from an initial reading of the data, where the researcher reads and re-reads the data and isolates interesting aspects or verbatim participants' words (Figure 3).

Axial coding is the second stage of data codes, which picks up relationships between codes, and reduces the number of open codes by merging similar codes.

Alongside coding, a note-taking scheme was also devised and implemented, documenting the researcher's thoughts while coding as an answer to the whats and whys of codification and categorization, and helping to shed light on the relationships between codes during the axial coding stage (Figure 4).

Figure 3. Free nodes – open coding stage

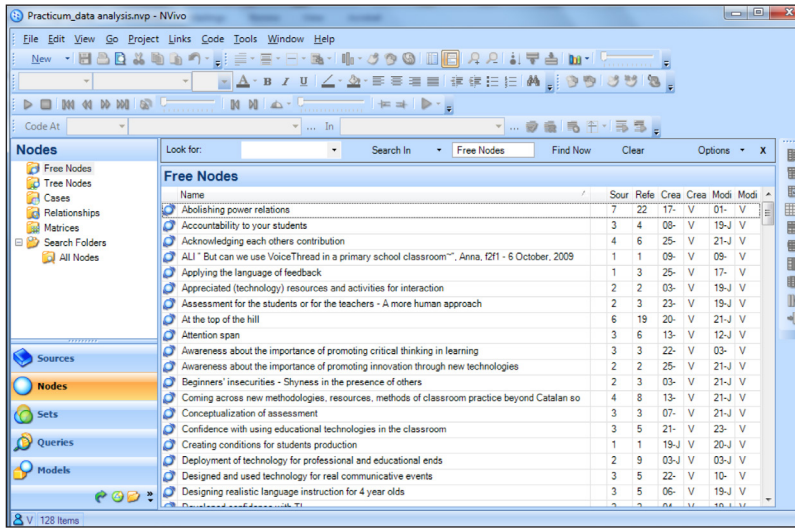
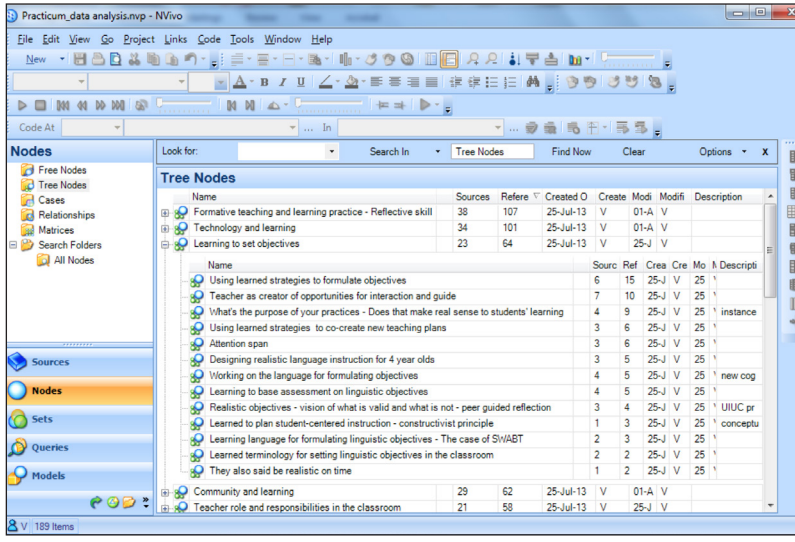
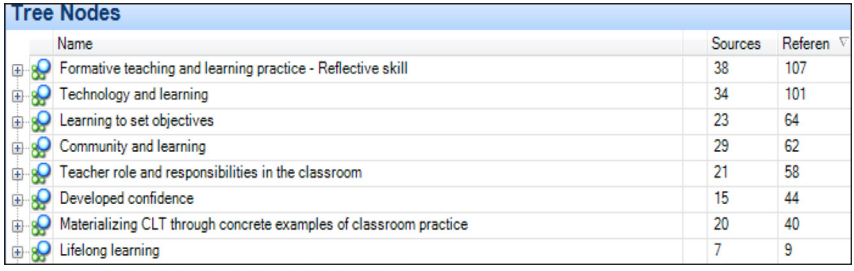


Figure 4. Tree nodes – axial coding stage



For the third coding stage, the researcher reviewed the literature for relevant theoretical background to explain and/or interpret his/her findings from the two previous coding stages. In this stage, the researcher creates larger categories that link data/codes with theory. This is the last building block in theory-building. The third and final analytical stage consisted in the eight categories illustrated in Figure 5 indicating learning outcomes, i.e., knowledge, skill and ability in different areas of teaching, e.g. formative teaching and learning practice, technology and learning, and learning to set objectives (lesson planning). These final categories were supported and reformulated along theoretical premises found in the literature.

Figure 5. Final categorizations in NVIVO – indicators of salience



Tree Nodes

Name	Sources	Referen
Formative teaching and learning practice - Reflective skill	38	107
Technology and learning	34	101
Learning to set objectives	23	64
Community and learning	29	62
Teacher role and responsibilities in the classroom	21	58
Developed confidence	15	44
Materializing CLT through concrete examples of classroom practice	20	40
Lifelong learning	7	9

9. Data interpretation and formal output

We chose to focus on the three most salient categories (based on the quantitative measurements provided by NVIVO8) in order to preserve analytical rigor. The findings were finally presented as a storyline of 'learning in the making' culminating to specific knowledge, skill and competence that the focal students reported having learned at the end of the practicum.

In-depth discourse analysis, as described in the introductory section of the methodology above, informed the interpretation of sequential learning events that took place across universities and online and school environments at different points in time, and explained how symmetrical and asymmetrical interaction

with virtual peers and tutors respectively as well as experiential learning from school practice and teaching implementation afforded teacher learning, within the formal parameters of contemporary teacher education (Antoniadou, 2013). Taken sequentially, these episodes depict how student-teachers use and combine the resources made available to them through interaction to construct new knowledge and reach qualitatively new cognitive outcomes in regards to strategic instructional planning, collaborative and digital knowledge and skills (Antoniadou, 2011, 2013; Dooly, 2011, 2013).

10. Concluding words

In this chapter, we have described a VE study. We have illustrated the types and processes of data collection in the VE. We have detailed how the analysis was carried out across multiple educational sites. We have explained how we used this data to carry out our research objectives, hoping to provide a practical how-to for future researchers interested in taking on ethnographic endeavors in computer-mediated learning environments. With this approach, we examined learning as a process, were able to discern critical episodes of interaction across instructional sites, and illustrated sequential meaning-making processes in regards to learning to teach.

The research described in this chapter verifies that there is no one typology of VE procedures for VE; rather VE implementation necessarily depends on and is informed by the contextual contingencies and relevancies of each particular site (Domínguez Figaredo et al., 2007). Institutional specifics and local challenges will necessarily influence the ways of investigation and impose adjustments to traditional ethnographic research.

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