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3. ELICITING TEACHERS' PRACTICAL KNOWLEDGE THROUGH MENTORING CONVERSATIONS IN PRACTICUM SETTINGS

A Propositional Discourse Analysis (PDA)

INTRODUCTION

> Student teacher: Sara asked me for the definition of "condensation" and I replied: It is like the humidity we feel in the air… I made a mistake and I feel terrible for it.
>
> Mentor Teacher: In the case where a classroom student asks you for a further explanation and you do not know how to do it, you can tell her/him to look up the word in her/his own dictionary. First, you will not commit a mistake and mislead the student. Secondly, you will show Sara, or any other pupil, how to make use of that specific skill. Remember that using the dictionary is one of the procedural skills for most of the teaching units and this one is no exception. (May, 2013)

This interaction is a fragment taken from a mentoring conversation that took place in a Primary school in Salamanca (Spain). The Student Teacher was giving a lesson about the states of matter to 5th graders (11 years old). After the explanation, when classroom pupils were working in pairs, Sara, a student, asked aloud for clarification of the term "condensation". Since it was a pivotal concept for the lesson the Student Teacher had carefully read the definition of the textbook to the whole class minutes before: The inverse process of vaporization in which a vapor turns into liquid when there is a contrast of temperatures. However, as Sara seemed not to understand the previous explanation the Student Teacher's reply to Sara's question was to incorrectly equate condensation to air humidity. That was wrong and the advice the mentor teacher provided was to redirect the student to a dictionary the next time as an alternate strategy for dealing with the situation.

The learning contained in this example may be relatively unsubstantial in the 'bigger picture' of schooling but, in essence, it illustrates a genuine teaching strategy about how to proceed when the teacher vacillates about the right answer to a question. This kind of knowledge is evident in schools but is often neglected in Teacher Education Programs. Suggesting that the student use the dictionary may

H. Tillema et al. (Eds.), Mentoring for Learning, 47–78.

be not among any canonical response to the above problem, namely, the correct explanation of the concept of *condensation* in terms that an eleven year old student can easily understand. Some may have thought that it would be better to tell the Student Teacher to prepare more consciously her knowledge of the key concepts of the lesson. We agree that this is one possible response. But we also believe that other strategies or formulation should be considered valid as far as it is useful when dealing with practical situations. We have in this example an expert teacher's *rule of thumb* suggestion for addressing a problem quickly—as a kind of *in-situ* response that might be useful the next time the Student Teacher might face a similar situation. If the mentor teacher, as expert, recommends using that particular rule it is because it serves a purpose (i.e., not misleading the student), although it might be a temporary one. Using the dictionary in this situation is a strategy that serves as a halfway step until the Student Teacher learns a more standard response: a strategy that implies the best solution of the teaching problem in terms of pedagogical adequateness.

Therefore, the sum of guiding *in situ* strategies, such as the one described above, constitutes part of the practical knowledge repertoire that expert teachers use in their daily teaching, and may be determined by different professional roles and identities over the course of one's career.

The important issue therefore is finding ways to make this valuable knowledge explicit and communicable to others, especially the newcomers to the profession. Apart from that, it is also important to articulate this knowledge into theories *of* and *for* practice that may be utilized in classroom settings (both in-service and pre-service). Practical knowledge is often tacit knowledge (Verloop, Van Driel & Meijer, 2001) not readily accessible or verbalized unless those teachers are triggered to reflect upon or problematize their practice (Shulman, 1986, 1987). In this case, the classroom teacher may have not thought about the use of the dictionary until witnessing the student teacher's pitfall. The elicited expert teachers' tacit knowledge could provoke, in turn, a particular learning process for the apprentice and consequently affect future performance and style of teaching (Clarke, 2001).

The purpose of this chapter is therefore to highlight the importance of revealing the teachers' practical knowledge that plays a determinant role in ordinary decision-making processes at schools through a research approach called Propositional Discourse Analysis (PDA). This methodology allows for systematically identifying meaningful units of knowledge and organizing them into action-oriented formats that could make knowledge utilizable in other in-service, novice and prospective teachers' contexts.

Our objective is twofold: on the one hand we aim at (1) stressing the relevance of seizing the practical knowledge that emerges in mentoring conversations (as in the one contained in the above example), leaving other aspects of the interaction aside for the moment (i.e. context, personal engagement, emotional commitment, roles, etc.); and, on the other hand, (2) describing a possible procedure that may help researchers, teachers, and teacher educators to make such practical knowledge not only explicit but accessible for other teachers.

Along these lines, and according to the objectives, the chapter is structured into two major sections: (1) theoretical underpinnings in teacher mentoring (three main viewpoints) aimed at clarifying the nature of this process in educational research. To this end, we develop the argument that practical knowledge not only needs to be made public, but also be articulated into theories which can be shared in real settings of practice; (2) a discussion of how to make the practical knowledge explicit stressing one method in particular: Propositional Discourse Analysis (PDA).

MENTORING AS A GENUINE PRACTICE OF TEACHING TO TEACH

Over the last two decades teacher mentoring has been regarded as a key activity that plays a crucial role for the improvement of the quality of the educational practices (Clarke, 2001; Packard, 2003). Basically, mentoring is understood as the process of mediating professional learning in practice settings (Osula & Irvin, 2009). Mentors Teachers (MTs) are the ones who supervise Student Teachers (STs) in the schools with the purpose of helping them learn how to teach (Clarke, 2006, 2007).

Many education programs worldwide have begun to invest in teacher mentoring as an important way of enhancing the profession because it implies a direct connection to actual practices (Zollo & Winter, 2002). At the same time, a substantial body of research has shed light on relevant dimensions of mentoring and has proposed ways to facilitate its improvement (Hudson, 2013). If these are provided, then the practicum experience would become one of their most significant sources of learning support for STs (Marable & Raimondi, 2007).

More specifically, Teacher Education has stressed mentoring as a professional relationship that activates critical learning (Bradbury & Koballa, 2008) and effectively assesses practice (Tillema, 2009); a process that supports the development of knowledge and skills (Hudson, 2013) and ensures social transformation (Orland Barak, 2001). Nonetheless the intricate details of the work of mentoring are difficult to determine because it is an activity that takes place in both formal and informal situations often carried out on a voluntarily basis, and is time-consuming (Weinberg and Lankau, 2011). Besides, MTs "are regarded as little more than ad hoc overseers [and] often neglected in terms of their potential role as teacher educators (Nielsen, Triggs, Clarke, & Collins, 2010, p. 840).

Three relevant meta-analysis studies (Hansford, Ehrich & Tennent, 2004; Hobson, Ashby, Malderez & Tomlinson, 2009; Clarke, Triggs, & Nielsen, 2013) have revealed the state of art in mentoring by reviewing a substantial sample of studies of more than 300 original research papers. The following conclusions were reached:

- There are hidden and highly complex dimensions associated with the mentoring process;
- The literature on mentoring is disjoint and disparate which limits the construction of solid theoretical frameworks.
- The learning that emerges from the mentoring interactions is especially relevant when teaching to teach.

Research Perspectives on Mentoring and the Place of Practical Knowledge

However, there was no explicit addressing of the weight of practical knowledge as an object of study in the reviews referred to. For that reason, we chose a random selection of 50 studies from the studies reported in the three meta-analyses (which had deemed them both substantive and relevant) and organized them according to their focus of research. Two criteria were followed: first, the studies selected were all in peer-reviewed education journals that were published throughout the last 30 years and appear in major databases such as ERIC, EBSCO, Science Direct and PsycINFO; second, all the works refer to mentoring as a formal professional activity supported by teaching institutions (as opposed to informal mentoring). A matrix was created including the title of the article, author, date of publication, descriptors, object of study and a short statement of major results. Our review resulted in the appreciation of three latent research trajectories (see Table 1):

1. Mentoring as a way of constructing a professional identity
   A substantial body of research states that mentoring leads to the construction of particular teacher identities (Connelly & Clandinin, 1999; McLean, 1999; Chong, Ling & Chan, 2011; Danielewicz, 2001) because only by the assimilation of routines and professional ideas can STs and MTs identify themselves as classroom teachers. Table 1 shows that 44% of the selected research studies (22 out of 50) highlight that mentoring contributes to enhancing personal attributes, assuming certain roles and beliefs which, in the end, determine professional growth (Killian & Wilkins, 2009). The identification (in research) and promotion (in practice) of those attributes is the epicentre of this perspective.

2. Mentoring as a form of establishing a supporting relationship.
   STs' learning of the profession happens through successive interactions that promote active participation in a community of practice (Lave & Wenger 1991). According to Table 1, 34% of studies defend that the mentoring communicative process is crucial to understand the teaching profession. Furthermore, the mentoring relationship extends beyond the MT and the ST dyad to include the administration, school staff and families (Clarke & Jarvis-Selinger, 2005). The key functions of the mentoring relationship according to Clarke *et al*. (2012) and Daloz (2012) are: challenge, motivation, and support. Johnson (2006) stresses the distinction between professional and personal dimensions whereas Feiman-Nemser & Floden (1999) refers to psychological support and instruction-related support.

3. Mentoring that discloses practice-based learning that emerges in school settings.
   The meanings that are negotiated by mentors and mentees in particular situations constitute the repertoire of knowledge that needs to be learnt. Those meanings arise through engaging in cognitive process such as critical reflection, think aloud, analysis of lessons or systematic observations and are represented in 22% of the studies in Table 1. Often what is discussed and reflected upon reveal

Table 1. Review of teaching mentoring research outcomes. Based on studies listed in Hobson et al., (2009); Hansford et al. (2004) and Clarke et al. (2013) reviews

Main idea	*Dimension*	*Results reported*		*Nr. of studies*
		For mentors	*For mentees*	
Mentoring a as way of constructing a professional *identity*	Self	- Mentoring provides additional non-contact time to prepare for their role (Abell, Dillon, Hopkins, McInerney & O'Brien, 1995) - Consolidation of teacher identity (Bodoczky & Malderez, 1997) - Contributing to the personal development of mentors (Danielewicz, 2001) - Mentors feel less isolated (Hagger & McIntyre, 2006); or feel more isolated (Graham, 1997) - Mentors are models for good professional practice (Foster, 1999) - Mentoring increases mentors' professional self-esteem (Evans & Abbott, 1997). - Mentoring develops professional beliefs (Rajuan, Beijaard & Verloop; 2007) - Mentoring increases confidence and self-esteem (McIntyre & Hagger, 1996) - Mentoring practice is sometimes constraining and not enough "freedom to innovate" (Beck & Kosnick, 2000). - Mentors do not grow professionally from mentoring (Tauer, 1998) - Mentors help mentees to construct particular teacher identities (McAdams, 2001; Chong, Ling & Chan, 2011)	-Teachers who are mentored are less likely to leave teaching because they assume a particular identity (Ingersoll, 2004) - Assumption of professional beliefs (Haser & Star, 2009). - Individual well-being (Ballantyne, Hansford & Packer, 1995; Kessels, Beijaard, Veen & Verloop, 2008) - Mentoring promotes identity transformation within the work environments and organization (Mullen, 2011) (Bullough, 2005) - Mentoring reduces STs' feelings of insecurity, nervousness by being observed (Orland Barak, 2001) - STs depend on mentoring for their well being (Hardy, 1999). - Insufficiently challenged by mentors (Edwards, 1998)	22
Mentoring as a form of establishing a supportive *relationship*	Interaction	-The mentoring relationship (MR) increases mentor teachers' job satisfaction and confidence (Douglas, 1997) -The MR is a way of Improving mentors' communication skills (Moor, Halsey, Jones, Martin, Stott, Brown & Harland, 2005) -The MR promotes support and connection to external networks (Whisnant, Elliott & Pynchon, 2005) -The MR leads to increasing workloads (Lee & Feng, 2007) -Difficulties in accommodating all their mentees' needs (Maynard, 2000) -The MR provides a chance to engage with STs (Glenn, 2006)	- The MR advances psychosocial support (Kram 1985) - The MR increases collaboration and enjoyment (Murray & Owen, 1991) - The MR helps the socialization of preservice teachers (Johnson, 2006) - The MR helps preservice teachers to adapt to the school norms (Wang &Odell, 2002) - Mentees have access to support in external networks (Brady, 1993) - The MR is framed under a structured programme of mentor preparation (Crasborn, Hennissen, Brouwer, Korthagen & Bergen, 2008) - The MR facilitates the development of a shared discourse (Carroll, 2005) - Great source of comfort characterized by collegial cultures (Bush & Coleman, 1995) - The MR assistance and support socialization (Crow & Matthews, 1998; Lipton & Wellman, 2001; Ballantyne, Packer and Hansford, 1995)	17
Mentoring as a way of practice-based *learning*.	Knowledge	-A way of improving critical reflection (Lopez-Real & Kwan, 2005) -A way of gaining new ideas and perspectives (Davies, Brady, Rodger & Wall, 1999). -A way of validating ideas with university tutors or re-engaged with the profession (Hobson, Malderez Tracey, Giannakaki, Kerr, Pell, Chambers, Tomlinson & Roper, 2007) -A way of fertilizing new ideas (Brady, 1993) -Helping mentors to understand the potential benefits of discussing pedagogical issues (Lindgren, 2005) -Mentoring stimulates mentees to reflect on their actions (Dunne & Bennet, 1997) -Observing lessons (of and by mentee) and analyzing them (Heilbronn, Jones, Bubb & Totterdell, 2002)	- A way of learning content knowledge in many areas (Hardy, 1999) - A way of learning new ideas from mentors' feedback (Tin, 1995) and reflecting on one's own teaching (Spargo, 1994) - It leads to rethinking beliefs and prior knowledge (Baumert & Kunter, 2006)	11

uncertainties or contradictory information (Daloz, 1986). However they constitute the platform for understanding teaching practice. It is a way of gaining new ideas and perspectives. In this sense, ideally, the knowledge that expert teachers gather throughout years of practice is shared with apprentices to initiate their learning of the profession. (Tillema & Van der Westhuizen, 2013; Orland-Barack, 2010)

Table 1 shows that most of the research assumes that teachers' styles are rooted in particular professional and personal attributes that result in more or less supportive mentoring relationships (a total of 78% of the studies). Fewer studies focus their attention on the practical knowledge learnt in mentoring conversations, and it is typically associated to processes such as reflection, critical thinking or action-research (Russell, 1987).

However, practical knowledge has been extensively promoted in Teacher Education as the knowledge of how to do things (*techne*) which is not subjected to scientific procedures (*episteme*) but needs to be studied and exposed to standards of justification because it is of crucial importance for the teaching practices (Fenstermacher, 1986, 1994). Elbaz (1983) extends the notion of practical knowledge not only to knowing how but also to being aware of different aspects of teaching activities (i.e. pupils' learning styles, social school dynamics, community policies, etc.). Connelly, Clandinin and Fang He (1999) as well as Meijer, Verloop & Beyaard (1999) expand the definition of personal practical knowledge as the body of beliefs, thoughts and attitudes found in the teacher's practice which finally result in a combination of practical understandings and principles. Practical knowledge is therefore bound to specific situations and oriented to action (Feiman-Nemser & Floden, 1986) because it serves as a platform for making decision on future classroom objectives, instructional strategies or curricular materials (Tillema, 2006; Tillema & van der Westhuizen, 2013).

Articulation of Practical Knowledge from Teacher Mentoring

As can be confirmed in the literature reviewed, Teacher Education has accumulated a corpus of evidence around mentoring which has been structured into coherent theories to guide practice. Current educational research usually follows four predetermined stages to articulate evidence (Sánchez, 2001), although they do not always unfold in the strict order as shown in Figure 1:

- Typically, new ideas (stage 1) impact practice after research shows that they are valid (stage 2). Through the dissemination of those results in specialized journals or Educational programs (stage 3), teachers are typically left with the responsibility of accomplishing the implementation process on their own (Stage 4) sometimes with the help of specialized literature. As a result, they are expected (but not researchers) to transform research evidence into instruments or know-how knowledge that may be useful for their practice.

- Alternatively, we propose another possible path to overcome this constraint and better articulate research findings. In the search to find spaces to elicit teachers' practical knowledge, and give it a leading role in educational research, we suggest that this path entails the accomplishment of four stages (see Figure 2):

1. Description of real practices: Instead of creating theories from the university we propose to follow a naturalist (grounded) approach and start by describing what is done in the teaching practice (i.e. through field observation; video-recordings, etc.)
2. Validation: Data gathered from the previous stage have to be subjected to regular educational research data analysis procedures.
3. Implementation: Educational research—and this should be underlined—has to provide the means by which the validated data can be implemented in the contexts of practice. In order to do this, the research outcomes must be transformed into practice-ready knowledge for teachers that can be used in regular teaching situations. We propose the use of Action Oriented Knowledge (AOK) units. Those units are know-how sets of strategies and techniques that help practitioners

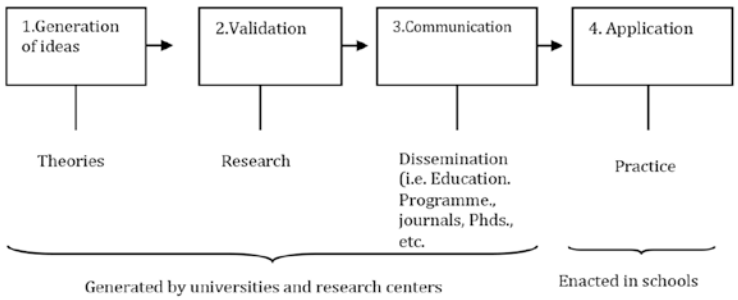

Figure 1. Stages followed in Traditional Educational Research in the articulation of Teacher Education evidence (Adapted from Sánchez, 2001)

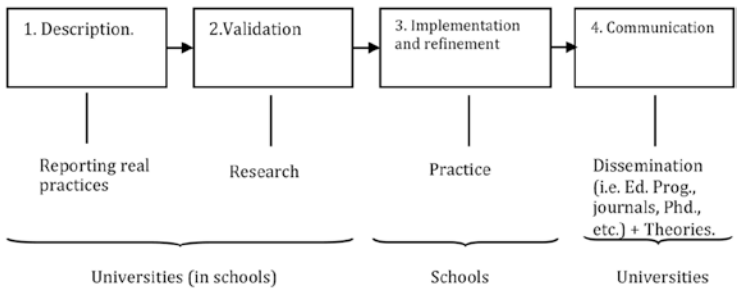

Figure 2. Alternative path to articulate research evidence in Teacher Education

to make sense of practice (Urzúa &Vásquez, 2008; Lougrhran, Berry & Mulhall, 2012). They bring together ".all profession-related insights that are potentially relevant to the teacher's activities" (Verloop, van Driel, & Meijer, 2001, p. 443). Those AOK units can be polished and refined once they are tested in practice as more teachers explore and experiment with them.

4. Communication: Schools would directly benefit from the results of research projects in the form of new knowledge, tools (i.e. handbooks and teaching practice guidelines) or knowledge management systems (i.e. on-line mentoring system) which, in turn, will facilitate teacher professionalization (with a direct impact on pupil learning and ST mentoring).

Steps 1 and 2 represent a way of assembling professional knowledge into *theories of practice*. Knowledge gathered from particular mentoring situations are further structured into a set of principles and ideas that serve to describe phenomena around teaching practice (Carr, 1986). In short, a "knowledge base for teaching" (Shulman, 1987, p. 4). On the other hand, steps 3 and 4 are a means of embedding practical knowledge into other practices *(theories for practice)*. Practical knowledge should not be only described as theories of practice but also framed in such ways that it can be implemented in real teaching needs, goals, and contexts (Cochran-Smith & Lytle, 1999).

A DISCOURSE ANALYSIS FRAMEWORK TO ARTICULATE PRACTICAL KNOWLEDGE

With a deliberate focus on the practice-based learning that mentoring provides (third research perspective, Table 1), in this section we want to clarify how practical knowledge can be made explicit from mentoring interactions and also communicated to other teachers. Universities and higher education institutions need to support teachers in eliciting and communicating their valuable ideas, thoughts and insights that facilitate teacher learning. We propose the use of research discourse analysis techniques for the identification and articulation of teachers' practical knowledge as opposed to action-research or narrative inquiry since this methodology admits the precise identification of practical knowledge units in regular discourse interactions.

Preliminary Considerations

Problem of substantiality. However, prior to making practical knowledge explicit educational research needs to prioritize what pressing aspects would firstly need to be known by STs and others, which may be complementary. Often many aspects are considered (see Table 1) without often realizing the local limitations and short time frames to act and learn to be a teacher. Thus, which learning would be more substantial to guarantee that STs learn the basics of the teaching profession during the practicum experience?

To better answer this question, imagine another professional learning context where an expert surgeon has to teach a novice surgeon how to suture a wound on a patient. What knowledge should the expert surgeon share with the apprentice in an attempt to better teach him/her how to perform this medical process?

By making a hypothetical transposition of some evidence from Teacher Education (see Table 1) to the field of medicine, the following would be part of what the expert surgeon must do to improve the learner's capacities:

1. Reduce feelings of isolation of the Student Surgeon (SS).
2. Increase SS' confidence and self-esteem.
3. Manage SS' time and workload.
4. Improve the BS's ability for critical reflection.
5. Share new perspectives and ideas with the SS.
6. Increase collaboration and enjoyment.
7. Identify SS conceptions about surgery.
8. Undertake an appropriate program to be a good surgeon mentor.

[…]

According to the actual procedure followed in surgery the knowledge to be shared would be similar to this (Aluwihare, 2002):

1. Insert the needle at right angles to the tissue and gently advance through the tissue avoiding shearing forces.
2. As a rough rule of thumb, the distance from the edge of the wound should correspond to the thickness of the tissue and successive sutures should be placed at twice this distance apart, i.e. approximately double the depth of the tissue sutured.
3. All sutures should be placed at right angles to the line of the wound at the same distance from the wound edge and the same distance apart in order for tension to be equal down the wound length. The only situation where this should not apply is when suturing fascia: the sutures should be placed at varying distances from the wound edge in order to prevent the fibers parting.
4. For long wounds being closed with interrupted sutures, it is often advisable to start in the middle and to keep on halving the wound […] (p. 14–15).

In the first mentoring situation the format of knowledge is based on abstract principles and good intentions to improve professional learning. In contrast, in the second mentoring situation the format of knowledge is based on rules that break down the procedure into manageable and easy to access steps and their conditions (= if you find "x"… then you should do "y"). Therefore while the two examples are extreme and the contexts different, the point that we wish to make is that the first is grounded in *intentions,* the second one in *actions.* We argue that, the most efficient

way for STs to make the most of their practicum is to start by learning the set of procedures and strategies that help to deal with practical situations (similarly to the medical procedure above) and, once the protocols are mastered (i.e. techniques to manage classroom, strategies to deliver a lesson, etc.) then they can also reflect on what is done, to share perspectives, work collaboratively, etc.

The problem of perspective. The use of discourse analysis, as a methodology that collects, transcribes and analyzes data to further find significant sequences of meaning (Schiffrin, Tannen & Hamilton, 2003), is crucial to systematically approach the representative events that are occasioned by and through mentoring interactions. Nonetheless, different types of discourse analysis may be undertaken depending on the units chosen (i.e. episodes, topics, critical incidents, utterances, etc.). Any of these are suitable for in-depth study of mentoring conversations depending on the research questions. However not every one can be potentially relevant to capture practical knowledge.

To illustrate this point, we take an example already published in literature by Crasborn, Hennissen, Brouwer, Korthagen and Bergen (2011, p. 322) to determine how it might be analyzed differently by using different units of discourse analysis:

> MT: Ella, in the reading comprehension lesson you carried out, I saw you had a correct diagram on the blackboard. Very good!
>
> ST: Yes, thank you!
>
> MT: But, I saw that Paula wrote on a small piece of paper. You know, the agreement is that she must use her notebook. You should have told her to do so.
>
> ST: Yes, I wanted her to write it in her notebook, but I forgot to give special attention to her, because a few other pupils were asking questions.

If utterances are used to analyse the conversation above the speech should be divided into statements, defined as a group of words that are demarked by two pauses. Henissen, Crasborn, Brouwer, Kortaghen and Bergen (2011) identify utterances by the principle of turn-taking. This unit may coincide with one or several sentences within the same participant's conversational turn (Schegloff, 2000). Therefore, in this interaction four utterances are identified coinciding with four turns of discussion, two for each of the participants (see Table 2).

In the case of using critical incidents the researcher has to analyse only significant events that are important for both the ST and MT (Fanagan, 1954; Orland-Barak, 2005). In the above fragment the critical incident may be designated as the broad theme-name that identifies it: (Not the) use of the notebook by one student (see Table 2). Critical events may underpin either positive or negative teaching experiences (Husu, Toom & Patrikainen, 2008) and trigger meaningful mentoring conversations in which questions about when, what and why happened are asked (Carnot & Stewart, 2006).

Table 2. A mentoring conversation fragment analysed according to different discourse analysis methods. Note: Talk Rubrics. Yes = Rubrics that were discussed in the fragment. No = Rubrics that were not discussed

Verbatim text	*Utterances*	*Topical analysis*	*Critical incidents*	*Interaction units*	*Talk rubrics*
MT. Ella, in the reading comprehension lesson you carried out, I saw you had a correct diagram on the blackboard. Very good! ST: Yes, thank you! MT: But, I saw that Paula wrote on a small piece of paper. You know, the agreement is that she must use her notebook. You should have told her to do so. ST. Yes, I wanted her to write it in her notebook, but I forgot to give special attention to her, because a few other pupils were asking questions.	U1. Ella, in the reading comprehension lesson you carried out, I saw you had a correct diagram on the blackboard. Very good! U2. Yes, thank you! U3. But, I saw that Paula wrote on a small piece of paper. You know, the agreement is that she must use her notebook. You should have told her to do so. U4. Yes, I wanted her to write it in her notebook, but I forgot to give special attention to her, because a few other pupils were asking questions.	Correct information in the blackboard Paula did not use the notebook. Not giving attention to students.	(Not) use of the notebook by one student.	*Unit of interaction 1.* -Judgment given by MT: " Your reading comprehension lesson was good" -Meaning attributed by the MT. "It was good because you had a correct diagram on the blackboard". -Formalization of the rule: "a diagram on the blackboard" is valuable in circumstances…"of reading comprehension" and leads to… "success". *Unit of interaction 2.* -Judgment given by MT: " Paula wrote on a small piece of paper" -Meaning attributed by MT: "You should have told her to… use her notebook". Meaning attributed by ST: -"I forgot to give special attention to her because other students were asking questions". -Formalization of the rule: "using the notebook"…is valuable in circumstances …"when students wrote from the blackboard" and leads to…"better understanding"	Rubric1:Visual information (Yes) Rubric 2:Teacher's Eye contact (No) Rubric 3: Individual attention to students (Yes) Rubric 4: Clear instructions to class students (No)

Topics are also often used in discourse analysis. This technique reduces primary data into different levels of categories following a grounded process of analysis (Straus & Corbin, 1994) enriched by relevant theories on mentoring. A topic seizes an essential piece of information with regard to the research question and "represents some level of patterned response or meaning within the data set" (Braun & Clarke, 2006, p. 82). It generally coincides with data categories at a certain level of analysis. In the example given above, there are three topics therefore (Table 2): (t1) Correct information in the blackboard; (t2) Paula did not use the notebook; and (t3) Not giving attention to the students.

Interaction units represent the meaning each participant attributes to the events that have been discussed in a mentoring interaction. Usually a unit of interaction is

created each time the object of meaning (or topic) changes and it is labeled strictly using the participants' vocabulary (Challies, Bruno, Méard & Bertone, 2010). Each interaction unit is represented by a structural pattern where the sequence of meaning is defined as: (a) the judgment given by the either the MT or ST to a particular event, (b) the meaning attributed to that event, and (c) the formalization of a rule, or principle of learning for the situation analyzed (Challies, Escalié, Bertone & Clarke, 2012). In the example above there are two units of interaction (see Table 2).

Finally, talk quality rubrics may be used for the analysis of any mentoring conversation. However they are based on a predetermined list of criteria or categories (i.e., objectives, class organization, etc.) about what is important for a teaching episode or interaction. Additionally, rubrics establish a rating scale for the behaviours observed: for example, from excellent to poor (Jonsson & Svingby, 2007). Usually rubrics are used as a top-down analysis tool, where preset indicators are first introduced to look through the data (Junker *et al*., 2004). In the selected example, if this unit of analysis is chosen it requires selecting instructional rubrics beforehand and then further identifying them in the mentoring conversation as it unfolds. Four rubrics might be included but it entirely depends on the listed categories chosen.

Each technique entails a different sort of analysis and, consequently, a different account of knowledge for the same mentoring conversation excerpt. Depending on the analysis, there are four utterances, one critical incident, three topics, two units of interaction, and two talk rubrics. Besides, according to Table 3 each unit has a different nature: *syntactical* if it is based on formal linguistic indicators (i.e. words, sentences, utterances); or *semantic* if it is based on inferred meanings. Semantic units seem to be more suitable for describing practical knowledge. Each unit also represents different ways of conducting the analysis (inductive: bottom up vs. deductive: top-down) and scales in levels of scrutiny depending on the size of the unit (data examination can be more or less rigorous according to it). Inductive and more specific sorts of analyses would be preferable to precisely depict shared understandings of practice.

The Propositional Discourse Analysis (PDA)

Since we propose to describe what MTs and STs do (stage 1 in Figure 2) we need to consider how to extract the substantial components of what constitutes practical knowledge (problem of substantiality) following a technique that more precisely allows accounting it (problem of perspective). The analysis of the mentoring interactions should be also performed in a way that it may be validated (stage 2 in Figure 2). In order to meet those criteria, we propose a research discourse methodology anchored in propositional analysis to describe the social representations of the conversations.

Table 3. Comparison of five discourse units of analysis in relation to their nature, type of analysis, level of scrutiny and contingent features

Unit of analysis (method)	*Nature*	*Type of analysis*	*Level of scrutiny (according to the unit size)*	*Contingent features*
Utterances	Syntactical	Inductive	High	- They allow seeing who brings the topic to the conversation. - Good for analysing the level of participation.
Critical incidents	Semantic	Inductive	Low	- Broader than topics they also allow to organize the contents of the conversation. - Good for making first-order categories.
Topics	Semantic	Inductive	Medium	- They allow to condense the information into comprehensible units of meaning: i.e. "*The ST had problems with the student' use of notebook (no use*)". - Good for making categories.
Units of interaction	Semantic and syntacticAL	Inductive	High	- They give a common frame to every interaction making the dialogue predictable. - Good for extracting structures/schemes of knowledge.
Talk rubrics	Semantic	Deductive	Medium	- They start from an agreed frame of categories to analyse practice. - Good to compare different mentoring performances out of the same dimensions.

Propositional analysis as the baseline to analyze mentoring interactions. Originally used in the field of reading comprehension (Kintch & Van Dijk, 1978; Kintsch, 1988; Sánchez, Rosales, & Suárez, 1999) propositional analysis is a methodological approach that provides insights on how knowledge is generated through the examination of text generated by the participants in professional conversations (Tierney & Mosenthal, 1983). A proposition is a statement that contains one single predicate (Kintsch & Van Dijk, 1978; Sánchez, Rosales, & Suárez, 1999). A predicate is an expression that can be true of something and usually includes the predicate or relational term (often verbs and auxiliaries) and the arguments of that predicate (i.e. the subject and object noun phrases) (Kroeger, 2005). From our perspective, and following Bovair and Kieras (1985), we define a proposition as "a unit of information containing a single predicate that, when isolated from its wider text, allows for a clear identification of its meaning (Mena, García, & Tillema, 2012, p. 5).

Making use of the same example used by Crasborn *et al*. (2011, p. 322), Table 4 shows briefly how the propositional analysis may work:

The verbatim text is divided into eight propositions or ideas (p1 to p8), each of them corresponding to a grammatical predicate. There are two levels of propositions: first order propositions (e.g., p1; p2, p3, etc.) when the idea is commonly stated within a main clause; and second order propositions (e.g., p8.1) when the idea usually comes in the form of a subordinate clause (e.g., a causal proposition in the case of p8.1; but they can also be conditional, modal, circumstantial or final propositions).

Secondly, a proposition, as we define it, has an independent meaning on its own without depending to a large degree on the context is taken from. Therefore they can be listed in order to infer categories in later stages of the analysis. For that reason we use square brackets to indicate that a piece of information has been repeated by the analyst in order to keep the meaning of the idea when the agent is omitted or when anaphoric elements have been used (i.e. "it" "that" "he/ she", etc.)

On the other hand we use curly brackets to indicate that a piece of information has been moved from its original wording position or slightly modified by the analyst in order to keep a single, non context-dependent predicate while preserving the original meaning.

According to Table 3, the criteria used for the propositions meet the requirements of being:

a. semantic units that reflect sociocognitive processes (necessary for looking for meanings or ideas in the conversation)—not syntactical units as words, sentences or utterances;
b. they arise after a bottom-up inductive analytical process is conducted (Grounded Theory Analysis, Strauss & Corbin, 1994)—this is important because what matters is what MTs and STs originally think and not the heuristics or predetermined set of categories researchers may apply to data;

Table 4. Example of propositional analysis. Following Mena, Sánchez and Tillema, 2008

Verbatim transcription		*Analysis (propositions)*	
MT.	Ella, in the reading comprehension lesson you carried out, I saw you had a correct diagram on the blackboard. Very good!	P1.	Ella, you carried out {a reading comprehension lesson}
		P2.	I saw you had a correct diagram on the blackboard.
		P3.	[The diagram on the blackboard] was good.
ST:	Yes, thank you!		
MT:	But, I saw that Paula wrote on a small piece of paper. You know, the agreement is that she must use her notebook. You should have told her to do so.	P4.	I saw Paula wrote on a small piece of paper.
		P5.	The agreement is: she must use her notebook.
		P6.	You should have told her to do so.
ST.	Yes, I wanted her to write it in her notebook, but I forgot to give special attention to her, because a few other pupils were asking questions.	P7.	I wanted her to write in her notebook.
		P8.	I forgot to give special attention to her
		P8.1.	(CAUS) Few other pupils were asking questions.

c. the level of scrutiny is high since the unit size of analysis is small (one proposition equals one predicate)—they are similar to utterances but with the difference being that propositions are aligned with ideas shared and not simple defined in terms of conversation turns; and
d. they are accurate as they generate an exact number of ideas that represent teachers' practical knowledge derived from the conversation.

Furthermore, propositional analysis should also be validated. Validating the knowledge that is extracted from mentoring interactions implies, as suggested by Cho & Trent (2006), that we should take into the account that a level of certainty needs to be reached. They refer to it as transactional validity,

> an interactive process between the researcher, the researched, and the collected data that is aimed at achieving a relatively higher level of accuracy and consensus by means of revisiting facts, feelings, experiences, and values or beliefs collected and interpreted. The role and use of transactional validity in qualitative research varies to the extent the researcher believes it achieves a level of certainty. (p. 321)

In gaining that level of consistency we need to subject propositions –as with any other unit of analysis—to at least two criteria if we want to focus our attention on the professional knowledge that emerges from mentoring conversations:

Fitness for purpose (Strauss & Corbin, 1998). Any work in research needs to plausibly meet "the relationship between the methods chosen and the process studied" (Mena & Tillema, 2006, p. 114). The last implies choosing the means that best expresses what is being searched for. For instance, if we want to analyze teachers' classroom performance, then topics from field notes or video-tape transcriptions could be more aligned to that purpose than excerpts from the answers given to a questionnaire; the latter talks more about teachers' beliefs while the former is more clearly tied to teachers' actions. Similarly, if we want to analyze the level of participation then topical analysis would be less useful than utterances.

Standard of unambiguity. Researchers also need to think about the unit of analysis that results in less ambiguous outcomes. In other words, we need a unit that leads to fewer interpretations of the data. We specially need to meet this criterion when quantitative data is offered or when reliability checks are to be undertaken. For instance, "turns" are a straightforward unit with a very small error-of-interpretation margin but they do not help to capture the shared understandings in mentoring conversations: They do not *fit* for that intention. Critical incidents or topics can respond for the last but they may include more than one teacher's thought, idea or belief (i.e. a wider unit). In this sense, the semantically longer the unit is the more difficult is to find unambiguity in its categorization.

We consider that propositional analysis to be an eligible approach to effectively deal with both criteria because it fits for the purpose of analyzing practical knowledge: it seeks for "meanings" contained in the predicates (Criterion 1). Secondly propositions are less ambiguous units of analysis than others described above since one unit only can contain one predicate. Therefore the smaller the unit is the less the interpretation margin (Criterion 2). Furthermore, the process of research data validation (step 2; Figure 3) can be undertaken by using Cohen Kappa reliability checks. Propositional analysis allows reaching higher levels of data replication according to ad hoc methodological verification processes (Denzin & Lincoln, 2000). Reliability scores from propositional analysis in previous works demonstrated k=.70 to k=.90 (Mena *et al*., 2012).

Extended procedure of the PDA. Relying on propositional analysis means that the analysis of mentoring interactions follows two processes: (a) segmentation of information and (b) categorization.

A. Segmentation of Information

Primary segmentation will consist of dividing the transcribed dialogues into propositions following the process described above (Please refer to Appendix A, column 4). A secondary and broader segmentation, according to Emilio Sánchez's work (Sánchez, Rosales, & Suárez; 1999; Sánchez & Rosales, 2005; Rosales, Iturra, Sánchez, & De Sixte, 2006) propose the use of larger units of discourse analysis such as episodes (coherent sequences of sentences or paragraphs that globally organize the mentoring dialogue into broad segments, for example, an episode of evaluation; Schegloff, 1987) and cycles (fragments of the discourse that often end up in conversational agreement; Wells, 2001) in order to scale the segmentation of the text transcriptions from wider to smaller bits of information (e.g., episodes-cycles-propositions). Please see Appendix A, columns 1 and 2.

B. Categorization

B1.Pairing propositions with knowledge types. Once the transcribed conversations are divided into propositions, the next step is to identify the types of practical knowledge by pairing each proposition with a type (see Appendix A; column 5).

According to previous works, we have identified at least four distinctive knowledge types that are present in most mentoring dialogues and that we argue help MTs to assist PTs in analyzing their practice: Recalls, Appraisals, Rules and Artifacts (Mena, García, Clarke and Barkatsas, *accepted*; Mena *et al.*, 2012; Mena, García & Tillema, 2009; Mena & García, 2011). These four types of practical knowledge scale in complexity or level of re-description (Karmiloff-Smith, 1992) from a compilation of facts and events (i.e., recalls), to evaluation and judgment of

those events (i.e., appraisals) culminating in a higher level of sophistication whereby those experiences are sorted into overarching strategies or know-how (i.e., rules and mobilization and/or incorporation of artifacts). In short they move from narrative knowledge through to inferential knowledge where rules and artifacts constitute a refined and more complex understanding of practice (Bruner, 1991).

Narrative Knowledge is characterized by being concrete (subjected to the experience lived) and less generalizable (its format of representation is usually stays at the descriptive level). It usually takes two distinguishable forms:

1. Recalls

Recalls are direct reproductions of what has been experienced, that is, images that STs extract from the lesson, as collected from memory, in the form of events or incidents. For example, "I organized the classroom in two groups" or "Ana shouted at Enrique" (Mena *et al., accepted*).

Those teaching actions are the basis of what teachers reflect upon and the first step to scale into more complex forms of knowledge construction (Schön, 1983, 1987; Elliot, 1991; Kemmis & McTaggart, 1988). According to Gholami & Husu, (2010) any teaching action is understood in terms of situational knowledge (actions and reactions to different facts) and routines (repeated actions repeated over lessons). They are part of what is done (actions) whereas reflection is about what is thought. However we want to draw the attention to the fact that the first step of any reflective process is to recount (remember) what has been done. Those representations can be more or less accurate depictions of actual experiences. Some authors do not often consider recalls as a form of practical knowledge (Engstrom, 2009) since they are roughly included within the realm of the experience itself.

2. Appraisals

Appraisals constitute evaluations or value judgments of the action that is being recalled. The function of appraisals is differentiating which episodes of practice were successful from the ones that were not. As such, we can divide appraisals into two groups: Positive appraisals are aspects of practice that are satisfactory and productive for STs (i.e., "They [Pupils] chose quickly a partner to work with) and negative appraisals are aspects of practice that turned out to be inadequate and detrimental to pupil learning (i.e., "The classroom size was very small for the activities").

From the field of philosophy, Engstrom (2009) equates appraisals to "practical judgments in which certain actions are deemed good or bad" (p. 56). However, practical judgments should be distinguished from "judgments of appraisal actions", that is to say "our approval or disapproval of particular actions and conducts which has been often recalled as moral judgments" (p. 56). Husu and Tirri (2003) referred to this as moral reflection.

Inferential knowledge, on the other hand, is more abstract in nature and therefore more generalizable to the broader context of one's practice. Two different sorts of knowledge are to be found within this category:

3. Rules (to guide practice)

Rules are defined in this study as inferences extracted from experience that constitute practical principles for teachers (for example, "controlling the time students spend in classroom tasks is important"). That is, it is a manner of re-describing particular facts and transforming them into global ideas (abstracting the general from the particular) that can be used in future situations. They are usually framed after memorable facts are recalled or when becoming aware of a classroom routine. In that sense they can be representations of tacit knowledge displayed in teachers' skills and competences (Toom, 2006, 2012).

The term rule has been used in research on practical knowledge. Elbaz (1981, 1983) and Conelly, Clandinin and Fang (1997) differentiate two different generalizations of practice: rules as expressions of actions (e.g., listening to students) and practical principles as wider conceptions than rules (e.g., "students learn more when they pursue their interests"). Connelly, Clandinin and Fang He (1997) add another category: personal philosophy. Personal philosophy represents engagement of a broader nature in which the teacher connects their own experiences, rules or principles, with theories.

4. Artifacts

According to Shulman (2002) "artifacts are things –objects, tools, instruments, that human beings construct because they are needed but don't exist in nature" (p. 62). Artifacts have two main characteristics: (1) they are products generated after reflecting on practice; and (2) they are considered in a wider sense as a generalization of experience: "… I would argue that these principles can be generalized, that learning from experience entails learning from, with, and through the artifacts that are generated to capture, display and preserve the experience" (Shulman, 2002, 62).

In our view, artifacts constitute instruments, physical supports, or tools and also mental representations of any procedure or strategy that can be applied in practice. Besides, we think that not all generalizations of experience may be considered as artefacts. Artefacts are made explicit as procedures whereas rules are conceptual representations of experiences. In other words, artifacts constitute ways of transposing rules to the practice setting thereby making them usable within the context of one's teaching practice, for example, "I will use the *Class Sojo* program for students to visualize the timing for the lesson activities." In this example using the *Class Sojo* program denotes an instrument the teacher will use according to a previous inferred rule: "It is better controlling the time students spend in classroom tasks". Both represent generalizations of a previous experience.

B2. Pairing propositions with knowledge precision. Additionally, another dimension can be applied to the types of knowledge outlined above: precision (see Appendix A; column, 6). Precision is useful because it differentiates which types of knowledge are more useful to teaching depending on how univocal and certain is the meaning contained in them. We generally consider that a type of knowledge

is *imprecise* when information conveyed is vague or unspecified (e.g., Kids liked the activity) and *precise* when the predicate contains detailed information about the knowledge generated (e.g., Kids remained silent in the auditorium). With both these notions in mind (types of knowledge and precision of knowledge) each single proposition can be coded accordingly and thereby allowing for the transformation of speech statements (e.g., ideas) into frequency counts (e.g., using descriptive statistics).

In a recent study (Mena *et al*., *accepted*) we tested three different sorts of mentoring interactions: dialogue journaling; regular conferences, and stimulated recalled conferences in order to explore which of them potentially elicited more types of practical knowledge and the level of precision associated with each. Overall 4,534 propositions were coded (see Table 5).

Results indicate, according to Log-linear analysis, that major statistical differences in the elicitation of inferential knowledge (rules and artifacts) were found when

Table 5. Propositions found in mentoring interactions that were classified according to the practical knowledge types. Taken from Mena et al. (accepted)

Mentoring interaction	*Knowledge type*		*Imprecise*		*Precise*		*Totals*	
			f	*%*	*f*	*%*	*f*	*%*
(1) Dialogue journaling (Text)	Narrative	Recalls	101	5.8	108	6.3	209	12.1
		Appraisals - Positive	570	32.9	359	20.8	929	53.7
		Appraisals - Negative	100	5.8	280	16.1	380	21.9
	Inferential	Rules	84	4.8	104	6.0	188	12.8
		Artifacts	8	0.4	16	0.9	24	1.3
Sub-totals			*863*	*49.9*	*867*	*50.1*	*1,730*	*100*
(2) Regular conferences (Face-to-Face)	Narrative	Recalls	92	6.4	144	10.0	236	16.4
		Appraisals - Positive	315	21.9	204	14.1	519	36.0
		Appraisals - Negative	181	12.5	110	7.7	291	20.2
	Inferential	Rules	93	6.4	219	15.2	312	21.6
		Artifacts	36	2.5	45	3.1	81	5.6
Sub-totals			*717*	*49.8*	*722*	*50.2*	*1439*	*100*
(3) Stimulated -recall conferences (Face-to-Face)	Narrative	Recalls	39	2.9	327	23.9	366	26.8
		Appraisals - Positive	81	5.9	58	4.2	139	10.1
		Appraisals - Negative	151	11.0	192	14.1	343	25.1
	Inferential	Rules	108	7.9	294	21.5	402	29.4
		Artifacts	43	3.1	72	5.3	115	8.4
Sub-totals			*422*	*30.9*	*943*	*69.1*	*1365*	*100*
All three types of interaction combined (#1, #2, #3)	Narrative	Recalls	232	5.1	579	12.8	811	17.9
		Appraisals - Positive	966	21.3	621	13.7	1587	35.0
		Appraisals - Negative	432	9.5	582	12.8	1014	22.4
	Inferential	Rules	285	6.3	617	13.6	202	19.9
		Artifacts	87	1.9	133	2.9	220	4.9
Total			*2,002*	*44.2*	*2,532*	*55.8*	*4,534*	*100*

comparing text-based journal interactions (14.1%) to regular conferences (27.2%) and stimulated recall conferences (38.2%). On the other hand stimulated recall conferences displayed the highest number of precise propositions: 69.1% compared to 50.2% found in the other two conditions. In previous work (Mena *et al*., 2012) Chi square statistics also demonstrated that inferential knowledge was habitually stated in precise terms which helped STs not only to understand experience but also to start changing it.

B3. Grouping knowledge types into content categories. The next step would be to generate content categories out of the knowledge types following a Grounded Theory Analysis approach (Strauss & Corbin, 1994). This is a crucial issue to be considered if we do not want to remain at a syntactical level where the content of the conversations is reduced to formal classifications (i.e. recalls, appraisals, rules and artifacts).

For instance, Gholami and Husu (2010) state that some of the overarching crucial content-categories for practical knowledge are "classroom management" "instructional strategies" and "learner, learning and teaching". Mena et al. (2012) propose as major content categories, that are subdivided into three levels of hierarchy: student learning, teaching strategies and family-school relationships. We claim that the content categories give us the "concept map" of particular mentoring conversations that help to easily visualize the contents of the dialogues.

B4. Including content categories in the domains of professional practical knowledge. Not all teachers' declarations belong to a unique domain or field of thought. For example the above categories by Gholami & Husu and Mena et al. (2012) belong to the domain of "pedagogical knowledge". According to Elbaz (1983) the main domains of practical knowledge would be knowledge of subject matter, curriculum, instruction, self and the milieu of schooling. Shulman's (1987) proposes: content knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of learners, knowledge of educational contexts, and knowledge of educational ends, purposes and values. Mishra & Koehler (2006) and Koehler & Mishra, (2008) in refining Shulman's (1987) categories, suggest three main domains of professional knowledge:

1. Content Knowledge (CK). The content of the subject that needs to be taught. The content to be taught in science is different from the one that is taught in History.
2. Pedagogical Knowledge (PK). The knowledge about teaching techniques and "… strategies of classroom management and organization that appear to transcend subject matter" (Shulman, 1987, p. 8).
3. Technical knowledge (TK). It is the knowledge about the use of educational technologies (i.e.Internet, Digital Whiteboards, tablets, videos, e-mail, software, or textbooks) and its integration in teaching dynamics (Cuban, Kirkpatrick & Peck, 2001).

It is important to note that the four sub-categories overlap (see Figure 3):

1 and 2. Pedagogical Content Knowledge (PCK). It is the type of knowledge that blends content and pedagogy of a given subject matter (Shulman, 1986; Lougran, et al., 2012).

1 and 3 Technological Content Knowledge (TCK). The way the technological content is related to disciplinary content.

2 and 3. Technological Pedagogical Knowledge (TPK). This is the knowledge about how teaching can change through the use of different technologies (i.e. webquests, blogs, chats, etc.).

1, 2 and 3. Technological Pedagogical Content Knowledge (TPCK). This kind of knowledge integrates the three major forms of knowledge at the same time.

We suggest that either the three main domains or the four combinations (or both) are useful to situate each piece of practical knowledge type (see Appendix A, column 8).

Construction of action oriented knowledge units: Implementation of research evidence into practice. The last part of the analysis coincides with stage 3 (Figure 2). Once the practical knowledge has been described and validated through

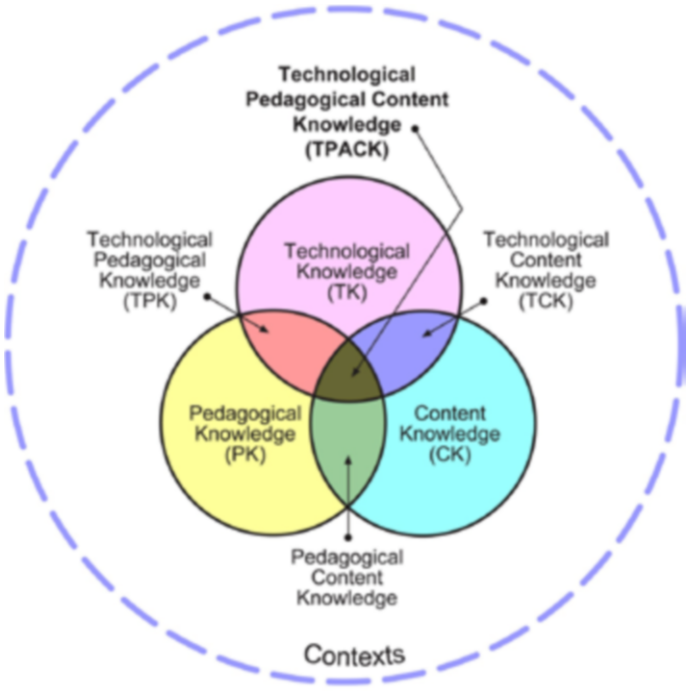

Figure 3. Depiction of the types of professional knowledge (Koehler & Mishra, 2008)

research processes there is still a need to encapsulate propositions, categories and domains within a comprehensible format that is readily accessible for use by teachers and other professionals (i.e. STs, Faculty Advisors, administrators, etc.). In other words, the evidence gathered from research needs to be organized according to teaching practice demands. One way to do this, we propose, is to construct Action-Oriented Knowledge (AOK) units that show in an organized way what others have learnt from particular practical situations.

AOK units may be defined as learning outlines that depict coherent know-how sets of knowledge contained in mentoring situations and that have previously been analyzed by following well-defined and validated research methods. Drafting those research results into a practice-oriented tool (AOK unit) will make explicit expert teachers' tacit knowledge that can be accessed by others (MTs and STs) as aids for making sense of such within the context of their own teaching.

AOK units could be generated from three contexts regarding the mentoring process:

1. Teaching situation. Brief summary information about the classroom and the event(s) of the lesson taught.
2. Mentoring interaction. Referring to the mentoring dialogue from which the knowledge was extracted. This part would contain: (2.1) identification information about the MT, the ST and the type of mentoring situation: Formal setting: *practicum* for STs or *practice year* for beginner teachers; Non-formal: *peer guidance* or *school supervision* (i.e. promotion); and (2.2.) a verbatim transcription of a significant episode of the conversation.
3. Mentoring outcomes. Description of the practical knowledge as extracted from the PDA: types of knowledge; content categories; and domains of knowledge. Additionally, the MT's explanation of the importance of that knowledge could be included along with the conditions he or she thinks to be put in consideration when applying the knowledge.

Below is an example of what an AOK unit may look like:

This AOK unit would be a readily accessible knowledge that other STs or MTs could use in the context of their practice. The five rules in Figure 4 could also be tested in other classroom contexts in a search for consistency (i.e., to know if they can successfully work when generalized to other situations) following the mentor's envisaged conditions. This would be the phase of refinement indicated in stage 3, Figure 2.

Finally, when these action-oriented units are verified by a number of practitioners it would be ideal to have them published under a handbook format or guidelines to show future teachers what actually works for a majority of professionals (stage 4; Figure 2).

1. TEACHING SITUATION.	*1.1. Classroom information.*	
	Teaching level and grade	Primary (3th grade)
	Subject and topic	Spanish Language: Synonyms and antonyms.
	Class size	25 pupils
	1.2. Event information.	
	Event title	Bad writing on the blackboard.
	Event description	At 10: 15 a.m. Sheila, a student teacher was delivering the content of synonyms and antonyms to 3rd graders in an urban Primary Education school. She tried to write the definitions of categories, uses and examples while she was further explaining it. The final writing seemed to be blurry, messy and disorganized. She uses blackboard and classroom IDB.
2. MENTORING INTERACTION	*2.1.Identification.*	
	Preservice teacher	Female, 21
	Mentor teacher	Female, 42
	Mentoring Situation	Formal (Practicum).
	2.2.Conversation.	
	Verbatim transcript.	*PT:I did not feel comfortable with what I wrote on the blackboard* *MT: you will need to practice the letter font on the blackboard. Pressing more the chalk would be a first step. Secondly, learn the correct graphical drawing [for this letter style] and third, organize better the information displayed on the blackboard, and not too much, to reach a higher level of visual comprehension".*
3. MENTORING OUTCOMES	*3.1. Analysis*	
	Knowledge types	RULE#1: Need to practice the letter font on the blackboard (Generalization) RULE#2: Pressing more the chalk RULE#3: Learn the correct graphical drawing. RULE#4: Organize better the information displayed on the blackboard RULE#5: Not {to write} too much information.
	Content category	Teaching strategies (Type of letter; Organization of information)
	Domain of knowledge	Pedagogical Knowledge (PK)
	3.2. Additional information	
	Explanation	MT: Writing properly on the blackboard is crucial since much of the information pupils catch and write in their notebooks are through the visual channel. They see what teachers write on the blackboard as the final production to be learnt.
	Conditions	MT: Apply this (i.e. all 5 rules) when: a.- there is no alternative source of offering visual information in the classroom (i.e. digital whiteboard; posters with the content, etc.). b.- Always when the students are between 6 to 10 years old. When they are older than that they usually catch the information through oral dictation and explanation.

Figure 4. Illustration of an AOK unit

CONCLUSION

Mentoring in education focuses on characterizing teaching practices as related to domains of expertise, to interpersonal relationships and to knowledge development (Orland-Barack, 2010). Any account of the ways in which teachers conceptualize

their practice represents a complex process because much of teachers' practical knowledge remains as non-verbalized constructs. For example, professional routines are deeply rooted in personal teaching styles and are socially embedded (Eraut, 2004). As a result teachers know more than they can tell (Polanvi, 1967).

This chapter highlights the importance of describing the experience-based knowledge that STs learn from their MTs when discussing classroom-based actions. We demonstrate by the use of PDA that much of this practical knowledge can be captured into propositional knowledge by following language operations that relates actions to ideas. Our proposal relies on disclosing those ideas that have arisen in mentoring conversations and seeking if there is any content that is more supportive in improving teachers' practice in terms of the teaching strategies that turn out to be more substantial for teaching. Formal criteria, as outlined above, suggests that PDA is an eligible methodology for disclosing practical knowledge because it plausibly fits for the purpose of accounting for the number of ideas that are shared in formal interactions and it also turns out to be less ambiguous because it operates with a small unit size.

The analysis of teachers' practical knowledge from this methodology leads us to confirm at least three major assumptions:

Teaching Professional Knowledge Needs to Be Learnt Progressively

In an early learning stage, such as the one where STs are immersed in the practicum setting, specific instructions, rules and procedures are needed to first engage in and move within the complexities of teaching. Once these elements are assimilated, the ST can attend more fully to higher levels of professionalization (i.e. critical reflection, sharing new ideas, feeling confident, etc.). In other words, if novice teachers do not master, for instance, basic classroom procedures (e.g., planning for instruction), whatever heuristic, scheme or protocol is agreed upon (e.g., establish the objectives, recapitulation, class management, etc.) it is unreasonable to expect them to critically reflect on their practice, envisage social consequences in the act of teaching or assuming certain roles and attributes.

Practical Knowledge Should Be Oriented as a Form of Gaining Expertise (Not Only as a Way of Gathering Experience)

Main findings from our studies indicate that ST's dedicate more of their speech to recall and appraisal events, therefore they are more episode-oriented (gathering experience). The easiest way to redescribe experience is by recalling and judging facts and events that occurred in their teaching. More complicated is the effort to codify those experiences into practical principles, rules or instruments. The last requires a more skill-oriented disposition to practice (gaining expertise) but it also guarantees extracting more regularities of practice (rules and artefacts) and redefining teacher actions into more precise terms (Mena et al., accepted).

Practical Knowledge Described in Research Should Be Redirected to Practice

The third implication is that *in-practice* knowledge that is described by research needs to be articulated as knowledge *for-practice* (Cochran-Smith & Lytle, 1999), a readily accessible knowledge for teachers. AOK units are offered in this chapter as a possible tool to move towards the redescription of practical knowledge into knowledge for practice or action-oriented knowledge. The combination of AOK units would help in developing a joint set of criteria (guidelines) for the practicum supervision in the university programs. These criteria have the advantage of being based on validated research outcomes from transcriptions, observation, and evaluation of teaching and therefore they are aligned to schools' actual practices.

We claim that these considerations are crucial in order to advance the professionalization of mentoring (Clarke, 2007) and PDA allows not only for precisely describing teachers' practical knowledge but also for the recognition of different patterns of mentoring in the form of most frequent behaviours (e.g., it is usual that PTs do not establish the objective of the lesson at the beginning of the session).

But, if describing MTs' mentoring techniques and procedures is a must, then it is also a pre-requisite to convey that learning to MTs and STs in a professional oriented format. In other words, if we want to improve the profession, we need to arrange the research outcomes into the language and procedures used in schools. Therefore, and based on the results from this approach, we suggest that the practicum and Educational Programs should provide opportunities for STs, SAs and Fas to make use of the knowledge that is been generated and accumulated from other teaching practices because it is a genuine way to replicate, contrast and make use of different valuable teachers' strategies.

In conclusion, the line of research we postulate in this chapter claims that future studies should take into consideration two moves: First, *understanding practice* (knowledge of practice) by scientific means and second, *changing practice* (knowledge for practice) by attending to teachers' needs (i.e., creating understandable and communicable instruments or tools that may be used by practitioners in their school settings).

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APPENDICES

Appendix A. The Propositional Discourse Analysis (PDA). Example about a mentoring conversation excerpt transcription (Primary school classroom. Age: 6 years).

Transcription	*(1) Segmentation*			*(2) Categorization (PK)*			
	Episodes	*Cycles*	*Propositions*	*Types*	*Precision*	*Content*	*Domain*
[…]							
P: Did you succeed with the objectives you planned for the lesson?	Ev	C1					
A: Not completely. Overall, they understood the tale plot when I first played the video in the iPad. They were highly motivated because they liked the animations. They wanted to interact with the device…But the app suddenly shut down and I had to start over…[laughs]. Anyway the activity works.			P1. {I did not succeed} completely {with the objectives for the lesson}	AP-	0	T2	PK
			P2. They understood the tale plot	AP+	1	T10	PK
			P2.1. (MOD) {with the use of the iPad}				
			P3. [The pupils] were highly motivated.	AP+	1	T14	PK
			P3.1. (CAUS) they liked the animations {on the iPad}.				
			P4. [The pupils] wanted to interact with the device.	RC	1	T31	PK
			P5. The app suddenly shut down.	AP-	1	T43	TK
			P6. I had to start over {the reading}	RC	1	T22	PK
			P7. The activity works.	AP+	0	T1	PK
P: What about the second part?		C2	P8. Some pupils seemed not to understand the passages of the story.	AP-	1	T10	PK
A: In the second part, some pupils seemed not to understand the passages of the story mainly because some students were slower at reading; some others felt ashamed, etc.			P8.1. (CAUS) {some students} were slower at reading				
P: Correct.			P8.2. (CAUS) {some students} felt ashamed.				
A: They were tired because it was Friday…			P9. {Pupils} were tired	AP-	1	T8	PK
			P9.1. (CAUS) it was Friday.				
Besides the text sentences were long and some of them contained unknown words for the pupils.			P10. The text sentences were long sentences	AP-	1	T12	CK
P: Yes, indeed. But maybe you should have modified the text according to 6-year -old students' vocabulary. They were unable to follow the story told by their mates. Additionally, notice that pupils this age cannot pay attention for long periods. And they need to rest in between those periods.			P11. [The sentences] contained unknown words for the pupils.	AP-	1	T13	CK
			P12. You should have modified the text	RL	1	T12	PK
			P12.1. (MOD) according to 6-year-old students vocabulary.				
			P13. [Pupils] were unable to follow the story.	AP-	0	T10	PK
			P14. Pupils this age cannot pay attention for long periods.	RL	0	T4	PK
			P15. {Pupils} need to rest between periods.	RL	1	T4	PK
A: Besides, the kids did not know when to stick the picture on the board. I should explain the pictures content before reading the text next time			P16. The kids did not know when to stick the picture on the board.	AP-	1	T16	PK
			P17. I should explain the pictures content next time.	RL	1	T16	PK
P: And also give them a clue, for instance pointing at the students, to indicate the association between the read text and their image.			P17.1. (CIR) before reading the text				
			P18. [You should] give them a clue	RL	1	T16	PK
A: Aha.			P18.1. (PUR) indicate the association between the read text and their image.				

Context:

"Ainhoa's objectives for the lesson were practicing pupils' reading aloud skills and oral comprehension. She chose a tale: "La castañera" [The chestnut seller]. First, she told the story playing a video on her iPad. In a second stage she handed out a piece of cardboard for each pupil containing a paragraph with two or three short sentences of the story. The cardboards were numbered following the story line. She also gave each student a picture with scenes or characters of the story. Pupils had to read aloud individually their fragment of text to the rest of the group and the kid that hold a picture related to the text read had to go to the board and stick it.

Abbreviations

Transcription: P= Pilar, the Mentor Teacher; A= Ainhoa, the Student Teacher.
Segmentation

Episodes: EV= Episode of Evaluation; PL= Planning; PR= definition of a problem; SL= Solutions for practice.

Cycles: C1= Activities done during the lesson; C2= Improvements and changes.
Propositions:

a. Propositions. Ideas that are shared in the dialogues. Pn= Number of proposition (p1, p2, p3, etc.)
b. Connectors. Connectives relate propositions in the text and provide it with coherence. According to traditional propositional analysis (Kintch and Van Dijk, 1978) eight categories are specified: Conjunction ("and"), disjunction ("or"), causality ("because"), purpose ("in order to"), concession ("but"), contrast ("more than"), condition ("if) and circumstance ("when"). In the analysis presented just 6 of them are used within the proposition introduced in the connected clause to indicate second order –subordinate- ideas. (CAUS)= Causal proposition; (COND)= Conditional proposition; (MOD)=Modal proposition (introduces a means to achieve something); (PUR)= Final proposition.; (CIR)= Circumstantial proposition (when). They are coded as p1.1.; p1.2. etc. and are dependent of a main previous proposition. 'Conjunction' and 'disjunction' connectors are not used because both ideas related are considered as first order propositions.
c. Formal keys. Symbols used to represent repeated or modified information by the analyst:

[…]= *Repeated information*. When the agent is omitted in the discourse and it is necessary to rescue it to make the proposition semantically independent outside the paragraph.

{…}= *modified information*. Simplification of an expression while preserving the meaning.

Categorization (PK = Practical Knowledge)

Types of practical knowledge:

RC = Recall, AP+ = Positive appraisal, AP– = Negative Appraisal, RL = Rule, AR = Artifact.

Precision:

0 = Imprecise proposition; 1 = Precise proposition.

Content.

Topics. i.e. T10 = not understanding the lesson; T8 = Pupils tired

Domains.

CK = Content knowledge; PK = Pedagogical Knowledge; TK = Technological knowledge