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How a pre-service teacher acquires tacit knowledge of teaching from practice: the process of becoming a teacher

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How a pre-service teacher acquires tacit knowledge of teaching from practice: the process of becoming a teacher

Abstract:

Within various fields of research tacit knowledge has been a topic of interest in the last decades. Researchers from different disciplines are focusing on expanding our knowledge of the concept, thereby making tacit knowledge explicit. Only few have however tried to provide an explanation of the underlying learning mechanisms, in order to gain a better understanding of how tacit knowledge develops in the first place.

For this study a practice-led approach has been chosen to investigate how a pre-service teacher acquires her tacit knowledge of teaching in practice. As the development of teaching techniques is part of the training a pre-service teacher receives during his or her trial period, the study is also to be considered as empirically grounded research on the teacher's personal development as a professional; however, its main focus rests on the teacher's development of tacit knowledge. The single case study format has been chosen for this study to give full consideration to the participant's personal development as a professional, of both teaching skills and tacit knowledge. Video-cued narrative reflection was used as method for the data collection, involving the video-taping of teaching sessions and subsequent video-cued interviews with the participant. The method was considered especially suitable for the single case study format as it allowed the participant to review her own teaching sessions on the video material, and reflect on her teaching beyond the limit of pre-chosen focuses though questionnaires etc. The focus was thus on the participant rather than the method, or the researcher. The field research was conducted over the course of the academic year September 2013 to May 2014. With only a few exceptions, research data was collected monthly throughout this period. The subsequent data analysis was performed in a two-step system of (1) formulation interpretation and (2) reflecting interpretation. The method of analysis is also known as documentary method.

On the basis of the empirical research data collected in the context of this study and findings of tacit knowledge theory, conclusions can be drawn regarding both tacit knowledge formation and the participant's professional development. Tacit knowing (knowledge) can be regarded as the coordination of explicit knowing (knowledge). The results of this study contribute to our understanding of tacit teaching knowledge formation through practice and experience. At the beginning of their carrier, pre-service teachers practice their teaching skills, review and reflect on them, and ultimately coordinate the acquired teaching knowledge until teaching becomes intuitive in practice. Once they reach this point, teachers do not need to reflect on the particulars of a teaching session as they have learned to cope intuitively with a wide range of situations they could potentially be confronted with in class. They are however seldom able to articulate the acquired tacit knowledge upon inquiry.

Moreover, the research data allows for conclusions regarding the pre-service teacher's development as a professional in the field of instruction. Firstly, the research results support a holistic view on the teachers professional development. While it is true that different techniques and types of knowledge are acquired separately throughout the teacher's professional carrier, it is the coordination of these components which furthers the teacher's development as a professional. Secondly, a teacher's development as a professional is always also a personal context-specific growth that differs from person to person. In the scope of this study, not only knowledge of teaching has a tacit dimension, but also a teacher's beliefs and attitude towards her profession and work. I therefore believe a teacher's development as a professional to be a dynamic process, in which the teacher acquires the tacit knowledge of instruction over time and with experience. The acquisition of tacit knowledge is further influenced by the teacher's personal beliefs about and attitudes towards her work, and should be regarded as a highly individual process.

Zusammenfassung

In den letzten Jahrzehnten war „Stilles Wissen" ein in verschiedenen Forschungsgebieten viel untersuchtes Thema. Wissenschaftler verschiedener Disziplinen erweitern unser Wissen über dieses Konzept und machen damit Stilles Wissen explizit. Wenige hingegen haben versucht eine Erklärung für den grundlegenden Lernmechanismus zu liefern, um die Entwicklung Stillen Wissens besser verstehen zu können.

Für diese Studie wurde ein praktischer Ansatz gewählt um zu untersuchen, wie eine Referendarin ihr Stilles Wissen des Lehrens durch praktische Erfahrung gewinnt. Da die Entwicklung von Lehrtechniken Teil der Ausbildung einer Referendarin während ihres Referendariats ist, kann diese Studie als empirische Untersuchung der persönlichen beruflichen Entwicklung der Referendarin angesehen werden; der Fokus jedoch liegt auf der Entwicklung des Stillen Wissens der Referendarin. Das Format einer Einzelfallstudie wurde gewählt um die persönliche Entwicklung der Teilnehmerin von sowohl Lehrfähigkeiten als auch Stillem Wissen voll zu erfassen. Video-geleitete narrative Reflexion wurde als Methode zur Datenerfassung gewählt, was das Filmen der Unterrichtsstunden der Referendarin und anschließende Video-geleitete Interviews mir ihr beinhaltete. Diese Methode wurde als angemessen gesehen, da dies der Teilnehmerin erlaubte ihre eigenen Unterrichtsstunden zu reflektieren, was durch vorher gewählte Fragen eines Fragebogens nicht möglich gewesen wäre. Der Fokus lag somit auf der Teilnehmerin als auf der Methode oder der Forscherin. Die Datenerfassung fand während eines akademischen Jahres von September 2013 bis Mai 2014 statt. Mit wenigen Ausnahmen wurden die Daten während dieser Periode monatlich erfasst. Die Datenanalyse wurde in zwei Schritten durchgeführt: 1. Interpretation der Formulierungen, 2. Interpretation der Reflexion. Diese Methode zur Analyse ist auch bekannt als „documentary method".

Die durchgeführte empirische Forschung dieser Studie führt uns zu Schlussfolgerungen sowohl bezüglich der Bildung von Stillem Wissen als auch der professionellen Entwicklung der Teilnehmerin. „Tacit knowing" kann gesehen werden

als Koordination von explizitem Wissen. Die Ergebnisse dieser Studie tragen bei zum Verständnis der Bildung von Stillem Lehrwissen durch Praxis und Erfahrung. Zu Beginn ihrer Karriere üben Referendarinnen und Referendare ihre Lehrfähigkeiten, kritisieren und reflektieren sie, und schließlich koordinieren sie das erworbene Lehrwissen bis es in der Praxis intuitiv wird. Haben sie diesen Punkt erreicht, müssen Referendarinnen und Referendare nicht mehr über Details einer Unterrichtseinheit nachdenken, da sie gelernt haben intuitiv auf eine Vielzahl von möglichen Situationen zu reagieren. Nichtsdestotrotz sind sie selten in der Lage das erworbene Stille Wissen zu erklären wenn sie danach gefragt werden.

Die Daten erlauben weiterhin Rückschlüsse auf die professionelle Entwicklung der Referendarin auf dem Feld des Lehrens zu ziehen. Zum einen unterstützen die Forschungsergebnisse einen holistischen Blick auf die professionelle Entwicklung der Referendarin. Während in einer Karriere einer Referendarin oder eines Referendars unterschiedliche Techniken und Typen von Wissen unabhängig voneinander erworben werden, ist es die Koordination dieser Komponenten, die die Karriere der Referendarin oder des Referendars vorantreiben. Zum anderen ist die professionelle Entwicklung einer Referendarin oder Referendars von Person zu Person unterschiedlich. Im Rahmen dieser Studie beinhaltet „Stilles Wissen" sowohl Lehren als Praxis als auch als Auffassung und Einstellung bezüglich der Tätigkeit. Daher sehe ich die professionelle Entwicklung einer Referendarin oder eines Referendars als dynamischen Prozess, in dem die Lehrperson Stilles Wissen im Laufe der Zeit und gewonnenen Erfahrung bildet. Die Auffassungen und Einstellungen bezüglich ihrer oder seiner Arbeit beeinflussen den Erwerb von Stillem Wissen, was ein höchst persönlicher Prozess ist.

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1. Introduction

In recent years, researchers in the field of educational research have tried to answer questions like 'Why can some teachers teach much better than others?' and 'Why do experienced teachers have a much better performance in the classroom than novices?' A lot of research has been conducted in order to answer these questions. For example, Swanson, O'Connor and Cooney (1990) found that all teachers try to find the best solutions to classroom problems within the classroom itself, but experienced teachers have a higher problem solving ability than teachers new to the profession. The reason for this phenomenon does not lie in the fact that expert teachers have more theoretical knowledge than novice teachers but that they have more teaching experience than novices (Chi and Glaser, 1983). This teaching experience forms a repository of mental knowledge that these expert teachers draw upon when devising a solution to classroom problems (Chi and Glaser, 1983). Different teachers have different mental knowledge structures that formed through their teaching experience (Beijaard, Verloop & Vermunt, 2000). In other words, the problem solving ability of teachers can be considered a kind of personal knowledge.

Some researchers (e.g. Shim & Roth, 2007) have also tried to get the answers from these expert teachers themselves, but the interesting thing is that these teachers are unable to explain this. They know how to cope with class problems properly, but they do not know how to articulate this kind of personal knowledge. Expert teachers have a limited ability to tell others how to deal with classroom problems when they are asked, but they can use their personal knowledge properly when they encounter real situations (Shim & Roth, 2007). Even when expert teachers tell novice teachers the procedures that they use to deal with classroom problems, the novice teachers still do not know how to use it properly in the classroom (Shim & Roth, 2007). For example, for an expert teacher, she or he just has to take a glance at the classroom after entering to keep the class quiet. However, this strategy does not tend to work for novice teachers in their classrooms. Of course there are a lot of elements that are connected to this strategy, such as the teacher's understanding of students and the dynamics of the class, the relationship between the teacher and the students, and so on. However it is obvious that what the expert teachers know is more than they are able to put into words.

This phenomenon is not uncommon, because many experts in other fields have similar experiences. They cannot tell others why and how to do something, but they can do it themselves when required. The reason for this is that this kind of personal knowledge cannot be taught (Polanyi, 1958). There

is a concept that can be used to describe the character of this kind of knowledge: it is called tacit knowledge and is a philosophical concept (Polanyi, 1958).

Michael Polanyi coined the term 'tacit knowledge' in the 1950s. He maintained that there are two kinds of knowledge: one is explicit, the other tacit. Explicit knowledge can be articulated by words, while tacit knowledge cannot (Polanyi, 1958). Usually explicit knowledge can be described and codified by words and numbers. Like Newton's famous approximate formula for the gravitational force between two bodies, we can introduce and explain this formula to others using words. However, as Polanyi (1962) argued, we cannot tell others how to keep balance on a bicycle and how to ride it. The reason for this is not that we do not want to tell others about those skills, but rather that we do not know how to describe the process (Polanyi, 1962). Even if we explain the steps of riding a bike, others still cannot keep their balance and move forward using our instructions alone. This is due to an inherent characteristic of this type of knowledge (Polanyi, 1962). We find that "there are things we know but cannot tell" (Polanyi, 1962, p. 601).

This kind of knowledge is tacit knowledge (Polanyi, 1958). We cannot describe what we know through words or numbers; it cannot be articulated. There are many examples of tacit knowledge: Polanyi (1962) cited an of a man who can swim very well but cannot explain, when asked, why is able to swim at all. He just knows that he can float on the water but he does not understand the relationship between his breath and his lungs when he is swimming. Of course, one still cannot swim, even if he or she is taught how to breathe in the water. So, we can say: "we can know more than we can tell" (Polanyi, 1967, p. 4).

This is the reason why expert teachers cannot tell others how to deal with classroom problems properly, because these kinds of abilities are about "know how" rather than "know that". When teachers encounter complicated problems in the classroom, they need to respond automatically. Sometimes, when teachers are asked why they take a certain course of action to deal with a classroom situation, they cannot explain the reasons but can still cope with the situation properly. Of course, even if they tell other teachers the methods and problem-solving process they use in the classroom, those teachers may still not know how to use it when they encounter a similar situation. These are kinds of practical knowledge that we cannot acquire from theoretical study. The most compelling example is that student teachers do their degree in education, which means they have studied some educational theory already. Presumably they have read books on education and have learned several teaching strategies. But when they enter the real classroom and prepare to teach they

find what they have learned does not seem to work. They are confused about how to use the knowledge they have acquired. This is the gap between theory and practice. Tacit knowledge is this kind of practical knowledge that can be acquired only through experience, rather than from theory.

In fact, tacit knowledge is a hot topic in the academic field because more and more researchers are coming to recognize its importance. Academics are conducting a lot of related research into this concept in order to elucidate this black box. Most of the research concentrates on making tacit knowledge explicit. In the field of management researchers (e.g. Kakabadse, Kouzmin & Kakabadse, 2001) have found ways that are useful to promote the sharing of tacit knowledge between people, such as increasing the communication between workers and reducing the distance between the research department and the practice department of a company. To some extent, these strategies are useful for sharing tacit knowledge among people. Gill (2000) produced a cognitive model about tacit knowledge, which he used to analyze one's activity from different dimensions. On the basis of Gill's model, Morgan (2008) presented a more detailed framework about personal knowledge theory in which he analyzed the cognitive mechanism of tacit knowledge theory and the relationship between tacit knowledge and explicit knowledge. Gill and Morgan, however, were trying to explain the concept of tacit knowledge from the perspective of cognitive science. I am going to discuss Gill's and Morgan's models below.

Verloop, Driel and Meijer (2001) realized the importance of tacit knowledge in the field of education, especially teacher education. Poulson (2001) found that the most important part of a teacher's knowledge is not the subject knowledge but an inarticulate pedagogical knowledge. Nash and Collins (2006) tried to analyze the knowledge structure of teachers in order to promote the transformation between tacit knowledge and other kinds of knowledge. Hargreaves (1999) tried to study the knowledge-creation model from the management field as he found some strategies are also useful in education. Freeman (1991) tried to find whether teaching training programs are a useful way to make tacit knowledge explicit.

However, these researchers still did not fully open the black box of tacit knowledge because we still do not understand the nature of tacit knowledge itself. In my view, we cannot know the nature of tacit knowledge unless we understand its development process. In other words, we need to know how tacit knowledge is formed, or how a person acquires some kinds of tacit knowledge. If we know how a teacher acquires her or his tacit knowledge of teaching over time, then we can have a relatively clear understanding of this kind of knowledge. Although tacit knowledge cannot be

articulated in words, the development process itself can be described in words.

In the classroom, teachers encounter a variety of situations and have to deal with them every day. Teachers have some kind of knowledge that they will use to overcome classroom problems. This kind of knowledge is developed differently among teachers and different teachers will take different approaches when encountering the same situation (Beijaard, Verloop & Vermunt, 2000). Obviously, compared to novices, experts are richer in this kind of knowledge (Hardiman, Dufresne and Mestre, 1989). When encountering classroom problems, experienced teachers respond quickly and deal with the situation automatically. Novice teachers, however, find this is a big challenge. They might need more time but still cannot deal with the situation very well. Nevertheless, we can be sure that novice teachers can acquire this kind of knowledge through practice. Of course, after some time in the classroom, they will become more experienced teachers.

But how does the novice teacher acquire this kind of knowledge over time? That is what I want to focus on in this research. In order to understand the nature of tacit knowledge, in this study I explore how a pre-service teacher acquired a tacit knowledge of teaching from her teaching experience over time by describing her professional development process. In this case, the acquisition of tacit knowledge occurred in the process of the teacher's professional development because the pre-service teacher acquires the tacit knowledge through her experience. In other words, tacit knowledge is inarticulate and we cannot describe it with words, but we can describe the process of forming tacit knowledge with words.

In this research, I adopt anthropological research methods, especially video analysis and interviews. Video analysis is a very useful research technique that can deepen our understanding of the classroom. It provides a unique research tool to study complicated phenomena in the classroom. Although video analysis is not suitable for all education research, it can be used in a variety of areas (Schnettler, Raab and Soeffner, 2009). By analyzing classroom videos, we can explore the phenomena beyond the surface level of the classroom situation, because we can never have an adequate observation and description of the micro-phenomena that occur in the classroom, such as a slight change in a teacher's behavior. In this research, the focus lies on the analysis of the change in a teacher's classroom practice, which is constituted by visible and small elements. Video analysis has been a significant part of my research project.

Besides video analysis, I collected interviews to get some important information that cannot be

acquired by other research techniques. There are a lot of elements that influence a teacher's teaching practice. We find that some of these elements are visible from the video analysis, but we cannot discover from that those invisible elements that lie behind the behavior of teachers. The acquisition of tacit knowledge is a process of learning from practice and this cannot be easily observed from the videos. Therefore interviews are needed to explore how teaching practice changes over the course of time. The interview method of this study is called "video-cued narrative reflection" (Raingruber, 2003). Raingruber (2003) explains, "Video-cued narrative reflection, one specific type of phenomenology, makes use of participant interpretation of videotaped interactions. This video-cued approach brings experience to life and simultaneously allows the participants interpreting the video to stop and reflect on what is most significant" (pp. 1155-1156).

Let me explain how I used video-cued narrative reflection as an interview method in this study. After making the class video, I immediately did the video-cued interview with the pre-service teacher. I let the teacher describe what happened in class by watching the video I had made. As I believe she understands what is happening in the video much more than anybody else, during the interview she could stop at any time if she thought a moment was important and wanted to comment on it. She could also just ignore moments that were not important to her. I recorded the whole interview process and transcribed the recordings into texts later in order to analyze the interviews more deeply. Different research techniques have different advantages, and in this study I have mixed different techniques to take advantage of the strengths of each.

This research is a single case study because it only included one research participant. Originally, at the beginning of the field research I had five participants. As every participant is an individual case, and their development is highly context related, I planned to choose one of them as the formal research object to do the deep analysis, single-case study on after the data collection was complete. Unfortunately four of them dropped out after two months because the study took up too much of their personal time.

The participant of this study was a pre-service teacher at a middle school in Berlin. In Germany, a pre-service teacher must get a masters degree in education before doing teacher training. Normally a teacher in middle school has to teach two subjects, for example, the pre-service teacher in this study teaches both English and History. But the concept of a pre-service teacher in Germany is different from other countries because their teacher-training program is done as part of a full-time teaching job where they also do the evaluation work for students. The pre-service teacher in

Germany is between the pre-service and in-service period, although I call her a pre-service teacher in this study. The reason for choosing the pre-service teacher as a research object is that I wanted to understand how students become teachers. If we know how the pre-service teacher acquires the tacit knowledge of teaching from classroom practice then we can analyze the development of this kind of tacit knowledge.

The field research lasted for one academic year from September 2013 to May 2014, except for some special situations (i.e. when the students had a test or the pre-service teacher was sick during the period of the study). I collected the research data almost once a month. I collected seven videos in one academic year, which means I also made seven video-cued interviews with the research participant. After transcribing the interview audio into texts I did the data analysis, which consists of two parts: video analysis and interview analysis.

The data analysis method of this study is called the "Documentary Method", which originated with Mannheim and was further developed by Bohnsack. In the 1980s, Bohnsack developed the documentary method "as a methodology for qualitative research and as a method for practical empirical inquiry" (Bohnsack, 2014, p. 217). In the framework of this method, there are two kinds of knowledge about a certain phenomenon: communicative knowledge and conjunctive knowledge (Bohnsack, 2014). Accordingly, there are two kinds of meaning: communicative meaning and conjunctive meaning (Bohnsack, 2014). Communicative meaning (or explicit meaning) is about "what", and the conjunctive meaning (or implicit meaning or tacit meaning) is about "how" (Bohnsack, 2014). The documentary method is used to interpret those being observed, and to move from "what" has happened to "how" it happened (Bohnsack, 2014).

In this study, I used the documentary method as data analysis method to analyze the development process of tacit knowledge because, as an empirical research method, it is focused on understanding the knowledge which guides our intuitive and automated practical actions (Bohnsack, 2014). Bohnsack (2014) did not differentiate between implicit knowledge, embodied knowledge and tacit knowledge in his work, but just uses the term "conjunctive knowledge" to describe all three. Actually, I think these concepts are very similar as they try to describe the similar phenomenon but from different conceptual perspectives, which is perhaps the reason why Bohnsack (2014) did not make that distinction. However, I prefer to believe that Polanyi's explanation of this inarticulate knowledge is more reasonable, which is why I choose the term 'tacit knowledge' as the key concept in this study.

Following the "Documentary Method" (Bohnsack, 2014), I did the two-step data interpretation: a formulating interpretation and a reflecting interpretation. By doing the data analysis, I found the pre-service teacher talked about some very similar, or even the same topics, in every interview. I therefore reconstructed the topical structure of the interview texts according to what the teacher focused on (formulating interpretation), and then compared the same topics among different interviews to reveal the changes over time (reflecting interpretation). There are eleven topics in every interview and eight of them are about problem solving. The eight problem-solving related topics are as follows: the teacher cannot start the class on time; the students are unclear about what to do in class; the students are not participating in class; there is too much private talk during class; students come unprepared; the teacher cannot do group work; students are inattentive; and the students are very impatient at the end of class. The other three topics are about her feelings towards teaching, her teaching beliefs and her attitude towards teaching.

According to the topics that she talked about in the interview, we find in this study that what the pre-service teacher mostly cares about is how to deal with the class problems, as most of the topics in the interview are about this. For example, her difficulty starting the class on time because the students are too loud, the students not being active in class, there being too much private talk, and so on. These eight problem-solving related topics describe how the pre-service teacher copes with the students' behavioral problems in class. By comparing the same topic across different interviews, I reveal the changes in her response to these situations and the changes of the pre-service teacher's teaching activity.

After finishing the data analysis, I developed some related research results. The first one is about the acquisition of tacit knowledge. In this study, I found that the pre-service teacher tried to deal with the problems in class in order to deal with one underlying issue: getting the students to concentrate so they can learn. I found that when the pre-service teacher talked about how to deal with these problems, she mentioned in almost every topic that the real purpose behind dealing with these issues was to allow the students to concentrate in class to facilitate their learning. In other words, her goal was to have the students concentrate and dealing with these eight problems was the strategy she used to reach that goal.

What is interesting about this is that I could find in this study all the elements of tacit knowledge that Polanyi (1962) described, which means this study is some kind of empirical research on tacit

knowledge. According to Polanyi's 1962 theory of tacit knowledge, there are two kinds of awareness in one's learning: focal awareness and subsidiary awareness. For example, when we are riding a bicycle, we have an awareness of riding the bicycle itself because we have to keep balance and move forward. But we also have an awareness of other parts of this activity, such as putting our feet in the right position, and keeping our body a little forward. However, these two kinds of awareness are different because keeping balance and moving forward is the main object; and keeping our body a little forward and putting our feet into the right place are not the objects of this activity as such, but indispensable elements of it. According to tacit knowledge theory, we call the awareness of keeping balance on the bicycle and moving forward "focal awareness" and the awareness of our feet and body "subsidiary awareness" (Polanyi, 1962).

Based on Polanyi's understanding of these two kinds of awareness, let us examine the focal and subsidiary awareness in this pre-service teacher's teaching. In her teaching practice, she tried to have the students concentrate in class by dealing with eight detailed problems. In other words, having the students concentrate and letting them learn is the object of her teaching, and dealing with the eight detailed problems is an indispensable sub-activity of that. Thus, her awareness of making the students learn is the focal awareness of her teaching activity and her awareness of dealing with the eight detailed problems is the subsidiary awareness.

On the basis of these two kinds of awareness, Polanyi (1962) analyzed one's activity from the perspective of knowing. Actually, Polanyi used 'knowing' and 'knowledge' interchangeably in his publications because he wanted to emphasize the dynamic character of knowledge. We do not, therefore, need to distinguish 'knowledge' and 'knowing' here. He writes, "there are two kinds of knowing which invariably enter jointly into any act of knowing a comprehensive entity. There is (1) knowing a thing by attending to it, in the way we attend to an entity as a whole and (2) knowing a thing by relying on our awareness of it for the purpose of attending to an entity to which it contributes. The latter knowledge can be said to be tacit, so far as we cannot tell what the particulars are, on the awareness of which we rely for attending to the entity comprising them" (Polanyi, 1962, p. 601). "We may call 'knowing by attending to' a focal knowing, and 'knowing by relying on' a subsidiary knowing" (Polanyi, 1962, p. 601).

Polanyi (1962) explained why we are not able to tell others about our tacit knowledge by analyzing one's learning from the perspective of knowing. Now we know that there are two kinds of knowing in one's activity: "focal knowing and subsidiary knowing" (Polanyi, 1962). We also know the

relationship between the two kinds of awareness and two kinds of knowing in one's activity. So, let us examine the focal knowing and subsidiary knowing in the case of this teacher and her class. It is clear that getting the students concentrated in class is the focal knowing of this activity because the pre-service teacher "knows that by attending to this entity as a whole" (Polanyi, 1962, p. 601). Dealing with the eight detailed problems is the subsidiary knowing of this activity because she "knows that by relying on her awareness of it for the purpose of attending to an entity to which it contributes" (Polanyi, 1962, p. 601). In other words, the pre-service teacher tried to get the students to concentrate in class "by attending to it as a whole entity" (Polanyi, 1962, p. 601), and she dealt with these problems for the purpose of making the students learn because "it is the entity that contribute" (Polanyi, 1962, p. 601).

Based on the data analysis, I found that the pre-service teacher could articulate a lot about how to deal with these eight problems individually, she could even express how she reflected on the situation and her approach to deal with these problems. For example, she tried to analyze the specific situation of the class and used different strategies to cope with these problems. If the old method did not work, she would consider the situation again, find the real reason for the problem and use a new method instead. However, she could not articulate how she got the students to concentrate in class, even though she could achieve it. Of course, she tried to make that clear by analyzing the reasons and seeking explanation through some related elements. But she could not articulate that knowledge because knowing how to make the students learn in class belongs to tacit knowledge and this is inarticulate.

In this case, getting the students to concentrate in class is the focal knowing and dealing with the eight detailed problems is the subsidiary knowing. Subsidiary knowing is the strategy, used to reach focal knowing. So let us take a look at the characteristics of these two kinds of knowing on the basis of my data analysis. In this study, the pre-service teacher could articulate a lot about how to deal with these eight problems individually, but she did not know why and how to make the students learn in class, although she could accomplish it. According to the tacit knowledge theory (Polanyi, 1958), knowing how to deal with class problems to get the students to concentrate is tacit knowledge and how to deal with these eight problems individually is explicit knowledge because each one has either the characteristics of tacit, or explicit knowledge. Similarly, from the perspective of knowing (Polanyi, 1962), getting the students to concentrate in class is focal knowing and dealing with these problems individually is subsidiary knowing. Therefore, the integration of subsidiary knowing to focal knowing is tacit knowledge (tacit knowing) and subsidiary knowing

alone is explicit knowledge (explicit knowing) in this case.

Now we need to examine how the pre-service teacher switched from subsidiary knowing to focal knowing in this activity in order to understand how she acquired her tacit knowledge of teaching. We find that there are eight elements that constitute subsidiary knowing in this activity, and during her teaching practice the pre-service teacher reflected on how to deal with these elements and coordinate them together to reach the entity as a whole. The goal of this activity is to get the students to concentrate in class (focal knowing). So we can say that focal knowing is the coordination of subsidiary knowing. As the integration of subsidiary knowing to focal knowing is tacit, and subsidiary knowing alone is explicit, we can come to the conclusion that tacit knowledge (tacit knowing) is the coordination of explicit knowledge (explicit knowing). This is the approach that the pre-service teacher used to acquire her tacit knowledge of teaching from teaching practice.

We can understand the development process of tacit knowledge by exploring how a person acquires her or his tacit knowledge of teaching from practice. We also know that the reason why we cannot tell others about our tacit knowledge is that we cannot articulate how we coordinate the subsidiary knowing elements together in order to reach the focal knowing, although we know how to reflect on our subsidiary knowing. Experienced teachers cannot articulate the secret of their good performance in class because they cannot use words to describe how to coordinate their subsidiary sub-activities together for the purpose of teaching as a whole. Coordinating the subsidiary knowing to reach the focal knowing is a dynamic process, which is also the process of "know how". I think Polanyi uses "tacit knowing" to describe the process of coordinating our subsidiary knowing to reach the focal knowing of our activity. Polanyi (1962) believes subsidiary knowing (as tacit knowledge) produces focal knowing (explicit knowing) in our activities. From here, he reaches the conclusion that all human knowledge comes from tacit knowledge because tacit knowledge facilitates the process of all activity (Polanyi, 1962). Actually, I do not think we acquire all of our explicit knowledge from tacit knowledge, as there must be some knowledge that does not exist on the foundation of tacit knowledge; explicit knowledge must sometimes exist before tacit knowledge. However, this question is not the focus of this study.

The second research result is about teacher professional development. In this study, based on the research of the acquisition of tacit knowledge, I present some empirically based understandings about teacher professional development, but from the perspective of tacit knowledge. After doing the data analysis, I found that besides these eight topics about problem solving, there were three

other topics that the pre-service teacher also talked about a lot during the interviews. These three topics are: her feelings about teaching, her teaching beliefs, and her attitude towards teaching, which also affected the development of her tacit knowledge. But from the perspective of teacher development, we can classify the eight topics as the content of teaching practice, and consider the other three as elements related in some way that affect the teaching practice. The eight topics describe what happened in her class, and the other three elements influenced her teaching practice. Therefore I think these eleven elements constitute a very important part of teacher professional development, and the changes of these elements presented the teacher professional development process.

Firstly, based on the existing research about teacher professional development and the results of this study, I present some empirically grounded understandings about the characteristics of teacher development. Most researchers (e.g. Berliner, 1988; Katz, 1972; Fuller & Bown, 1975; Burden, 1980) think that teacher development includes some stages, and the teacher moves from one stage to the next over time. They also present some models about teacher professional development in which they describe the characteristics of each development stage. Some of these models (e.g. Burden, 1980) indicate that there are some different characteristics in each stage of the development process, and the teacher can move onto the next stage only when she or he meets all the requirements of the previous stage. In other words, these models divide the development process into a number of categories and the teacher can progress onto the next development stage only when she or he has acquired all the categories of expertise from the previous stage.

But based on this study, I found there is no significant boundary between two neighboring development stages, and the teacher does not have to meet all the requirements of last development stage in order to progress to the next. The teacher development process is a whole entity, which includes a number of different parts. These components of the teaching expertise, however, are not the teaching expertise itself because the teacher development is the combination of the development of these different parts rather than these parts themselves. The teacher tries to go further by bringing these categories of expertise together rather than completing these categories themselves. That is the reason why some very experienced teachers still have problems with classroom management even though they have a high level of teaching expertise. In short, teacher professional development is a dynamic process in which the teacher develops as a whole.

The second thing we must understand about teacher professional development is specific-text,

personal and tacit. Based on this study, it is obvious that there is no universal teaching knowledge that the pre-service teacher could use to deal with these problems in her class. She must consider the specific situation in her class and try to find the best way to cope with it, as there are several individual elements in class. That means a different teacher has a different repository of knowledge because of different class experiences and the fact that a teacher's professional development is learned individually. Therefore, we have to admit that teacher professional development is an individual development program in which a teacher acquires his or her personal, context specific and tacit teaching knowledge over time.

On the basis of the data analysis, I found that there are some elements that affected the acquisition of tacit knowledge during the teacher professional development process. As I have described, there are eleven topics in every interview, eight of them are about problem solving (the acquisition of tacit knowledge) and the other three are about the pre-service teacher's feelings towards teaching, her teaching beliefs and her attitude towards teaching. I found these elements have something to do with the acquisition of tacit knowledge. But how do these elements affect the acquisition of tacit knowledge and how do they affect each other? Based on the data analysis, I present the relationship between teaching practice (problem solving or the acquisition of tacit knowledge), teaching beliefs, feelings about teaching and attitude towards it.

Firstly, the relationship between these elements is non-linear and complex. In this case, the main content of teacher professional development is about how the teacher tried to deal with her class problems or how she acquired her tacit teaching knowledge from teaching practice. I found her teaching practice affected the other three elements directly while the other three elements affected each other indirectly. For example, the pre-service teacher's teaching ideology affected her teaching practice directly, because these beliefs are like the guidance that decides what kind of class the teacher wants to have. On the other hand, her teaching beliefs are also influenced by her teaching practice because she gains new understandings through teaching, which affect her approach to teaching. Similarly, teaching practice also affected the teacher's feelings about teaching and her attitude towards teaching directly. For example, if the pre-service teacher had a very good performance in class, she would feel very good about her abilities, and her attitude towards teaching also became more positive. Meanwhile, the change in her feelings and her attitude towards teaching subsequently affected her teaching practice.

However, the relationship between feelings towards teaching, teaching beliefs and her attitude

towards teaching is not so direct. For example, her feelings towards teaching also affected her teaching beliefs, but they did not affect each other directly. Her change of feelings would influence her teaching practice, and then the changes in practice would affect her beliefs. Therefore these three related elements affected each other indirectly during the professional development process, but they affected the acquisition of teaching knowledge directly during this process.

The other finding from the relationship between these elements is these three elements (beliefs, feelings and attitude) also have some kind of tacit dimension. That means that these elements not only affect the acquisition of tacit knowledge during professional development, but they also have a tacit dimension. In this study, I found that the teacher's beliefs guide her practice because the relationship between teaching belief and teaching practice is like the relationship between "know that" and "know how". Teaching belief provides some ideas about teaching, and the practice realizes the theory. From this perspective, we can define teacher professional development as a process in which the teacher makes her "know that" become "know how".

Her feelings towards teaching also have a tacit dimension. The pre-service teacher described her feelings during class as some kind of intuition that guides her teaching practice. She could not articulate the reasons why she adopted a particular strategy to cope with a situation because it depended on how she felt in the situation. She described it as a kind of intuition that she could only feel but could not articulate. Actually, intuition is one of the interpretations of tacit knowledge from the perspective of some researchers (e.g. Sternberg & Horvath, 1999).

The teacher's attitude towards teaching also had a tacit dimension in this case. The pre-service teacher's attitude changed over time. However, she could not articulate the reasons behind that because there were a lot of elements that contributed to it. The changes of her attitude towards teaching were the result of the combination of the different elements discussed above.

In summary, these related elements (teaching beliefs, feelings towards teaching and attitude towards teaching) have a tacit dimension and they affect teaching practice tacitly. We can define teacher professional development as a process in which the teacher acquires tacit teaching knowledge over time, and the elements of teaching beliefs, feelings towards teaching and attitude towards teaching all affect the acquisition of tacit knowledge, tacitly.

In this study, I present some empirically based understandings about the acquisition of tacit

knowledge and the teacher professional development process. However, there are also some limitations to this study. The research comes from a single case study: a pre-service teacher in a middle school in Berlin. As with any single-case study, the methodological decision to focus on one research participant allows for an extremely deep penetration of this one special case, which might not have been possible if more pre-service teachers had participated. The general research strategy is explorative. It thus would be a misinterpretation of the research results to conclude with any degree of certainty that the acquisition of tacit knowledge or professional development necessarily proceeds in similar ways independent of the context in which it occurs. The common applicability of these research results still need to be explored.

2. Theoretical Framework: Tacit Knowledge and Teacher Professional Development

2.1 Tacit Knowledge

2.1.1 Polanyi's Conception

For a long time, tacit knowledge and its discussion have been in existence in the history of philosophy, but the first person to systematically discuss it was Polanyi. At that time it was a totally different view on the existing scientific paradigm to claim that all human knowledge is personal rather than objective, which Polanyi (1958) termed as the concept of tacit knowledge. Because Polanyi thinks that "we can know more than we can tell" (Polanyi, 1967, p. 4), he has a different opinion on the objectivism of scientific knowledge. In his book "Personal Knowledge" (Polanyi, 1958), he states: "The purpose of this book is to show that complete objectivity as usually attributed to the exact sciences is a delusion and is in fact a false ideal. But I shall not try to repudiate strict objectivity as an ideal without offering a substitute, which I believe to be more worthy of intelligent allegiance; this I have called 'personal knowledge'" (Polanyi, 1958, p. 18).

(1) Two Kinds of Knowledge

The theory of tacit knowledge involves questioning the origin of knowledge. Polanyi (1958) analyzes the mechanism of cognition and the construction of knowledge in order to create a new concept of it, which is different from the dominant concept. From Polanyi's perspective, there are two kinds of knowledge: one is explicit knowledge and the other is tacit knowledge. He calls the kind of knowledge that we can articulate with words and numbers explicit knowledge whereas tacit knowledge is the kind of knowledge that cannot be described and codified with language (Polanyi, 1958). Polanyi uses some examples to explain explicit knowledge and tacit knowledge separately instead of giving a definition for them. For example, we can use words and pictures to describe and explain scientific research, such as the cellular structure of plants, but we cannot tell others how to ride a bicycle. The reason for this lies in the character of these two kinds of knowledge rather than the ability of expression because "there are things we know but cannot tell" (Polanyi, 1962, p. 601).

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We can describe and explain the cellular structure of plants to others with words and pictures because this kind of knowledge is explicit and it is effable. Instead, we cannot tell others how to keep balance on the bicycle and move forward as this is tacit knowledge and it is inarticulate. Even if we tell others the detailed steps of riding a bicycle, such as needing to put our feet on the right place of the bicycle and keep our body a little bit forward on the bicycle, others will still not know how to do that. We cannot articulate what we know because it is tacit knowledge. Polanyi (1962) thinks that tacit knowledge plays a predominant role in personal knowledge and that tacit knowledge is the foundation of explicit knowledge.

It seems like there are two kinds of knowledge, one is about "know what" (explicit knowledge) and the other is about "know how" (tacit knowledge). For tacit knowledge, most of it is about skills learning and understanding. I have taken some examples of tacit knowledge in the area of skills learning. Now, I will represent this characteristic in the area of understanding. In his paper "Problem Solving" (Polanyi, 1957), Polanyi describes the process of mathematics problem solving and interprets the tacit knowing by using some cases. Problem solving is in fact a process of understanding. Polanyi states, when Gauss finishes the mathematics problem solving, he always says: "I have had my solutions for a long time but I do not yet know how I am to arrive at them" (Polanyi, 1957, p. 102). We can find, from the perspective of Polanyi, that understanding is also tacit knowing that we know but cannot tell. Let me give you another example. You can recognize the face of your friend and know what your friend looks like, but you cannot describe the appearance of your friend by words. Supposedly, you can say that she is 28 years old with shoulder-length black hair with typical Eastern features. It seems like your description is very complete, however, others still cannot image the appearance of this woman, and they may not recognize her when they are in front of her. This kind of understanding belongs to tacit knowing, which can be known but cannot be said.

(2) Two Kinds of Knowing and Awareness

Polanyi thinks that there are two kinds of knowledge: one is explicit knowledge and the other is tacit knowledge. According to Polanyi (1962), tacit knowledge is the foundation of explicit knowledge. He tries to explain the mechanism of tacit knowledge from two dimensions: the awareness and the knowing in one's learning (Polanyi, 1962). Polanyi (1962) thinks that there are two kinds of awareness in one's learning and they are called focal awareness and subsidiary awareness. Similarly, there are two kinds of knowing in every activity: focal knowing and

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subsidiary knowing (Polanyi, 1962).

Before explaining two kinds of awareness and two kinds of knowing, I need to make an illustration of two concepts that emerge interchangeably in the works about tacit knowledge which may sometimes confuse readers. As Polanyi thinks that knowledge is not only static but also dynamic, he uses tacit knowledge to emphasize static knowledge and describes dynamic knowledge by tacit knowing. He uses the terms "tacit knowledge" and "tacit knowing" interchangeably in a lot of his works. It is not necessary to distinguish these two concepts in this work because they will also have the same meaning here.

Let us analyze those classical examples in Polanyi's publications. By doing this, we can have a clear understanding of the mechanism of tacit knowledge. We can ride and swim well but we cannot tell others how to ride a bicycle and how to swim. "It is not because we do not know how to ride a bicycle or how to swim but we do not know how to coordinate those complex muscular actors, in fact, we know how to carry out these performances as a whole and also know how to carry out these elementary acts which constitute them"(Polanyi, 1962, p. 601). Although we know these elementary acts, we still cannot tell others what they are. "We perform a skill by relying on the coordination of elementary muscular acts, and we are aware of having got these right by accomplishing our skillful performance. We are aware of them in terms of this performance and not (or only very incompletely) aware of them in themselves" (Polanyi, 1962, p. 601). "We are generally unable to tell what particulars we are aware of when attending to a coherent entity which they constitute" (Polanyi, 1962, p. 601). That is the reason why we cannot tell others how to perform.

Obviously, there are different kinds of activities in one's performance according to Polanyi. For example, when we perform a skill, there are two kinds of activities in this performance, one is the skillful performance itself, and the other is our muscular act. But these two kinds of activities are different because we perform the skill by relaying on our muscular act, but we are aware of our muscular act by doing the skillful performance rather than the muscular act itself. In other words, although our muscular acts constitute the skillful performance, we can only be aware of them by accomplishing the skillful performance instead of muscular acts themselves.

Polanyi (1962) uses knowing to describe these two kinds of activities in one's performance. He thinks there are two kinds of knowing in one's activity: one is focal knowing and the other is subsidiary knowing (Polanyi, 1962). "There is (1) knowing a thing by attending to it, in the way we attend to an entity as a whole and (2) knowing a thing by relying on our awareness of it for the purpose of attending to an entity to which it contributes" (Polanyi, 1962, p. 601). In the activity of

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performing a skill, performing the skill itself is the first knowing and the muscular act is the second knowing that Polanyi describes. Polanyi (1962) gives names to these two kinds of knowing, the first one is called focal knowing and the second one is subsidiary knowing. Therefore, there are two kinds of knowing in one's activity. We call knowing a thing by attending to it focal knowing, and knowing a thing by relying on our awareness is called subsidiary knowing (Polanyi, 1962).

Now we have described the two kinds of knowing of one's learning. But what are the focal awareness and subsidiary awareness that Polanyi describes? Let us clarify these two kinds of awareness by giving examples. When you are playing the piano, you will focus on musical rhythm and melody instead of the movements of your fingers. So, we can say that your awareness of presenting the musical rhythm and melody is focal awareness and the awareness of muscular activity is subsidiary awareness. Supposedly, you will say that you also have awareness of your finger movements, because you can present the rhythm and melody of the music by doing muscular acts. You indeed have awareness of your finger movements, but this kind of awareness is subsidiary awareness instead of focal awareness.

Let us image an extreme situation. Of course, you can concentrate on your awareness of the finger movements when you are playing the piano. However, you cannot present the musical rhythm and melody in this situation. You will probably break the musical rhythm in this case. The reason for this circumstance is that you move your main attention from focal knowing to subsidiary knowing. That is why we say "when we focus our attention wholly on a particular, we destroy its meaning" (Polanyi, 1962, p. 601).

To clarify the two dimensions of awareness that are involved in any activity, Polanyi often uses the example of driving a nail into a wall. We have awareness of both hammer and nail when driving the nail into the wall with the hammer, but the awareness differs. The main object that we are aware of in this activity is the nail we try to hit in an effective way. We also have awareness of our palm that holds the hammer. On the other hand, holding the hammer is just an instrument of our attention, but not the object. Just like what Polanyi says: "I have a subsidiary awareness of the feeling in the palm of my hand which is merged into my focal awareness of driving in the nail" (Polanyi, 1975, p. 33). "If we switch our focal attention to particulars of which we had only subsidiary awareness before, their meaning is lost and the corresponding action becomes clumsy" (Little & Ray, 2005, p. 112).

There are many examples which can illustrate the relationship between focal awareness and subsidiary awareness. For example, when you are reading a text, your attention is focused on the content of the text rather than the single word itself. If you focus your attention wholly on the word,

you must lose the meaning of the reading. We can also find the relationship between two kinds of awareness and two kinds of knowing in one's learning: the awareness on focal knowing is focal awareness and the awareness on subsidiary knowing is the subsidiary awareness.

By analyzing one's learning from the dimension of awareness and knowing, Polanyi (1962) explains the mechanism of tacit knowledge theory, and he also explains the reason why we cannot tell others our tacit knowledge. "We can tell what the things are which we know by attending to them focally, but we are uncertain, or entirely ignorant, of things that we know only by relying on our awareness of them for attending to something else, which is their meaning" (Polanyi, 1962, p. 601). That is the reason why we cannot articulate our tacit knowledge with words because "we know subsidiarily the particulars of a comprehensive whole when attending focally to the whole which they constitute; we know such particulars not in themselves but in terms of their contribution to the whole. To the extent to which things are known subsidiarily in terms of something else, they cannot be known at the same time in themselves" (Polanyi, 1962, p. 601).

Therefore, we can say the root of tacit knowledge is the subsidiary awareness during one's performance because subsidiary knowing produces the meaning of one's activity although we can only be aware of that in terms of the whole entity it constitutes (Polanyi, 1962). According to Polanyi (1962), explicit knowledge and tacit knowledge are never two autonomous and separate knowledge systems; quite opposite, they always exist as a continuum.

(3) A Review of Tacit Knowledge

In his publications such as "Personal Knowledge" (1958), "The Study of Man" (1959), "The Tacit Dimension" (1967), "Meaning" (1975), "Knowing and Being" (1969) and others, Polanyi uses some examples instead of giving a definition to explain his tacit knowledge theory. Polanyi creates a new structure of knowledge with tacit knowledge theory: all of our knowledge is personal knowledge. There are two dimensions of personal knowledge: one is explicit knowledge and the other is tacit knowledge. We can express and describe our explicit knowledge with words or pictures. However, we cannot tell others our tacit knowledge as it is inarticulate.

Polanyi (1962) also explains why we cannot tell others our tacit knowledge by describing the mechanism of tacit knowledge or tacit knowing. He thinks that there are two parts which constitute the whole of one's activity: one is the main object of one's learning, and the other is the particulars in one's activity. When we are doing a performance, we have awareness on both of these two parts, but in a different way. We have focal attention on the main object of the activity while we only have

subsidiary attention on these particulars. Polanyi (1962) calls these two parts of one's activity as focal knowing and subsidiary knowing separately. We know the main object of the activity by attending to it while we know the subsidiary knowing by relying on our awareness of it for the purpose of attending the focal knowing that it contributes (Polanyi, 1962). But "knowing something by relying on our awareness of it for the purpose of attending the meaning it produces is tacit knowledge" (Polanyi, 1962, p. 601), which is the reason why we cannot tell others our tacit knowledge, because we cannot tell what the particulars are when we are not aware of them directly.

When we try to tell these particulars, we have to switch our main attention from the main object to these particulars. In this way, we have focal awareness on subsidiary knowing. The fact proves that the meaning of the activity is destroyed in this way. For example, when you are writing a letter to a friend, if you have known what you want to write, then you can write the whole text fluently. However, if you have the main attention on the single word that you choose to use and think about the word again and again, the meaning of this activity is lost. That is the reason why Polanyi (1962) thinks the relationship between focal awareness and subsidiary awareness in one's activity is exclusive, as one cannot have both focal awareness and subsidiary awareness on the same part of one's learning at the same time. If we want to perform the whole entity of one activity, we can only have the main attention on the focal knowing, and subsidiary awareness on these particulars. For example, if you are focusing on your fingers when typing, you cannot type fluently. In short, only subsidiary awareness in one's learning can produce tacit knowledge. When we try to give focal awareness on these particulars and describe it, the meaning of the whole entity will be destroyed (Polanyi, 1962).

2.1.2 Understanding of Tacit Knowledge

Some scholars are working on the explanation and understanding of tacit knowledge itself. Polanyi's explanation of the structure of human experience was presented by Gill (2000). Before discussing the dimension of activity, Gill (2000) works on the interpretation of the awareness dimension of human activity. "Finally these two dimensions, awareness and activity, will be integrated into yet a third dimension of human experience, that of cognitivity, thereby providing an overall schema within which to present and grasp Polanyi's theory of knowledge" (Gill, 2000, p. 31). With the following model, Gill (2000) provides an understanding of tacit knowledge:
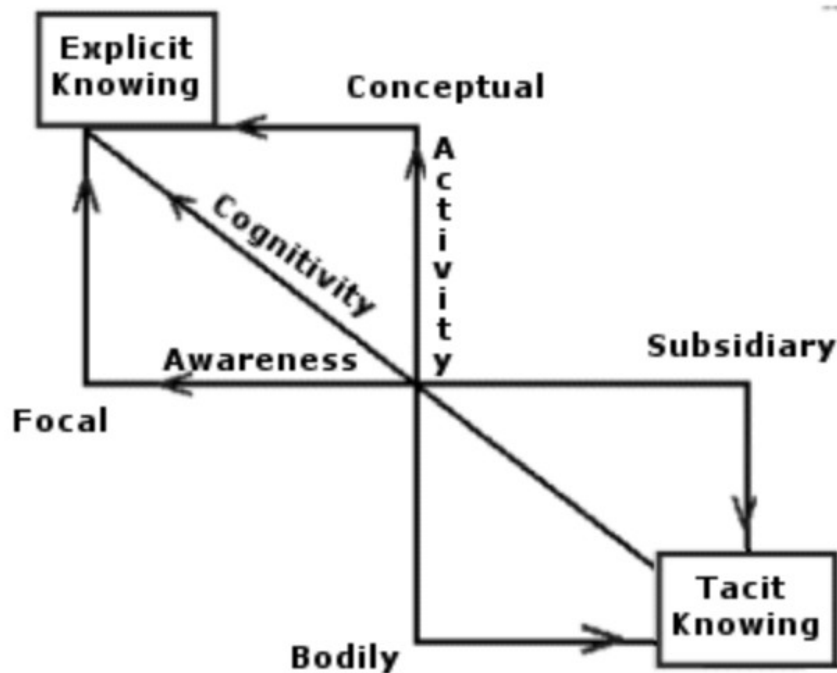
Gill's model for understanding tacit knowledge theory (Gill, 2000)

In this model (Gill, 2000), we can find the two dimensions that Polanyi describes: the awareness dimension and the activity dimension. There are two sub-categories of the awareness dimension: the focal awareness and the subsidiary awareness, which exist in every activity. Similarly, there are also two sub-categories of the activity dimension: the conceptual activity and the bodily activity, which are described separately as "intellectual" and "practical" activities by Polanyi (1962). "All human activity takes place along a continuum between its bodily and conceptual poles" (Gill, 2000, p. 38), therefore, we can say the most of the human action is the blend of body and mind (Gill, 2000). "To anticipate a bit, in Polanyi's scheme of things, the intersection between the awareness and activity dimensions, with their respective poles, gives rise to yet a third dimension or continuum, namely that of cognitivity" (Gill, 2000, p. 38).

Obviously, the name of the third dimension of human experience is given by Gill (2000) instead of Polanyi. From this model, we can also conclude that Gill (2000) thinks the focal awareness and the

conceptual activity produce the explicit knowledge while the subsidiary awareness and the bodily activity create the tacit knowledge. The cognitive process of human action is directed from tacit knowledge to explicit knowledge because it only has one direction in this model. The direction from tacit knowledge to explicit knowledge presents the conclusion that all knowledge comes from tacit knowledge and tacit knowledge is the foundation of explicit knowledge (Polanyi, 1962).

Based on Gill's Model, in the paper titled "Does Polanyi's Tacit Knowledge Dimension Exist?" Morgan (2008) provided a concept map of Polanyi's personal knowledge theory. Using that map, we can have an understanding of Polanyi's whole knowledge theory.

Polanyi's Personal Knowledge Theory Concept Map
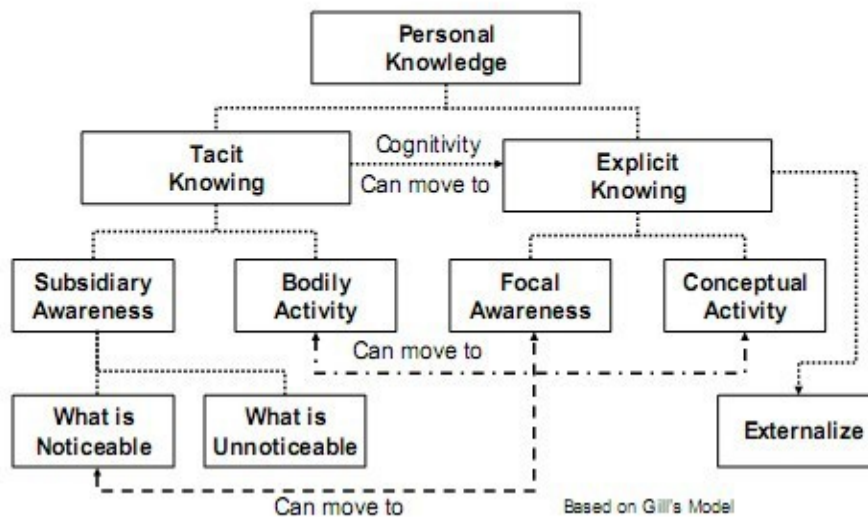
Morgan's concept map for understanding Polanyi's personal knowledge theory (Morgan, 2008)

The map of knowledge (Morgan, 2008) is just like an inverted tree. Obviously, from this concept model (Morgan, 2008) we can conclude, as Polanyi argues, that personal knowledge has two dimensions: tacit knowing and explicit knowing (knowledge). There are two kinds of awareness (focal awareness and subsidiary awareness) in one's learning, and two kinds of activity (bodily activity and conceptual activity). Focal awareness is noticeable while subsidiary awareness is unnoticeable. But when we switch our main attention from focal knowing to subsidiary knowing, then the subsidiary awareness becomes noticeable rather than unnoticeable. Morgan (2008) also thinks tacit knowing is created by subsidiary awareness and bodily activity while explicit knowing

has two sub-components: focal awareness and conceptual activity. "Explicit knowing can be externalized" because it is noticeable and we can also articulate that with words (Morgan, 2008, p. 10). But unlike Gill (2000)'s model, we can find from this map (Morgan, 2008) that conceptual activity can move to bodily activity, which means not only subsidiary awareness and bodily activity produce tacit knowing. On the contrary, conceptual activity and subsidiary awareness also create tacit knowing or tacit knowledge.

In this map (Morgan, 2008), there is only one transform direction between tacit knowing and explicit knowing. Tacit knowledge can move to explicit knowledge by cognitive processes because Polanyi (1962) thinks all kinds of knowledge have a tacit dimension and tacit knowledge is more fundamental than explicit knowledge. Actually, Polanyi uses the act of indwelling to describe this cognitive process from tacit knowing to explicit knowing stating that "tacit knowing appears as an act of indwelling by which we gain access to a new meaning" (Polanyi, 1962, p. 606). For example, "when exercising a skill we literally dwell in the innumerable muscular acts which contribute to its purpose, a purpose which constitutes their joint meaning, therefore, since all understanding is tacit knowing, all understanding is achieved by indwelling" (Polanyi, 1962, p. 606).

I think Polanyi (1962) uses indwelling to describe the development from subsidiary knowing to focal knowing in one's activity. As subsidiary knowing is tacit while focal knowing is explicit, therefore, Polanyi (1962) gets the conclusion that tacit knowledge exists before explicit knowledge and all of our knowledge has a tacit dimension. In these two models, both Gill (2000) and Morgan (2008) use cognitivity to describe this dynamic process in our learning and underline the conclusion that Polanyi presents. In other words, both of them try to present a framework to explain the process from subsidiary knowing to focal knowing in one's learning, as they use cognitivity to explain how subsidiary knowing contributes to focal knowing. But how does one learn and acquire subsidiary knowing in one's activity? In these two models, none of them analyze the subsidiary knowing individually and give an explanation.

2.1.3 Descriptions and Definitions of Tacit Knowledge

There are a number of different definitions and concepts used to explain tacit knowledge. Haldin-Herrgard (2004) reviewed academic "books and articles on knowledge and tacit knowledge" (p. 2)

during the period of 1956 to 2002 in the paper titled "Diving under the Surface of Tacit Knowledge". "The review resulted in 149 different epitomes of tacit knowledge used. Some of these epitomes were though used in different meanings by different authors and, as opposite, different epitomes were used on same or similar topics by different authors" (Haldin-Herrgard, 2004, p. 6). In this research, Haldin-Herrgard (2004) presented 23 different definitions of tacit knowledge, which are used to expand the explanation of tacit knowledge.

According to the research results of Haldin-Herrgard (2004), "scholars seem to agree that tacit knowing is highly personal, abstract and difficult to express. Due to these characteristics they also agree on the difficulty of tacit knowledge diffusion. They also agree on experience being a main source of tacit knowledge creation and tacit knowing is related mainly to practicality" (Haldin-Herrgard, 2004, p. 4).

Haldin-Herrgard (2004) presented the most frequently used epitomes of tacit knowledge (ETKs) as follows:

"* Intuition

Intuition expressed as direct knowing or learning without conscious reasoning or making choices without formal analysis. Related expressions to intuition are non-analytical behavior, automatic knowledge, or flashes of inspiration or insight.

 * Skills

Skills are used as such but also with specifications like inductive, negotiation, physical, coordination or cognitive skills. This is perhaps the epitome that is most used without any form of definition. Some other terms such as ability, crafts and practical knowledge are closely related and often used in the same meaning.

 * Insight

Insight is used as understanding, often in a sudden form but also as "glimpse" into knowledge (ones own or others).

 * Know-how

Know-how often expressed as the ability to put know-what into work which is to great extent the product of experience. Know-how is mostly used as such but also with specifications as practical and collective know-how.

* Beliefs

Beliefs used as a set of understandings that reflect our perspective of the world. Beliefs are also expressed as opinions and sometimes even as attitudes.

* Mental models

Mental models are cognitive structures formed by the abstractions of experience. They reflect our perspectives of the world around us. Other ETK like cognitive schemas; mental maps and schemas are used as same meaning.

* Practical intelligence

Practical intelligence expressed as 'a person's ability to apply components of intelligence to everyday life'" (Haldin-Herrgard, 2004, pp. 7-8).

These seven most frequently used epitomes of tacit knowledge (Haldin-Herrgard, 2004) have something in common. Almost all of them share the same core idea regarding tacit knowledge: one knows but one cannot tell (Polanyi, 1958). Some of them claim that tacit knowing is some kind of ability that guides our activity to be automatic and spontaneous. For example, these ETKs such as skills, know-how, and practical intelligence describe tacit knowledge as an ability or competence to put "know what" into "know-how". Some ETKs regard tacit knowing as an unconscious action. For example, intuition, as one kind of interpretation of tacit knowledge, describes tacit knowing as "learning without conscious reasoning" (Haldin-Herrgard, 2004, p. 7). Some of them hold the opinion that tacit knowledge is about understanding. For instance, insight, beliefs and mental models identify tacit knowing as "understandings that reflect our perspective of the world around us" (Haldin-Herrgard, 2004, p. 8). This list of ETKs summarizes the main characteristics of tacit knowledge and its interpretations, with which we can have a relatively clear understanding about how researchers understand and interpret tacit knowledge.

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McAdam, Mason and McCrory (2007) "analyzed the interpretations of tacit knowledge in a range of business and management journals for the purpose of understanding the phenomenon of tacit knowledge and the work that has already been conducted in this field" (p. 44). The reason why I list the interpretation of tacit knowledge from the field of business and management here is that the researchers in the management field do the related research on tacit knowledge much earlier than those in other fields, and the most of tacit knowledge related literature is also from the management field. Of course, the interpretation of tacit knowledge in the business and management field is slightly different from other fields because the researchers in this field are focusing on presenting the management related tacit knowledge, such as the management ability of the company worker. However, their interpretation of tacit knowledge is also very meaningful for other fields such as education because some educational researchers like Hargreaves (1999) also find that the tacit knowledge related innovation model from the management field is also useful in education.

McAdam, Mason and McCrory (2007) present the most widely cited descriptions of tacit knowledge from the field of business and management in the following figure.
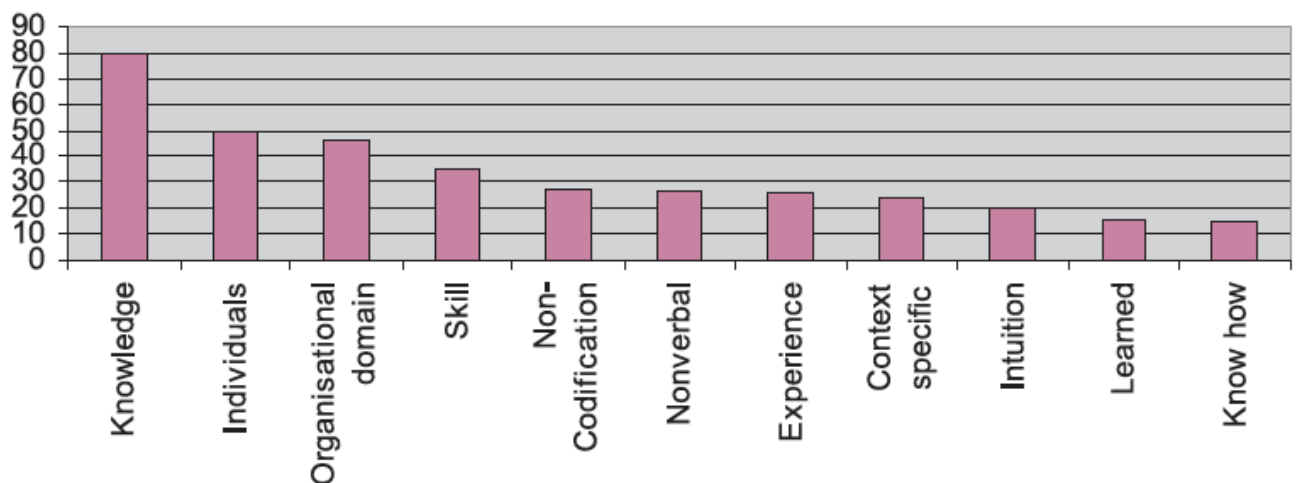
The y-axis of the above figure shows the number of citations of a specific description of tacit knowledge in the management field.

Most researchers hold the idea that tacit knowledge belongs to knowledge, as there are 80 citations of this description. Another significant character of tacit knowledge is its individuality, which

means tacit knowledge belongs to personal knowledge and different people might have different kinds of tacit knowledge. There are 50 instances about its individuality in this figure. We can also see that a lot of researchers think that tacit knowledge is organizationally based, because there are almost 46 instances of using this assignment. Besides this, a lot of researchers think that tacit knowledge is about skillful performance and that it cannot be codified with words or numbers, as it is inarticulate. It is context specific, and we can only obtain it from our experience rather than from theory. Sometimes it is like some kind of intuition, as we do not know why we can perform some act but we can do it correctly anyway. "Know how" is also one of the most widely used interpretations of tacit knowledge, and it is one of the concepts that are used to define tacit knowledge from the perspective of some researchers.

From this figure (McAdam, Mason & McCrory, 2007), we can conclude that most researchers agree that tacit knowledge is some kind of knowledge that can be learned only by doing rather than from theory. It is some kind of practical intelligence, and it is about know how. This kind of knowledge belongs to personal knowledge, as it is individualized and context specific. We obtain it from our own experience, but we cannot articulate it with words because it is nonverbal. But how do we learn it from experience? We cannot find the clear answer from most of the related studies.

Besides this, researchers try to give the definition of tacit knowledge for the purpose of having a clear understanding of this concept. Haldin-Herrgard (2004) made a list of definitions for tacit knowledge given by different researchers by reviewing the academic books and articles on tacit knowledge. These definitions mainly describe the characteristics of tacit knowledge, such as tacit knowledge being very difficult to be expressed and articulated; it cannot be codified with words and numbers. Some definitions also present some interpretations of tacit knowledge, for example tacit knowledge belonging to some kind of practical intelligence that can only be acquired from practice rather than from theory. Some of them even define tacit knowledge as implicit knowledge or unconscious knowledge, as they have similar characters.

Actually, I think these definitions are descriptions and interpretations of tacit knowledge rather than definitions, because they just present the characteristics of it. Furthermore, Polanyi himself does not give a definition to the concept of tacit knowledge in his works; what he did is simply use a lot of examples to explain tacit knowing. However, these different interpretations and descriptions of tacit knowledge are still meaningful, because with them we can know how tacit knowledge is interpreted by different researchers. Actually, from my perspective, the main point about tacit knowledge is not only giving definition to it; the more important thing is trying to understand the mechanism of it.

For example, we should pay more attention to the process of how one develops his or her tacit knowledge rather than only describing the characteristics of this concept, because even if we know that tacit knowledge can be understood as abilities or competence to deal with problems or that it belongs to some practical skills, we still may not know the learning mechanism behind of it.

2.1.4 Summary

It can be found from the definitions and interpretations of tacit knowledge given by different researchers that tacit knowledge is personal and abstract. It is based on experience and difficult to express. Researchers use epitomes and definitions to describe the character of tacit knowledge; for example, they use intuition, good feelings, practical intelligence, skills and "know-how" to interpret it. These epitomes and interpretations themselves are different; for example, intuition is not equal to practical intelligence, and good feelings also do not mean skills. However, all of them have one common characteristic that one knows but one cannot articulate. Therefore, in this way, we can say that the researchers try to facilitate the understandings of tacit knowledge by expanding the explanation of it, such as defining tacit knowledge and using the epitomes to interpret it. The other point is that different people will have different interpretations and understandings about the same phenomenon, and as such they will use different concepts or words to describe this phenomenon that one knows but cannot articulate. For example, some people think that tacit knowledge is embodied knowledge, and implicit knowledge also shares the same meaning with tacit knowledge. This may be the reason why there are so many different definitions or interpretations of the term.

According to the interpretations of tacit knowledge given by Polanyi, I think there are two main kinds of tacit knowledge or tacit knowing: skills and understanding. Epitomes, like practical intelligence, problem-solving ability and expertise, which mainly belong to "skills", because these epitomes are mainly about bodily activity and skillful performance. And for intuition, good feelings, beliefs, insight, "know-how" and mental models, are the epitomes of "understanding", as they mainly refer to conceptual activity and mental reasoning. Of course, most of the time, our tacit knowledge is the blend of skills and understanding because we need to understand the special situation first and then cope with it.

2.1.5 Some Relevant Studies about Tacit Knowledge in the Field of Education

Because of the importance of tacit knowledge, more and more researchers have tried to open the black box of tacit knowledge in the field of education. Verloop, Driel and Meijer (2001) realized that tacit knowledge is very important in the field of education, especially for teacher education, because "the knowledge base of teaching is potentially relevant to teachers' activities" (p. 441), and "teachers' knowledge is strongly related to individual experience and teaching context" (p. 441). Therefore, we cannot ignore the concept of tacit knowledge in the field of education. Poulson (2001) found that the most important part of teachers' knowledge is not the subject knowledge but the unarticulated pedagogical knowledge, although the researchers and policy-makers always emphasize the importance of the teachers' subject knowledge. The research shows some teachers still do not teach well even though they possess very rich subject knowledge (Poulson, 2001). Therefore, Poulson suggested for "the researchers and policy-makers to reconsider their current emphasis on teachers' subject knowledge" (Poulson, 2001, p. 40) and pay more attention to "the relationship between teachers' unarticulated tacit knowledge and formal knowledge"(Poulson, 2001, p. 40), as teachers' tacit knowledge plays a more important role in the teaching activity.

Hargreaves (1999) detected that teachers in England are always expected to have a better professional knowledge about school management and teaching, which demands the creation of such kind of professional knowledge. The British government expects that the university-based institutions can create the new professional knowledge and then disseminate it to the teachers in school (Hargreaves, 1999). However, they overlook one important character of this kind of professional knowledge: the most professional knowledge that teachers should have cannot be taught or shared with each other, as it belongs to tacit knowledge and it is inarticulate (Hargreaves, 1999). This kind of knowledge should be created and learned by doing rather than from the theories that university researchers produce (Hargreaves, 1999). That is the reason why university-based researchers are not very successful. Therefore, the task of knowledge creation should be located in school rather than in university institutions (Hargreaves, 1999). Hargreaves (1999) also proposes some useful suggestions about how to create an effective knowledge-creating model in education. For example, Hargreaves (1999) found that the related research results from the high technology firms are also very suggestive in education. We should consider exploring and learning these existing models from the business and management field to use in education (Hargreaves, 1999).

Freeman (1991) examined how the teacher education program influences the teachers' conceptions or understandings of teaching by describing the changes of four teachers' conceptions of class practice in an 18-month long teacher training program. As the understanding or conception of teaching is tacit or intuitive, one of the main purposes of the teacher education program is to help teachers make their tacit understanding become explicit (Freeman, 1991). In this research, Freeman (1991) found that the teacher education program has strong influence on teachers' development of teaching understandings, as it is useful to help teachers to express and articulate their tacit understandings and conceptions of teaching practice. The research results show that teachers can express more about teaching after participating in the program (Freeman, 1991). I think this may be because the program provides more opportunity to teachers to let them talk about or discuss their understandings of teaching, or the teacher educators can help teachers to organize what they want to express and make their expression fluent.

There are also some researchers in the field of education who try to analyze the knowledge structure of experts in order to reveal the nature of tacit knowledge. For example, Nash and Collins (2006) analyzed the knowledge structure of experts in order to promote the transformation between tacit knowledge and other kinds of knowledge. In the paper titled "Tacit Knowledge in Expert Coaching, Science or Art?", Nash and Collins (2006) described the obvious characteristics of expert coaches and emphasized the tacit nature of this kind of expertise and skills in coaching. They presented the tacit knowledge of coaches by analyzing the knowledge structure of expert coaches (Nash & Collins, 2006). There are three kinds of knowledge: sport specific, pedagogy and "ologies", which constitute the coaching knowledge by integrating each other (Nash & Collins, 2006). "Coaches would be expected to have similar declarative knowledge about the specifics of their sport: tactics, training techniques as well as similar procedural knowledge regarding the pedagogical process. Coaches must also make use of the 'ologies,' i.e., psychology, physiology, kinesiology, and sociology to improve the performance of their athletes" (Nash & Collins, 2006, p. 468).

Besides this, they also tried to analyse how the expert coaches gain their coaching knowledge, as "the lack of a clear development pathway for aspiring expert coaches is a clear indicator that the current coach education system needs review" (Nash & Collins, 2006, p. 465). As "tacit knowledge is knowledge gained primarily from experience performing practical, everyday problems" (Nash & Collins, 2006, p. 470), they suggested that "in the design of coach education courses, much more time should be allocated to developing this procedural knowledge base, which coaches require to improve their athletes" (Nash & Collins, 2006, p. 474). For example, the coaches should be allowed

and encouraged to ask questions like, "What do I do?", "How do I do it?", "Where do I get the knowledge?" (Nash & Collins, 2006, p. 473). I think as tacit knowledge is related to teachers' teaching experience, we can encourage teachers to expose their experience and teaching stories, which might be useful for the clarification of tacit knowledge. Nash and Collins (2006) analyzed the structure of coaching knowledge and presented a model of it, which is very meaningful for coach education. However, they emphasized the tacit nature of expertise of expert coaches, but did not present the nature of tacit knowledge.

Shulman (1987) also analyzed the knowledge structure of teachers by categorizing their knowledge base. He thinks there are seven categories of professional knowledge that teachers should have: "content knowledge", "curricular knowledge", "pedagogical content knowledge", "general pedagogical knowledge", "knowledge of learners and their characteristics", "knowledge of educational contexts" and "knowledge of educational ends, purpose and values" (Shulman, 1987, p. 8). "Among those categories, pedagogical content knowledge is of special interest because it identifies the distinctive bodies of knowledge for teaching. It represents the blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction" (Shulman, 1987, p. 8). In other words, pedagogical content knowledge is about how teachers translate the content knowledge into the special understanding that the students can accept and learn effectively.

After the creation of pedagogical content knowledge (PCK), this concept becomes an important topic in the field of education. There are a lot of researchers trying to model PCK (Gess-Newsome, 1999; Baumert et al., 2010) and even measure it (Duit & Rhöneck, 2000; Park & Oliver, 2008). Gudmundsdottir and Shulman (1987) did case studies by comparing the teaching performance between novice teachers and expert teachers. They found "the important difference between the novice and the expert is manifested in a special kind of knowledge that is neither content nor pedagogy knowledge. It rests instead in pedagogical content knowledge, a form of teacher understanding that combines content, pedagogy and learner characteristics in a unique way" (Gudmundsdottir and Shulman 1987, p. 59). This means that the pedagogical content knowledge is a kind of knowledge "that enables the expert teacher to see the larger picture several times, and the expert has the flexibility to select a teaching method that does justice to the topic"(Gudmundsdottir and Shulman, 1987, p. 69).

We can find that pedagogical content knowledge belongs to teachers' professional knowledge, which makes teachers do the right decision in front of the classroom situation and choose the appropriate teaching methods to teach. It is a kind of expertise that belongs to experienced teachers at least to some extent. According to the researchers' definitions and interpretations of tacit knowledge, expertise and competence belong to tacit knowledge, because they have the obvious character of tacit knowledge that one knows but one cannot articulate. Some researchers (e.g. Loughran, Mulhall, Berry, 2004; Loughran, Berry, Mulhall, 2012) recognized the tacit characteristic of pedagogical content knowledge. Berry & Loughra & van Driel (2008) found that pedagogical content knowledge, as one kind of teachers' professional knowledge, is very difficult to be articulated and documented. Actually, Shulman (1988) himself also mentioned the tacit character of teachers' professional knowledge, as he stated:

"While tacit knowledge may be characteristic of many things that teachers do, our obligation as teacher educators must be to make the tacit explicit. Teachers will become better educators when they can begin to have explicit answers for the questions, "How do I know what I know? How do I know the reasons for what I do? Why do I ask my students to perform or think in particular ways?" The capacity to answer such questions not only lies at the heart of what we mean by becoming skilled as a teacher; it also requires a combining of reflection on practical experience and reflection on theoretical understanding" (Shulman, 1988, p. 33).

Obviously, Shulman (1988) not only emphasized the tacit characteristic of teachers' professional knowledge, he also offered some strategies about how to make this inarticulate knowledge explicit. For example, teachers should reflect on their teaching practice and ask some explicit questions, such as "Why should I do this?", "Why can I do this?", "How do I do this?" as he thinks these explicit questions can help teachers to reflect and clarify their teaching practice (Shulman, 1988).

The creation of the concept of pedagogical content knowledge (Shulman, 1987) is mainly based on the American teaching training system, which means PCK is relatively context specific and it may be inappropriate when it is used to identify the knowledge structure of teachers in other countries. This is due to the differences of teacher training systems in various countries. For example, in some countries like Germany or China, student teachers have learned how to teach in universities although they may be unable to use this knowledge properly in practice. That means teacher educators in other countries might have blended content knowledge and pedagogical knowledge together in university courses, and student teachers might also have learned other kinds of knowledge about how to teach, although they are not called as PCK. As there are various kinds of

knowledge that are about how to teach, we can say that pedagogical content knowledge is only one of the most important parts of teachers' professional knowledge. Shulman (1988) realized the tacit characteristic of pedagogical content knowledge; however, Shulman did not identify how teachers acquire this kind of tacit knowledge. What he mainly focuses on is how to make this kind of tacit teaching knowledge explicit, rather than identifying how teachers gain it over time.

Schön (1983) identified an important character of professional knowledge, which exists in various field. He stated:

"When we go about the spontaneous, intuitive performance of the actions of everyday life, we show ourselves to be knowledgeable in a special way. Often we cannot say what it is that we know. When we try to describe it we find ourselves at a loss, or we produce descriptions that are obviously inappropriate. Our knowing is ordinarily tacit, implicit in our patterns of action and in our feel for the stuff with which we are dealing. It seems right to say that our knowing is in our action" (Schön, 1983, p. 49).

According to what Schön (1983) described, we can see what one knows is more than what one can tell. We cannot describe or articulate our knowledge that guides us to perform spontaneously and intuitively, because this kind of knowledge is tacit, and it cannot be articulated. As this practical knowledge exists in our action and it is inarticulate, Schön (1983) calls it "knowing-in-action". But how do we develop this "knowing-in-action"? Schön (1983) explains one's learning mechanism with "reflection-in-action". He thinks that although we cannot explain or articulate this practical knowledge, "both ordinary people and professional practitioners often think about what they are doing, sometimes even while doing it. Stimulated by surprise, they turn thought back on action and on the knowing which is implicit in action" (Schön, 1983, p. 50). Obviously, Schön (1983) holds the idea that we always reflect and think about what we are doing, although we cannot articulate this "knowing-in-action" with words.

The reason why Schön calls this kind of reflection "reflection-in-action" is because "although we sometimes think before acting, it is also true that in much of the spontaneous behaviour of skilful practice we reveal a kind of knowing which does not stem from a prior intellectual operation" (Schön, 1983, p. 51). For example, we do not always know how to put the theory into practice, although we have learned it before. "Reflection-in-action" means "the reflection process occurs in the midst of a performance" (Schön, 1983, p. 54). Let us take the example that Schön (1983) gave to explain that. When jazz musicians are improvising in a common jazz session, they have to act

instantly without thinking about theory in order to meet the requirements of the sound of their common music (Schön, 1983). "They are reflecting-in-action on the music they are collectively making and on their individual contributions to it, thinking what they are doing and, in the process, evolving their way of doing it. Of course, we need not suppose that they reflect-in-action in the medium of words. More likely, they reflect through a 'feel for the music' which is not unlike the pitcher's 'feel for the ball'" (Schön, 1983, p. 56).

Although the practitioners develop "knowing-in-action" with "reflection-in-action", "a practitioner's reflection-in-action may not be very rapid" (Schön, 1983, p. 62). "It is bounded by the 'action present', the zone of time in which action can still make a difference to the situation" (Schön, 1983, p. 62). For example, a teacher needs 45 minutes to finish his or her teaching, so he or she reflects-in-action during this class time, whereas a detective needs several months or even one year to finish a case. Therefore, his or her time duration of "reflection-in-action" is very long. In other words, "the pace and duration of episodes of reflection-in-action vary with the pace and duration of the situations of practice" (Schön, 1983, p. 62).

As Court (1988) argues, I also think Schön should give a definition of "action" before using "reflection-in action" to explain how one acquires "knowing-in-action". On the one hand, Schön (1983) claims the characteristics of professional knowledge are that we do not have to think about it when we are doing it, and we are always even unaware of it, although it guides our performance to be spontaneous; on the other hand, he thinks that we can still "reflect-in-action" in order to know how to do better, and the duration of this reflection process is also not rapid. The question is, if we can still reflect in action, how could we be unaware of it when doing it? For those actions that we have to react to immediately, such as coping with class problems, I think we hardly have time to reflect-in-action in a very short moment. And for those actions, such as to detect a criminal case, the detective might mainly reflect on action rather than in action, as he or she needs more time to reflect on what he or she is doing, and take some measures to deal with the problem. Therefore, I think Schön's "reflection-in-action" can be used to explain how one or a group coordinates some related elements to reach the whole activity until their actions become automatic and spontaneous. In this sense, Schön's "reflection-in-action" shares the similar meaning as coordination or integration.

Elliott et al. (2011) "examined the tacit knowledge of trainees and experienced teachers in relation to various problematic interpersonal aspects of school life" (p. 83). They think that "skilled interpersonal relations are crucial for effective teaching and learning but much professional knowledge here is tacit and thus not easily communicated" (Elliott et al., 2011, p. 83). In their

research, "it was found that experience appeared to be related to the capacity to identify 'bad' response, but there was little difference in relation to the identification of 'good' response" (Elliott et al., 2011, p. 83). I think it is not difficult to understand this research result, because the capacity to make good responses is a kind of tacit knowledge which belongs to personal knowledge. Different persons might have different solutions to the same problem. Because of their teaching experience, experienced teachers have a better capacity to recognize and identify the 'bad' responses, and they know what kind of good situation they want while trainees cannot.

There are also researchers who try to analyze the tacit dimensions and hidden dimensions of other education related phenomena. Wulf (2012) analyzed the tacit dimension of ritual performance in school. He uses the concept of mimesis to explain how we learn and practice the basic skills which constitute the body movements such as the ritual performance until the whole body movements become intuitive and automatic (Wulf, 2012). For example, Wulf (2012) identified the process of how schoolgirls learn to perform the collective performance accompanied with music. He thinks "if someone perceives a gesture, they understand it by imitating it, thus grasping the symbolic-sensual content of the way it is expressed and represented through movements of body. Although understanding the different aspects of what a gesture signifies is important, what it expresses and means for the body can only be grasped through mimetic process. It is through recreating a gesture mimetically that it is possible to really understand it, because it has become part of the body" (Wulf, 2012, p. 23). Obviously, Wulf (2012) thinks the mechanism behind of the girls' collective performance is mimetic learning process, however, this learning process is not only about imitation. Wulf (2008) stated:

"Mimetic learning does not, however, just denote mere imitation or copying: rather, it is a process by which the act of relating to other persons and worlds in a mimetic way leads to an enhancement of one's own world view, action, and behaviour. Mimetic learning is productive; it is related to the body, and it establishes a connection between the individual and the world as well as other persons; it creates practical knowledge, which is what makes it constitutive of social, artistic, and practical action" (Wulf, 2008, p. 56).

As what Wulf (2008) stated, mimetic learning is not only about imitation or copying, it is also about creative production of practical knowledge in social actions. When a mimetic relationship is built between two persons, there would be some similarities between their actions (Wulf, 2008). At the same time, some differences would emerge, as the learner incorporates the meaning from others and produces his or her own meaning during mimetic learning process (Wulf, 2008). However, not all

social actions are transferred from one to others by mimetic learning process. Wulf (2008) clarified:

"Social actions may provisionally be described as mimetic if, as gestures, they refer to other gestures; if they can be understood as a corporeal performance or staging; and if they are autonomous actions, comprehensible on their own accord, and related to other actions or words. Therefore, actions like mental consideration, decisions, reflexive or routine behaviour as well as unique actions and rule violations are all non-mimetic" (Wulf, 2008, p. 61).

We can find, from the perspective of Wulf (2008), those social actions that we can learn by mimesis mainly refer to the corporeal performance or physical movements, such as skillful performance. For those mental activities, such as choosing a most suitable teaching method to teach do not belong mimetic learning, because it is not only about corporeal performance, it mainly refers to mental consideration. Besides this, Wulf thinks, "as long as the social practice is not questioned, however, the practical knowledge behind it remains, as it were, half-conscious. Like the knowledge which constitutes a habitus, it consists of images, concepts, and forms of action, which can be used in the scenic corporeal performance of social action without reflecting on their appropriateness. They simply are known and used for the staging of social practice" (Wulf, 2008, p. 62). It means there is almost no reflective process behind this mimetic learning, as it is incorporated, and the practical knowledge in this social action is incorporated knowledge or embodied knowledge, because during the repetition of mimetic learning, these social actions become some parts of our body itself. Just like Wulf (2008) said:

"Physical movements, too, with the help of which scenes of social action are arranged, form part of practical knowledge. When physical movements are subjected to discipline and control, a disciplined and controlled practical knowledge emerges, which – stored in the memory of the body – makes possible the staging of corresponding forms of symbolic scenic action. This practical knowledge refers to the forms of social action and representation belonging to a certain culture" (Wulf, 2008, p. 62).

This kind of practical knowledge is formed during mimetic learning process, and it becomes the memory of our body, which guides us to perform the body movements automatically and intuitively. Therefore, we can label it as incorporated knowledge or embodied knowledge. Wulf (2012) also denotes this practical knowledge as implicit knowledge or tacit knowledge. It seems like there is no significant difference among this knowledge, such as tacit knowledge, implicit knowledge, incor-

porated knowledge and embodied knowledge, because Wulf uses them to describe the same phenomenon. Bohnsack (2014) also did not distinguish them, but used all of them to describe the knowledge that guides our action to become automatic.

Tacit knowledge, implicit knowledge, incorporated knowledge and embodied knowledge, almost all of them are used to explain why one can do something intuitively and automatically but cannot articulate it, such as how to ride a bicycle or touch type. However, the way the researchers explain it is different. For example, Polanyi (1962) thinks the reason why we cannot tell others this kind of inarticulate knowledge is because the existing of two kinds of awareness and two kinds of knowing in one's activity. However, Merleau-Ponty (1996) thinks this kind of knowledge, which guides our practical action to be intuitive, is knowledge of body itself rather than mind. So, he calls it embodied knowledge. Some researchers (e.g. Shanks & St John, 1994; Stadler & Frensch, 1994) think implicit knowledge is the result of implicit learning, and the main character of this learning is without awareness and is not affected by attention. It seems like researchers use different concepts to describe and explain a similar question: why one can do something intuitively but cannot articulate it with words. As the main focus of this research is to identify how one develops this kind of practical knowledge, I think it does not make much sense to distinguish the differences among them in this study. Instead, the main attention should be given to reveal the mechanism behind this phenomenon, because only if we know how it works, we can give a definition to it.

Around the topic "Tacit Dimension of Pedagogy", more research has been done by researchers from various perspectives. For example, in the book titled "Hidden Dimensions of Education" (Werler & Wulf, 2006), some researchers (e.g. Simonsen, 2006 & Blaschke, 2006) analyzed the tacit dimension that lies behind the rhetoric and the rituals in education, although there is not much information regarding these research topics. In the book "Performativity, Materiality and Time: Tacit Dimensions of Pedagogy" (Kraus, Buhl & von Carlsburg, 2014), researchers focused on the tacit dimensions of pedagogic practice. For example, Ferrin (2014) explored "the relationship between human bodies, digital images and material objects in situations of media use" (p. 41). In his study, Ferrin (2014) did a microanalysis of the actors' body movements when they were playing Wii games in order to identify the tacit or implicit character of their performance. This includes two steps: what are they doing, and how do they play? (Ferrin, 2014) By doing this, Ferrin (2014) acquired an empirically grounded understanding about how mimetic learning contributes to the interaction between human bodies and the material world. In other words, his research is "concerned with a historical –anthropological investigation on social mimesis in a mediated world"

(Ferrin, 2014, p. 41). Others discussed the tacit dimension of teaching and learning, such as concept teaching. Salamounova (2014) emphasized that teachers can take their language for granted to explain and teach scientific concepts to students, which means the way teachers use their language spontaneously to transfer scientific concepts to students has a tacit dimension. But how do teachers do this in their class? In her study, Salamounova (2014) identified the process of how teachers teach scientific concepts in class by doing a microanalysis of the discourse between teachers and students. The research results show that teachers use some strategies to deliver the concepts that they have to teach, such as building a bridge between scientific concepts and everyday concept, using metaphor or simile as strategies to let students become clear about the concepts (Salamounova, 2014). Obviously, the tacit dimension of education should not be ignored in the education related research. Besides that, from the related research results, we can find that anthropological research methods are very useful to explore the complexity of educational science such as analyzing the tacit dimensions of education.

As just described, researchers from different areas have done much research on tacit knowledge. Most of them focus on two directions about tacit knowledge. Some researchers are trying to expand the interpretation and descriptions of tacit knowledge, such as using some epitomes to understand it, or trying to give definition to it. This can be found in most of the literature review about tacit knowledge. For example, Haldin-Herrgard (2004) presented a list about the main definitions of tacit knowledge from different researchers. Some other researchers are trying to make tacit knowledge explicit. For example, Freeman (1991) tried to find whether a teaching training program is helpful to make teachers articulate their tacit knowledge, and the research results showed that teachers can articulate more about their understandings of teaching when they participate in that teacher training program. Shulman (1988) also attempted to find some useful strategies to make teachers' tacit knowledge explicit. For example, he thinks that teachers should always ask themselves some explicit questions about their teaching, such as "Why can I do this?", "How do I do this?" in order to make their reflection process explicit (Shulman, 1988). Only very few of them try to identify and understand the learning mechanism of tacit knowledge. For instance, Schön (1983) defines tacit knowledge as "knowing-in-action", as we can only obtain this kind of "know how" from our practice. He uses "reflection-in-action" to analyze and explain how one acquires this kind of "knowing-in-action" (Schön, 1983). Wulf (2008) identifies one's learning mechanism of tacit knowledge with the theory of mimetic learning. He uses the concept of mimesis to explain how one acquires the knowledge that guides our activity to become spontaneous (Wulf, 2008).

To some extent, trying to analyze the development process of tacit knowledge is more practical than only expanding the interpretations of this concept. Although there are already several different definitions and interpretations of this concept, we still do not know the nature of tacit knowledge unless we understand its development process. In other words, we need to know how tacit knowledge is formed or how one acquires her or his tacit knowledge from practice. Nash and Collins held the same idea that "more important should be how coaches develop knowledge, how they access that knowledge at the appropriate time and how this affects their decision making" (Nash & Collins, 2006, p. 465). Similarly, if we can describe and identify how teachers develop their tacit knowledge in the classroom, we can have a much clearer understanding about this kind of tacit knowledge. Although tacit knowledge cannot be articulated by words, the development process can be described by words.

2.2 Teacher Professional Development

2.2.1 A Definition of Teacher Development

"Teacher development" is a research area that focuses on improving the performance of teachers and schools, and there has been plenty written on this subject (e.g. Fullan & Hargreaves, 1992; Darling-Hammond, 1994; Day, 1999; Evans, 2002). However, "definitions of teacher development are almost entirely absent from the literature: even those who are generally considered leading writers in the field do not define precisely what they mean by the term"(Evans, 2002, p. 124). Evans (2002) examined the concept of teacher development and presented her own interpretation and definitions in the review of this concept.

In "What is Teacher Development?" (Evans, 2002), the author presented the descriptions and interpretations of this concept, which are given by leading writers in this area of study. For example, Fullan and Hargreaves (1992) wrote in a footnote: "We will not attempt to define the term teacher development at this stage of the chapter. As will become clear we use it both to refer to specific developments through in-service or staff development, as well as to move thorough advances in teachers' sense of purpose, instructional skills and ability to work with colleagues" (pp. 8-9). From the perspective of Evans (2002), Fullan and Hargreaves did not give a definition for the concept of teacher development.

Evans (2002), also cited the interpretation of what Darling-Hammond (1994) called "professional development", as "it is a process of enhancing teaching's professional status by expanding the knowledge base upon which the professional draws, and increasing teachers' epistemological awareness" (Darling-Hammond, 1994, p. 10). However, Evans (2002) thinks that this interpretation of "teacher development" is not explicit enough, and it is therefore only possible to make assumptions.

It seems like that some researchers focus on describing the situations and circumstances of teacher development, rather than giving a definition for this concept (Evans, 2002). For example, Evans (2002) presented the description of "teacher development" given by Grossman (1994), "this has taken a number of different forms, including workshops, study groups, fireside chats, a district-wide colloquium for middle school teachers, action research projects, and conversations with the professor-in-residence...."(Grossman, 1994, p. 58)

Evans (2002) also cited a description by another researcher. Whitford (1994) explained: "Perhaps the most powerful professional development happened as those in PDS (Professional Development Schools) sites planned and experimented with innovative arrangements. As they talked about what they wanted to do, as they designed and refined, they encountered questions and problems. That prompted a great deal of professional reading and conversations with other educators. Thus, much professional development occurred in a learning-by-doing approach"(Whitford, 1994, p. 86).

Although many researchers give descriptions and interpretations of "teacher development", none of them provide an explicit definition of this concept (Evans, 2002). Bell and Gilbert (1994), also provided an illustration of this concept, and their interpretation is much more clear than others. They described teacher development as follows:

"Teacher development can be viewed as teachers learning, rather than as others getting teachers to change. In learning, the teachers were developing their beliefs and ideas, developing their classroom practice, and attending to their feelings associated with changing. Another aspect of the teacher development was the teacher's learning about professional development and changing process, and how they themselves learn… Learning in the teacher development process can be viewed as a purposeful inquiry. The teachers were inquiring or investigating into an aspect of their learning—an aspect that they saw as problematic and wished to change" (Bell and Gilbert, 1994, p. 493).

Besides the interpretation of teacher development, Bell and Gilbert (1994) identified and described three aspects of the teacher development: personal development, professional development and social development:

"The teacher development of the teachers in the research project can be described as personal, social, and professional development. Personal development involved attending to feelings about the change process, being a teacher and about science education. Professional development involved changing concepts and beliefs about science education, and changing classroom activities. Social development involved working with and relating to other teachers and students in new ways. These three aspects were interactive and interdependent. The process of teacher development can be seen as one in which personal, professional, and social development is occurring, and one in which development in one aspect cannot proceed unless the other aspects develop also" (Bell and Gilbert, 1994, pp. 493-494).

According to this interpretation (Bell and Gilbert, 1994), teacher development can be seen as a long-term process rather than a product. Bell and Gilbert (1994) also described some details about teacher development, such as the three aspects of development, the relationship among them, and the main characters of each type of development. Additionally, Bell and Gilbert (1994), regarded teacher development as a process of trying to deal with problems in practice. In other words, teacher development is a process of getting problem-solving abilities in the classroom, as teachers try to change the situation that is problematic from their perspective (Bell and Gilbert, 1994).

This interpretation was not good enough for Evans. She states, "Bell and Gilbert's interpretation appears to be narrow and restrictive" (Evans, 2002, p. 127). In her view, only Day (1999) gave a definition rather than descriptions or interpretations for this concept. Evans (2002) claims that the other researchers should follow this model and give a clear definition of teacher development rather than only trying to describe and interpret this important concept. Day (1999) gave the definition of professional development as follows:

"Professional development consists of all natural learning experiences and those conscious and planned activities which are intended to be of direct or indirect benefit to the individual, group or school and which contribute, through these, to the quality of education in the classroom. It is the process by which, alone and with others, teachers review, renew and extend their commitment as

change agents to the moral purposes of teaching; and by which they acquire and develop critically the knowledge, skills and emotional intelligence essential to good professional thinking, planning and practice with children, young people and colleagues through each phase of their teaching lives" (Day, 1999, p. 4).

By analysing and reviewing the descriptions and interpretations of "teacher development", Evans (2002) found that there were no shared interpretations and definitions about this concept. "The absence of shared understanding is a problem that manifests itself as: threatened construct validity, difficulties in establishing the parameters of the field of study, and difficulties in identifying the teacher development process" (Evans, 2002, p. 128). So, Evans gave her own interpretation and definition of teacher development.

"I interpret teacher development as a process, which may be on-going or which may have occurred and is completed... I also consider teacher development to be a subjective or an objective process, or both. It may be thought of as an internalization process on the part of teachers, or it may be an externally applied process, directly at teachers, but effected by external agencies... My interpretation of 'teachers' is wide and extends to all who carry out professional, recognized teaching roles, including those who work at pre-school level and in the post-compulsory education sector" (Evans, 2002, pp. 130-131).

Evans defined "teacher development" as "the process whereby teachers' professionality and /or professionalism may be considered to be enhanced" (Evans, 2002, p. 131). In fact, this definition is abstract, because it includes two similar and abstract sub-concepts: professionality and professionalism. So, Evans (2002) gave an interpretation of these sub-concepts. She emphasized that her definition of teacher development is influenced by "Hoyle's (1975) identification of two distinct aspects of teachers' professional lives: professionalism and professionality" (Evans, 2002, p. 130). However, Evans (2002), thought "Hoyle does not define these two terms, but he explains his distinction as being between status-related elements of teachers' work, which he categorises as professionalism, and those elements of the job that constitute the knowledge, skills and procedures that teachers use in their work, and which he categories as professionality" (Evans, 2002, p. 130).

Evans defined "professionality" as: "an ideologically-, attitudinally-, intellectually-and epistemologically-based stance on the part of an individual, in relation to the practice of the

profession to which she/ he belongs, and which influences her/his professional practice"(Evans, 2002, p. 130). In her other paper "Professionalism, Professionality and the Development of Education Professionals" (Evans, 2008), she gave a definition of professionalism: "I define professionalism as: professionality-influenced practice that is consistent with commonly-held consensual delineations of a specific profession and that both contributes to and reflects perceptions of the profession's purpose and status and the specific nature, range and levels of service provided by, and expertise prevalent within, the profession, as well as the general ethical code underpinning this practice" (Evans, 2008, p. 29).

This definition of teacher development includes two elements and two dimensions. Evans described the features of this definition:

"With my definition I currently identify two constituent elements of teacher development that relate fundamentally to individual teacher development: attitudinal development and functional development. Each element reflects specific foci of change. I define attitudinal development as: the process whereby teachers' attitude to their work are modified and I define functional development as: the process whereby teachers' professional performance may be improved" (Evans, 2002, p. 131).

"I also identify two dimensions, or forms, of teacher development which represent a combination of range of applicability… These are: role development and cultural development... Role development is: the process whereby the accepted parameters, remits and responsibility of specific recognised specialist professional roles may be redefined and/or modified. And cultural development is: the process whereby teachers' professional culture is redefined and/or modified" (Evans, 2002, p. 132).

This is the definition of teacher development which is offered by Evans. Compared with other descriptions and interpretations of this concept, this one is much clearer because it is a definition rather than a description. However, I think it is still not concise enough, because it includes two abstract sub-concepts: professionality and professionalism, and the interpretations of these two sub-concepts are not explicit enough. Evans (2002) also presented some of her own interpretations of this definition. For example, from her perspective, the concept of "teacher" is broad enough to include all persons who do teaching work, no matter whether the teaching is formal or informal, or if the person is a pre-service teacher or an expert teacher (Evans, 2002).

Besides this, there are also two elements and two dimensions to this definition. The two elements in this definition are attitudinal development and functional development, and the two dimensions are role development and cultural development (Evans, 2002). There are no significant differences between Evans's definition and Bell and Gilbert's, because Bell and Gilbert (1994) have described those features of teacher development in their own discussion of three aspects of development: personal development, professional development and social development. Although Bell and Gilbert do not give a definition of "teacher development", their work incorporates the key components of Evans's definition.

Based on the review of this concept, we can find that, from the perspective of most researchers in this field, teacher development is a process rather than a product. There are a number of changes that emerge in this process, such as changes in attitudes, roles, values, knowledge, professional performance, social adaptation of teachers and so on. In my view, the main problem in this research field is the lack of a detailed understanding about the teacher development process rather than the concept itself. In other words, there is not enough research about how teachers develop and how teachers' performance is enhanced. Of course, giving a clear definition for the concept of teacher development is also very important, but only when we have a clear understanding of the teacher development process, can we give a good interpretation or definition for this concept.

2.2.2 Some Selected Studies about Teacher Development

There has been much written about teacher development, but the researchers approach the topic from different perspectives. However, "the teacher development process-the understanding of precisely what we need to do if we want to develop teachers-remains unclear" (Evans, 2002, p. 133). We know that teacher development is a process rather than a product. In this process new teachers become more experienced teachers from learning by doing. But, how do teachers learn from their teaching activity? There is little understating how this comes about.

Researchers (e.g. Berliner, 1988; Fuller & Bown, 1975; Katz, 1972; Burden, 1980) try to identify the process of teacher development by describing the characteristics of each developmental stage. In other words, they try to build a theory of teacher development. Some researchers (e.g. Berliner, 1988) think teacher development is a process, which includes several different developmental stages, and by going through these stages, teachers' expertise is enhanced. Inspired by Marshall

(publication date unspecified), who summarized the main theories about teacher development, I present a more detailed and richer summary about teacher development. Now I offer a brief review of the main theories of the teacher development process, and with that we can derive a basic understanding of how teaching careers develop.

Based on the "general theory" stage of the development of expertise in the field of artificial intelligence, Berliner (1988), views the development of a teacher as a process that consists five skill stages. Berliner (1988) hypothesizes about the time duration of each stage, and describes the different characteristics of each developmental stage.

In the first developmental stage, the teacher is a "novice" (Berliner, 1988). "Novice teachers are generally students and beginning first-year teachers" (Berliner, 1988, p. 2). According to Berliner (1988), in this stage, the teachers mainly learn basic rules, such as praising the students for good answers, waiting a while after posing a complicated question, encouraging the students to participate in the class activities. Obviously, these rules belong to the theoretical domain of teaching knowledge. The teachers' behaviour is also relatively inflexible, because they just tend to follow the rules (Berliner, 1988). "This is a stage for learning the objective facts and features of situations. It is a stage for gaining experience. And it is the stage at which real-world experience appears to be far more important than verbal information" (Berliner, 1988, p. 3).

The teachers progress to "advanced beginners" in the second stage (Berliner, 1988). "Advanced beginners are often in the second and third years of their teaching careers" (Berliner, 1988, p. 2). In this stage, "experience can become melded with verbal knowledge, similarities across contexts are recognized, and episodic knowledge is built up" (Berliner, 1988, p. 3). As these teachers begin using their experience, they learn when to ignore the rules and when to follow them (Berliner, 1988). Their teaching starts to become guided by practical knowledge (Berliner, 1988). For example, they learn when it is best to praise and when it is best to criticise. Advanced beginners differ from novices in that they synthesize rules from their own experiences as opposed to simply following procedures (Berliner, 1988).

 "If the teachers have any talent and motivation whatsoever, about the third or fourth year", they progress to the third stage and become competent teachers (Berliner, 1988, p. 2). "Competent performers of a skill have two distinguishing characteristics. Firstly, they made conscious choices about what they are going to do… In addition, while enacting their skills, they can determine what

is and what is not important" (Berliner, 1988, p. 4). According to Berliner (1988), in this stage, teachers have reasonable teaching goals and use appropriate methods to realize them. Teachers are able to select a suitable class activity, and find ways to create better class tasks for the students, due to their teaching experiences (Berliner, 1988). They also know when to ignore students talking in the classroom, and when to interrupt them. The progress compared with the first two stages is obvious. They are more flexible, and they are able to control the situation much better (Berliner, 1988). However, he also noted "competent performers are not yet fast, fluid, or flexible in their behaviour" (Berliner, 1988, p. 4).

Teachers in the fourth stage of teacher development are "proficient" (Berliner, 1988). "Perhaps around the fifth year a modest number of teachers may move into a further stage of development, that of proficient" (Berliner, 1988, p. 2). According to Berliner (1988), teachers in this stage are intuitively aware of the class situation. Their wealth of experience equips them with an ability to handle the class situation (Berliner, 1988). For example, the teacher might see that a student will have the same problem in the next class that he had in the previous two classes. It is worth mentioning that the teacher is able to come to this conclusion subconsciously (Berliner, 1988). This ability is similar to being able to ride a bike, as when riding a bicycle, we do not think about how to ride it. For example, you do not need to think about your feet when riding the bicycle. Similarly, teachers at this stage can subconsciously handle the class situation (Berliner, 1988).

The highest, and final, stage of teacher development is the "expert" stage (Berliner, 1988). "If novices, advanced beginners, and competent performers are rational, and proficient performers are intuitive, we might categorize experts as 'arational'"(Berliner, 1988, p. 5). Teachers who reach this stage have an intuitive feeling about the class situation, and are able to respond to class problems automatically (Berliner, 1988). Their teaching performance can be described as very flexible and fluid (Berliner, 1988). Expert teachers know what to do, and how to do it, at the right time, thus they are able to effortlessly handle the class situation (Berliner, 1988).

Berliner (1988) emphasizes that this teacher development theory is derived from related research in the field of artificial intelligence. Therefore, it is debatable whether this theory can be applied to education research (Berliner, 1988). As an individual teacher's development is an individual process, the time needed to progress to the next stage differs for each teacher (Berliner, 1988). Furthermore, different teachers exhibit different characters at the same developmental stage

(Berliner, 1988).

Katz (1972), suggests that teachers go through developmental stages to learn how to teach, because teaching expertise comes with experience and practice. No teacher will think she or he teaches better in the first teaching year compared to the fifth teaching year (Katz, 1972). Katz (1972) categorizes teacher development into four development stages: survival, consolidation, renewal and maturity. She also proposes different characteristics and training needs during the different development stages (Katz, 1972).

The first stage is "survival", which Katz describes as "during this stage, which may last throughout the first full year of teaching, the teacher's main concern is whether or not she can survive" (Katz, 1972, p. 50). Because new teachers have many fears and uncertainties about their work, such as whether they can deal with the class situation well, or whether they can build good relationships with their colleagues and students, the "survival" stage is the most challenging of the whole career (Katz, 1972). "During this period the teacher needs support, understanding, encouragement, reassurance, comfort and guidance" (Katz, 1972, p. 51). Katz (1972) thinks that on-site support and technical assistance are the most important needs of new teachers.

Usually, after one year of teaching practice, a teacher will progress to the consolidation stage (Katz, 1972). Their initial teaching experience enables teachers to switch their attention from survival to dealing with class problems (Katz, 1972). "During stage II, teachers usually begin to focus on individual problem children and problem situations" (Katz, 1972, p. 51). While teachers acquire basic information about a class during the survival stage, in the second stage, they can go further and identify misbehaviour by individual children (Katz, 1972). "During this stage, on-site help continues to be valuable" (Katz, 1972, p. 52). Trainers are able to help the teachers deal with class problems, and thus improve the teachers' problem solving abilities (Katz, 1972).

The stage of consolidation is followed by the third stage of teachers' development, the renewal stage (Katz, 1972). "Often, during the third or fourth year of teaching, teachers begin to tire of doing the same old things. They start to ask more questions about new developments in the field" (Katz, 1972, p. 52) such as, "Are there some new ways to make the class be more interesting? What should I do in order to attract the students' attention to class?" Because they are not content with their present achievements, they are exploring new approaches (Katz, 1972). "Teachers in this developmental stage are particularly receptive to experiences in regional and national conferences and workshops

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and profit from membership in professional associations and participation in their meetings" (Katz, 1972, p. 52).

The "maturity" stage is the final stage of Katz' teacher development theory. "Maturity may be reached by some teachers within three years, by others in five or more. The teacher at this stage has come to terms with herself as a teacher" (Katz, 1972, p. 53). In this developmental stage, teachers "begin to ask some deeper and more abstract questions" (Katz, 1972, p. 53) about their teaching. For example, "What is the nature of growth and learning? What are my historical and philosophical roots?" (Katz, 1972, p. 53) A teacher might have asked these questions during earlier developmental stages, however, after five years or even longer teaching practice, he or she is now able to give more meaningful and insightful answers to these questions (Katz, 1972). Though this is the final stage, opportunities to interact with educators is still very meaningful for the teachers' career development (Katz, 1972).

One of the reasons Katz' theory focuses on teacher training is that she tried to design new forms of teacher's training, by identifying the teacher development process (Katz, 1972). Generally speaking, most of the studies in this research area focus on teacher training, and teacher professional development programs. Katz (1972) also analysed the main characters of each development stage, although without much detail.

Fuller & Bown (1975), initially proposed a development model comprising six stages. After the first revision, they proposed three development stages, and after another revision, they proposed four teacher development stages.

(1). The original model of teacher development

The initial model Fuller, Pilgrim and Freeland presented in 1967 introduced six stages of teacher development, which were derived from the main concerns of student teachers being in their teaching practice. The six developmental stages ask: "Where do I stand? How adequate am I? Why do they do that? How do you think I'm doing? How are they doing? Who am I?" (Fuller, Pilgrim & Freeland, 1967, pp. 10-14). By analysing these questions, they identified the teacher development process and described the characteristics of each stage.

In the first stage, "student teachers are concerned with the coming student teaching situation and their position in it" (Fuller, Pilgrim & Freeland, 1967, p. 10). The student teachers try to understand the principles of the new teaching environment (Fuller, Pilgrim & Freeland, 1967). They need to adjust to, and find security in the new school situation, for example, student teachers not only need to become familiar with their teaching task, but also with the administrative rules of the school (Fuller, Pilgrim & Freeland, 1967). This stage is very difficult for student teachers.

According to this theory (Fuller, Pilgrim & Freeland, 1967), student teachers have two main concerns in the second stage. "One concern is with subject matter adequacy", such as when student teachers are unclear about some subject questions (Fuller, Pilgrim & Freeland, 1967, p. 11). Occasionally, they have to say, "I do not know" (Fuller, Pilgrim & Freeland, 1967, p. 11). The other important concern is about class management, which is the most common problem in class (Fuller, Pilgrim & Freeland, 1967).

At the third stage, "student teachers are concerned with individual students, generally the 'problem' students and their strange behaviour" (Fuller, Pilgrim & Freeland, 1967, p. 12). They ask the question, "Why do they do that?" and analyse the reasons behind their behaviour (Fuller, Pilgrim & Freeland, 1967, p. 12). During this stage, student teachers try to establish a norm for behaviour during class, "what is usual", and "what is strange" (Fuller, Pilgrim & Freeland, 1967, p. 17). They also realize that they have to take the students into account as individuals, because the same action has a different effect on different children (Fuller, Pilgrim & Freeland, 1967).

During the fourth stage "some students merely worried about their student teaching grade, but most tried to discern how parents, supervising teachers, principles and others were evaluating them" (Fuller, Pilgrim & Freeland, 1967, p. 12). In this stage, student teachers are concerned about how others evaluate them, because evaluation is important to their teaching practice. With feedback from others, the student teachers can obtain a clear understanding of their teaching activities, and develop new goals for themselves and their classes (Fuller, Pilgrim & Freeland, 1967).

At the fifth developmental stage "student teachers are concerned with what the pupils they taught were actually learning as distinguished from what they believed themselves to be teaching" (Fuller, Pilgrim & Freeland, 1967, p. 13). In earlier stages of teacher development, student teachers seldom ask, "Will the class remember that?" (p. 13), because they are more concerned with the school

environment, and the evaluation from their supervisors, rather than the children's learning (Fuller, Pilgrim & Freeland, 1967). Only when they reached this stage are they more concerned with how children are learning (Fuller, Pilgrim & Freeland, 1967). Teachers in this stage try to reflect on their teaching, and to evaluate their teaching quality by understanding how children are learning (Fuller, Pilgrim & Freeland, 1967). As their ability to do so improves, they adjust their teaching plans to meet the different requirements of the children (Fuller, Pilgrim & Freeland, 1967).

The defining question of the sixth stage is, "Who am I?" (Fuller, Pilgrim & Freeland, 1967, p. 14) "To know oneself requires first deciding how much self-knowledge one can bear" (Fuller, Pilgrim & Freeland, 1967, p. 15). Fuller, Pilgrim and Freeland (1967) argue that the question "Who am I?" (p. 14) cannot be posed by student teachers during the early developmental stages because, at this stage, the teachers are not concerned about that. Student teachers, at this stage do not realize the roles they play in the class, and their interactive status between them and the children (Fuller, Pilgrim & Freeland, 1967). They are in some kind of unconscious status during the sixth stage (Fuller, Pilgrim & Freeland, 1967). For external observers, like supervisors or colleagues, though, it is apparent what happens between student teachers and the children in class, and what kind of roles the student teachers adopt when they interact with the children (Fuller, Pilgrim & Freeland, 1967).

(2). The three-stage model of teacher development

Fuller (1969) refined the model of teacher development into three-stages. The basis of this model is interviews with student teachers, and written statements answering the question, "What you are concerned about now" (Fuller, 1969, p. 214). From this data, Fuller classifies student teachers' responses into three categories: "(1) Where do I stand? How adequate am I? How do others think I'm doing? (2) Problem behaviour of pupils. Class control. Why do they do that? (3) Are pupils learning? How does what I do affect their gain?" (Fuller, 1969, p. 214) These results suggest a three-phase teacher development model, with a pre-teaching phase, an early teaching phase, and a later teaching phase (Fuller, 1969).

According to Fuller (1969), during the pre-teaching phase student teachers have almost no concern about teaching. "These students rarely had specific concerns related to teaching itself, and the teaching-related concerns they did express were usually amorphous and vague: anticipation or apprehension" (Fuller, 1969, p. 219). Most of the student teachers in the pre-teaching phase think about teaching according to their own experience as students in school (Fuller, 1969). Therefore,

"this pre-teaching period seemed to be a period of non-concern with the specifics of teaching, or at least a period of relatively low involvement in teaching" (Fuller, 1969, p. 219).

During the early teaching phase, student teachers are more concerned about themselves, consisting of two parts: covert concerns and overt concerns (Fuller, 1969). Concerns that student teachers only express when among other student teachers are covert, "but these concerns were rarely expressed in either written statements or in routine interviews unless directly elicited" (Fuller, 1969, p. 220). Fuller (1969) suggests that teachers in this stage are (covertly) concerned with their teaching performance and evaluation from their supervisors and others. They are worried about building good working relationships with others in school, and how to present themselves in order to be accepted as professionals by others (Fuller, 1969).

The overt concerns can be partly characterized by the question: "how adequate am I? The concern student teachers feel about class control is no secret; it is a blatant and persistent concern of most beginning teachers" (Fuller, 1969, p. 220). Overt concerns also include subject matters, because they must reply, "I do not know", to students if they do not know the answer to their question (Fuller, 1969, p. 220). Student teachers need to learn to fail, and to correct their mistakes when they do not give correct answers (Fuller, 1969).

The student teachers' attention shifts, from themselves to pupils, in the third developmental stage (Fuller, 1969). Instead of measuring their success by consulting the evaluation of their supervisors and others, they pay attention to the achievements of their pupils, and measure their successes by the pupils' progress (Fuller, 1969). The specific concerns of student teachers in this stage are "about ability to understand pupils' capacities, to specify objectives for them, to assess their gain, to partial out one's own contribution to pupils' difficulties and gain and to evaluate oneself in terms of pupil gain" (Fuller, 1969, p. 221).

(3). The four-stage teacher development model

Based on the original, and the three-stage teacher development model, Fuller and Bown (1975) presented a new four-stage teacher developmental model by identifying the teachers' concerns: "survival concerns, teaching situation concerns and pupil concerns" (p. 37). Survival concerns are about "one's adequacy and survival as a teacher" (Fuller & Bown, 1975, p. 37), teaching situation concerns are teachers' worries about teaching itself (such as class control and working pressure),

and pupil concerns "are about recognizing the social and emotional needs of pupils" (Fuller & Bown, 1975, p. 37). Pupil concerns are also about treating every student fair, and meeting the special needs of individual students (Fuller & Bown, 1975). "These stages, if such they are, have been described mainly in terms of what the teacher is concerned about rather than what she is actually accomplishing" (Fuller & Bown, 1975, p. 37). In contrast to the previous models, this new model emphasizes the student teachers' concerns, rather than what they actually accomplish (Fuller & Bown, 1975).

In the first stage, "education students who have never taught are concerned about pupils, that is, about themselves" (Fuller & Bown, 1975, p. 38). Maybe they also want to analyse the pupils, but only "in fantasy", because they do not have experience about real teaching situations (Fuller & Bown, 1975, p. 38). Their impression of teaching is based mainly on their own experience as pupils in school (Fuller & Bown, 1975). The students' concerns are ambivalent in the pre-teaching stage, on the one hand, they want to analyse the students, but on the other hand, they are afraid of the reality of teaching (Fuller & Bown, 1975).

The student teachers progress to the second developmental stage after having real contact with teaching (Fuller & Bown, 1975). "Their idealized concerns about pupils are replaced by concerns about their own survival as teachers"(Fuller & Bown, 1975, p. 38). They are worried about their teaching career. "Most intense are concerns about class control" (Fuller & Bown, 1975, p. 39). Other concerns are about, e.g., evaluations from their supervisors, and the content of the subject to be taught to the students (Fuller & Bown, 1975).

The third developmental stage is characterized by the teachers' concerns "about limitations and frustrations in the teaching situation, about the varied demands made on them to teach, not just survive, are added on to self-survival concerns" (Fuller & Bown, 1975, p. 39). In this period, they are mainly focusing on handling various teaching situations (Fuller & Bown, 1975). However, "these are still concerns about their own performance, their teaching performance, not concern about pupils and their learning" (Fuller & Bown, 1975, p. 39).

Instead of focusing on themselves, student teachers are mainly focusing on pupils' needs in the fourth stage (Fuller & Bown, 1975). Since they already acquired knowledge about how to survive in class, and how to handle the class situation, in this stage the "pre-service teachers express deep

concerns about pupils, their learning, their social and emotional needs, and relating to pupils as individuals" (Fuller & Bown, 1975, p. 39).

Burden (1980) also identifies teachers' development processes in his study "Teachers' Perception of the Characteristics and Influences on their Personal and Professional Development". In this study, deep interviews with fifteen teachers were conducted in order to reveal their perceptions about career development (Burden, 1980). "The teachers' perceptions of their developmental characteristics were organized into three categories: (1) personal characteristics, (2) professional characteristics, and (3) the interaction between personal life and professional life" (Burden, 1980, p. 5). In the interviews, the teachers mostly talk about the characteristics of their professional development (Burden, 1980).

Burden (1980) suggests that the teachers' characteristics change a lot across their teaching careers. Based on the information the teachers supplied, Burden (1980) categorized the main changes in their professional development. There are seven main categories of professional characteristics for teacher development: "(1) Knowledge of teaching activities, (2) knowledge of teaching environment, (3) changing images about teaching, (4) professional insight and perception, (5) approach to curriculum and instruction, (6) professional confidence, security and maturity, and (7) willingness to try new teaching methods"(Burden, 1980, pp. 6-7). Furthermore, these changes can themselves be categorized into three stages of teacher development (Burden, 1980).

Burden (1980) suggests that the three stages are completed linearly with time. The first stage corresponds to the first teaching year, the second stage corresponds to the three ensuing teaching years, and the third stage is reached in the fifth teaching year, and beyond (Burden, 1980). During their career, teachers change a lot. "The changes seemed to occur in ordered, hierarchical sequences, with each year characterized by different changes, the changes occurring gradually and cumulatively" (Burden, 1980, p. 14). The relationship among these changes can be seen as: "(1) An increase in knowledge, leading to (2) a change in attitude, which (3) increased ability, leading to (4) changes in job performance" (Burden, 1980, p. 14). This is not meant to imply automatic progress; each step of each developmental stage has to be completed before the next stage is reached (Burden, 1980).

In the first teaching year, and thus in the first stage, the most distinct character trait of teachers is

deficiency and uncertainty, because the novice teachers lack teaching expertise (Burden, 1980). They only have "limited knowledge of teaching activities and environment, and limited professional insight and perception" (Burden, 1980, p. 15). They "conformed to an image they held of teachers", and hold a "subject-cantered approach to curriculum and instruction"(Burden, 1980, p. 15). Because of feelings of "uncertainty, confusion, and insecurity", they are "unwilling to try new teaching methods" (Burden, 1980, p. 15).

 In the second developmental stage, seven categories of characteristics can be identified. All characteristics developed during the second stage are due to the teaching practice (Burden, 1980). Because of the "Increased knowledge of teaching activities and teaching environment", the teachers "gradually abandon the image they held of teachers", and "start to see the child as a person"(Burden, 1980, pp. 17-18). They "gradually gain more professional insights and perceptions"(Burden, 1980, p. 18). The teachers are also "gaining confidence, security and maturity", and are "willing to experiment with new teaching techniques"(Burden, 1980, p. 18).

The seven categories of professional characteristics are further developed in the third stage, as teachers become more experienced (Burden, 1980). The teachers acquire more knowledge about the teaching environment and teaching activities (Burden, 1980). They are "continuing to abandon the image they held of teachers, and gain more professional insight and perception", while at the same time, they fill with "confidence, security and maturity" (Burden, 1980, p. 20). More experienced teachers continue to experiment with new teaching methods, and take the child-cantered teaching approach (Burden, 1980).

Obviously, all these characteristics are connected to each other. Some of them are reasons, which cause development in some of teachers' professional characteristics. On the other hand, some of these characteristics are influenced by other characteristics. For example, teachers have "the feelings of uncertainty, confusion and insecurity" because of their "limited knowledge of the teaching environment and limited professional insight" regarding teaching (Burden, 1980, p. 15). Similarly, their "limited knowledge of teaching activities" leads to the result that they are "unwilling to try new teaching methods" and want to use the "subject-centered approach to curriculum and instruction" (Burden, 1980, p. 15). Therefore, a teacher's professional development is a complicated map, which includes several different, but mixed elements. Because of their interdependence, it is impossible to distinguish some of the characteristics from others. The real

situation of a teacher's development is described by the entire map.

Kugel (1993), in his paper titled "How Professors Develop as Teachers" makes an account of the development process of teaching ability of professors. He proposes five developmental stages for professors to complete before they become good college teachers. Kugel (1993) calls the five stages "self, subject, student as receptive, student as active, and student as independent" (p. 315). Obviously, this account is on the basis of what college teachers are concerned about in their teaching life.

In the first of the five stages, professors are mainly concerned about themselves as teachers (Kugel, 1993). Like schoolteachers, college teachers are worried about how to survive in class, because they know a lot about the subject they are supposed to teach, but much less about how to teach it (Kugel, 1993). They worry about whether the students can follow their way of teaching, whether they speak clearly enough in class, and so on (Kugel, 1993).

According to Kugel (1993), in the second developmental stage, professors are mainly focusing on the subject they teach, and not so much about themselves. They shift their concerns to the subject because after getting some teaching experience, the professors feel comfortable about the way they present themselves in the classroom (Kugel, 1993). For example, they will ask themselves questions like: Do the students finish their assigned homework? Do they understand what I am talking about in class?

In the third stage, a professor's concern is switched from teaching the subject to the student (Kugel, 1993). They want to know whether the students, as recipients of information, really understand what they should learn, and what they should ignore (Kugel, 1993). It is very important to professors that the students absorb the information that they have to learn.

However, after gaining more experience, professors find that individual students are different and also have different needs (Kugel, 1993). Therefore, in the fourth stage, they are more concerned about how to help students learn that in which they are interested, and how to treat them as active learners rather than passive listeners (Kugel, 1993). "As the professors' views of how to teach change, their views of what to teach may also change. They may decide that it is more important that students learn how to think, than learn what to think"(Kugel, 1993, p. 323).

In the fifth stage, the professors' main concern is to try and cultivate the students to become independent learners (Kugel, 1993). They take measures to improve the students' independent learning ability, because making the students become independent learners is the aim of the college education (Kugel, 1993).

In their study "A Life-cycle Model for Career Teachers" Steffy and Wolfe (2001) identified "the process of how one continues to grow and become a more competent career teacher along the continuum of practice," by presenting a six phase teacher development theory: "the novice phase, the apprentice phase, the professional phase, the expert phase, the distinguished phase and the emeritus phase" (pp. 16-17). This theory, like others, presents specific characters for each developmental stage, but in contrast to other theories, it focuses on the whole career life of teachers instead of only on the process from novice to expert. They additionally explored how a teacher, in a certain phase, learns and introduces the teachers' reflective learning process: "the reflection-renewal-growth cycle" (Steffy & Wolfe, 2001, p. 18).

The theories presented above are the main theories in the field of teacher development. Most of them were formulated by American researchers. Consequently, most of these theories are based on the American teacher education system. We can find that most of these theories have been presented in the last century and are well established. A reason for the dominance of American theories in the field might be that the teacher training systems or programs in each state of the United States have been relatively similar during the last half-century. There are also some cross-country teacher training programs in the United States. Performance-based teacher education (PBTE) is one of them (Zeichner, 2005). The performance-based teacher education approach played a dominated role in teacher training programs in 1970s, and even had a lasting strong influence in the later years in the United States (Zeichner, 2005). During that period, almost all teacher training projects were asked to use performance-based teacher education (PBTE) as guidance (Zeichner, 2005). PBTE incorporates system theories in their teacher training designs to promote teachers' teaching competences (Zeichner, 2005). Performance-based teacher education also presents some specific categories of teaching competences and outlines the development steps of teachers (Zeichner, 2005). PBTE has been further developed during the last several years, and "the recent re-emergence of performance-based teacher education is the fact that what is going on today in most programs in the United States is not new" (Zeichner, 2005, p. 6). Maybe due to the fact that the teacher training programs include stages, US educational researchers tend to divide the whole teacher development into stages and present models by describing the characteristics of each developmental stage.

In other countries, such as Germany for example, we can hardly find a "German system" of teacher education, as there is much variation in the teacher education system. In Germany, the teacher education system varies from state to state, although all teachers have to go through the same two educational phases. The first phase of teacher education is set in university and finishes with a master's degree. The second phase is a practical training at teacher seminars and schools, which lasts for two years for middle school teachers and one year for primary school teachers in some states. The second teacher education stage is called Referendariat, and it is ended with the second national exam. The structure and content of the teacher training programs differ from state to state within Germany, because education is a matter regulated by each federal state individually. This wide variation might be the reason why there are not as many systematic teacher development models in Germany as in the United States. This is maybe why many of the systematic teacher development theories are from the United States.

As the teacher training systems vary in different countries, caution might need to be exercised if we try to take the theories based on the American teacher training system to explain how the teachers in other countries develop during their career life. However, there are some general factors in the development of teachers which they all have in common. For example, all teachers develop from being a novice to being more experienced; all of them acquire teaching knowledge and competence from their practice; their teaching performance changes over time; their teaching belief and attitude towards teaching also change during teaching.

In other words, teachers in various countries experience something in common during their career life, although the teacher training systems might be very different. After entering the real class, most new teachers notice that the real class situation is different from what they had expected, and they find it a big challenge to "survive" in class and to teach. Novice teachers attempt to use the knowledge they have learned in university to cope with the class situation, however, most of them find the theoretical knowledge that they obtained does not work in practice. So they try to reflect on their practice and acquire some practical knowledge from their own experience. Due to their practical experiences, teachers perform better than before. They try to abandon the old teaching methods and find some more suitable teaching strategies from their own practice. Some teachers even get some kind of intuition of teaching. This shows that the basic framework for the career development process is very similar for each teacher. Therefore, these American education system based teacher development theories can still outline the fundamental process of teacher

development.

Beside the main theories of teacher development, researchers have presented more related theories from different perspectives. For example, Christensen et al. (1983) identified three stages during the teacher development process: the early years, the middle years and the later years. This model is not based on empirical research results, but on the reviewing of related literature, such as Fuller & Bown (1975) and Burden (1980)'s teacher development models. Bell & Gilbert (1994) found that teacher development involves three different dimensions: professional development, personal development and social development. For them, teacher development is the mixture of these three dimensions (Bell & Gilbert, 1994). In order to have a better understanding of a teacher's change, Anderson (1997) made a review on the concerns based teacher development model. Anderson (1997) suggests that the future research should pay more attention to refining the concerns based teacher development model rather than just applying it. Dall'Alba & Sandberg (2006) also gave a critical review on the existing stage models of teacher development. Based on their critiques, they presented an alternative model, which absorbed the strengths of the previous models but tried to overcome their limitations (Dall'Alba & Sandberg, 2006).

2.2.3 Summary

The theories of teacher development discussed above present how teachers develop during their career life by describing their changes of professional characteristics over time. Almost all of them describe the teacher's development by dividing the whole process into stages. Some of them (e.g. Berliner, 1988 & Katz, 1972) label the different stages with names such as the novice, advanced beginner and expert stage. They (e.g. Berliner, 1988) also hypothesize the time duration of each stage, for example, the novice stage lasts for almost one teaching year, and the advanced beginner stage is the second or third teaching year. Some of them (e.g. Burden, 1980 & Berliner, 1988) describe the changes of the teacher's professional characteristics, such as their knowledge of teaching, their ability of understanding the teaching environment, and their insight of teaching activities. And others (e.g. Fuller & Bown, 1975) focus on what teachers are concerned about and how their concerns change during their career development.

Although the presented teacher development models look at the phenomenon from different per-

spectives, they all have something in common. Most of them hold the opinion that teachers learn from their teaching practice and acquire some kind of teaching ability from their experiences over time. This kind of teaching expertise guides the teachers' teaching performances to be intuitive and automatic. But how do teachers acquire this kind of teaching expertise over time? Most of the theories do not identify the learning process of teachers; instead, they divide the whole development process into stages and describe the characteristics of each developmental stage. From some of the reviews (e.g. Anderson, 1997; Dall'Alba & Sandberg, 2006) about teacher development theories, we can find that most researchers in this field focus on applying the previous theories in order to create a relatively new model on the basis of existing models. Only very few (e.g. Steffy & Wolfe, 2001) are concerned with the teachers' learning processes behind the developmental stages and explore how teachers evolve from one developmental stage to the next one. In other words, most researchers try to describe the changes of teacher development, but do not identify and present how these changes happen. They claim that teachers acquire teaching expertise from their experience, but they do not present how teachers develop this expertise.

As some of them consider (e.g. Berliner, 1988), becoming an experienced teacher comes along with developing the following new characteristics: the teachers' teaching activities become intuitive and automatic, they know when to ignore situations and when to take actions in class. It seems like experienced teachers acquire some intuition or knowledge about how to teach, and this knowledge guides their teaching to be intuitive. However, some researchers (e.g. Shim & Roth, 2007) found that experienced teachers have limited ability to articulate this kind of intuition, although they know how to use this knowledge to take actions properly. This is due to the character of this kind of knowledge, as what one knows is more than what one can tell (Polanyi, 1967). This kind of knowledge is called tacit knowledge and we cannot articulate it with language (Polanyi, 1962).

We all know that teachers will get some kind of ability from their teaching experience, which leads to the good teaching performance in class. But the problem is how do they get this kind of ability? And what are the developmental steps towards this tacit teaching knowledge. In Evans' words: "in the field of teacher development, though, processes are, in general, more neglected. Certainly, there are models available of the stages and/or dimensions involved in professional development, but these tend not to identify the precise process whereby teachers progress from one stage to the next" (Evans, 2002, p. 133).

As a consequence of the above findings, the main research purpose of this study is an attempt to fill the described gap by giving a relatively detailed description of the teacher development process. Therefore, I try to explore how a pre-service teacher acquires her tacit knowledge over time. In this way, that is the aim, we can gain a clearer understanding of the teacher development process.

3. Research Design and Methodology

3.1 Research Method

This research focuses on this question: How does a pre-service teacher acquire a tacit knowledge of teaching in her professional development?

To answer this question, this study took a case study approach. "The case study approach was selected because of its suitability for studying people engaged in real-life activities in context" (Samarawickrema & Stacey, 2007, p. 316). This research approach enables the study of highly context related phenomena. Yin (2009) thinks the case study design is especially appropriate for dealing with the questions of "how and why," as other research methods cannot reach this degree of focus as well as case study approach.

The aim of this study is to identify the development of tacit knowledge by describing the teacher's professional development process, and recording how she develops over a period of time. Obviously, therefore, this research tries to answer the question of "how and why". Besides this, the study focuses on exploring highly context related real life phenomena, as each teacher is an individual, her or his development process is also an individual case. So, case study design is the best choice for this research.

But, what is the case study research method? There are definitions about the case study research method, but "the most frequently encountered definitions of case studies have merely repeated the types of topics to which case studies have been applied"(Yin, 2009, p. 17). So, Yin (2009) gave a new definition of case study research, which includes two parts. "The first part begins with the scope of the case study: 1. A case study is an empirical inquiry that investigates a contemporary phenomenon in depth, and within its real-life context, especially when the boundaries between the phenomenon and its context are not clearly evident. The second part of the technical definition of case study is: 2. The case study inquiry copes with a technically distinctive situation in which there will be many more variables than data points, and as one result relies on multiple sources, with data needing to converge in a triangulating fashion, and as another result, benefits from the prior development of theoretical propositions to guide data collection and analysis" (Yin, 2009, p. 18).

Generally speaking, we can distinguish between two kinds of case study designs: a single case design, and a multiple case design (Yin, 2009). If a case study research includes only one case, it is single-case design, and if there is more than one case, it uses a multiple-case design (Yin, 2009). "When you have the choice (and resources), multiple-case designs may be preferred over single-case designs" (Yin, 2009, p. 60), as "your chances of doing a good case study will be better than using a single-case design" (Yin, 2009, p. 61). For example, if you have two cases, "you have the possibility of direct replication. An analytic conclusion arising independently from two cases, as with two experiments, will be more powerful than that coming from a single case (or single experiments) alone"(Yin, 2009, p. 61). However, for some specific research questions, there are a lot of restrictions on case study research. In other words, the researcher has no chance to use multiple-case designs in some kinds of study. For example, for some kinds of study, it is very difficult to find research participants, or the participants decide to give up participating in the research, and so on. In these situations, the multiple-case designs cannot be used in case study research.

Yin thinks "the single-case design is eminently justifiable under certain conditions: where the case design represents (a) a critical test of existing theory, (b) a rare or unique circumstance, or (c) a representative or typical case, or where the case serves a (d) revelatory, or (e) longitudinal purpose"(Yin, 2009, p. 52). These five conditions are the major reasons researchers do the single case study (Yin, 2009). The reasons why I conducted a single case study design in this research are diverse.

Firstly, the single case design is unique, as it is highly context-related, which is also the main reason why I chose to conduct a single case design in this study. There are several different elements, which decide the individual development of a teacher, such as the number of the students, the sex ratio of the students, their social background, the location of the school, the academic level of the teacher, the subject the teacher teaches, the teacher herself, and so on. Therefore, every case is unique, because you cannot find two cases which are the same, or even very similar. This leads to different research results for every research participant.

As the case itself is unique, and there were too many context-related elements in each individual case, it would not make much sense to do any comparison among different cases, even if I did a multiple case designs in this study, because there are too many variables in every unique case, and

the research result from multiple case designs would be also different. Therefore, it would be better to conduct a single, but profound, case study for this research question. That is why I decided to conduct a single case design, rather than multiple case designs, at the beginning of this study.

Besides this, this study belongs to longitudinal case, as I recorded and described the development of the pre-service teacher in one academic year. Therefore, it reduces the possibility for multiple case designs, that is, collecting and analyzing the data from multiple cases. Thirdly, this single case design is revelatory, because it is very difficult to find the research participant. Most of the pre-service teachers did not want to participate in this study, as they did not want to be videotaped in their class. In his study, Pille (2014) also showed that it was very difficult to find pre-service teachers as research participants in Germany, as most of them did not want to be videotaped. Another reason why they did not volunteer is the time it took to collect the research data. Normally, after videography, I still needed at least one hour to conduct the interview with the participant, which made the situation worse. This is the main reason why four of my participants decided to quit after one month.

3.2 The Research Participant

The study's participant is a pre-service teacher in a middle school in Berlin. This middle school is especially focused on physical education; therefore, the students have athletic courses everyday. The research participant received a master's degree in education, and taught two subjects (English and History) at this school. I visited her English class nearly once a month. They are ninth-grade students, in this class, there were twenty-one students, and only two of them were girls.

The meaning of "pre-service teacher" differs in various countries. In Germany, a pre-service teacher is called a "Referendar," or "Referendarin," which means university graduates must obtain a master's degree before participating in the teacher-training program (Referendariat). This master's degree is equivalent to the first national exam, which is the standard examination before the Bologna reform. Those students who receive a master's degree are allowed to participate in the teacher-training program, two years for middle school teachers, and one year for primary school teachers. After finishing the teacher-training program, the pre-service teachers have to take the second national exam. Only those Referendare who pass the second national exam are allowed to work as a fully responsible teacher.

The pre-service teacher participated in this study from April 2013, to May 2014. From April, 2013, to June, 2013, I conducted pilot research, and beginning Sept, 2013, I carried out the formal research of this study. The formal field research lasted for one academic year, from Sept. 06, 2013 to May. 16, 2014. Except for some special cases, such as when the research participant was sick or she had public courses, I collected the research data once a month. The following is the data collection timetable:

Number	Time
1	Sep.06,2013
2	Oct.25,2013
3	Nov.15,2013
4	Jan.17,2014
5	Feb.28,2014
6	Mar.21,2014
7	May.16,2014

3.3 Data Collection Methods

This research aims to identify the development of "tacit knowledge". Due to the specificity of tacit knowledge, one cannot articulate it. However, one can observe the natural setting in which this kind of knowledge is used, as "the experience is best described, not with words, but by embodied responses, practices, sensory perceptions, and tones or climates of feeling" (Raingruber, 2003, p. 1168). Therefore, videography is used in this study because it can record the natural work setting of the research participant, and present how the participant works in this setting. The related research results also prove that it is very effective to "use video to record and transmit tacit knowledge in creative practice" (Wood, 2014, p. 3), as videotape can record the details of practical experience, and the researchers can obtain more information about the practical working process from videos than from other methods.

Besides video, I also conducted interviews to reveal and present how the research participant works in her natural work setting, as one cannot glean all that information from videos alone. With interviews, one can acquire more detailed information behind the videos, such as the reasons why

she took some measures, and the feelings of the research participant at certain moments. However, the interview method for this study was not a traditional interview conducted by the researcher, with some planned questions, but is called "video-cued narrative reflection" (Raingruber, 2003). It is "one specific type of phenomenology, which makes use of participant interpretation of videotaped interactions; this video-cued approach brings experience to life and simultaneously allows the participants interpreting the video to stop and reflect on what is most significant"(Raingruber, 2003, pp. 1155-1156).

Video-cued narrative reflection "is based on the assumption that the involved participants best understand their own lived experiences" (Raingruber, 2003, p. 1164), as the related research (e.g. Rhodes, Hill, Thompson, and Elliott, 1994; Raingruber, 2003) proves that the response of persons who self-identify are much deeper and cover all important points, in contrast to answers stemming from researcher-controlled interviews, which are more superficial. In my pilot study, I also found responses from researcher-controlled interviews were relatively scant and superficial. Therefore, I decided to let the participant herself identify and interpret her own experience by watching the videos.

The main characteristic of this interview method is it's participant-centered (Raingruber, 2003). After recording the videos, the researcher interviews the participant by watching the videos together. However, this interview is participant-controlled, rather than researcher-directed, as, during the interview, the participant, instead of the researcher, "views the video and self-identifies meaningful moments, stopping the video to reflect on the significance of those moments" (Raingruber, 2003, p. 1156). The participants can decide how long the interview lasts because they are free to talk as long as they want. By taking the "video-cued narrative reflection" as a research method, Raingruber found that this method "was effective in accessing tacit understandings, embodied responses, skilled practices, and qualitative distinctions that would not have shown up to the same degree using another research approach" (Raingruber, 2003, p. 1165).

In her research, Raingruber (2003) combined video with a cued-recall interview, which means the participant is videotaped when interpreting the videos. However, in my study, I made some changes to this research method because of some specific situations and restrictions. I did not videotape the interview process due to technical restrictions, and I also asked some prompting questions during the interview process in order to let the participant tell me more about the videos, such as "what do you think of that"? "Can you tell me more about that"?

3.4 The Interview Process

Immediately after recording the video, I met individually with the participant to do the video-cued narrative reflection. I let the participant watch the video and describe what happened in her class. She could stop the video at any time to describe her teaching, and tell me her feelings about the class. If necessary, she could also tell me something about the background of the students in the class. During the interview, I did not give her any suggestions about how to interpret the videos; I just let her tell me in her own words.

Sometimes, I needed to direct the attention of the pre-service teacher to the video itself, if she strayed off-topic. Therefore, it is a semi-structured interview; since the goal of the interview "is to direct the participant's attention toward the task of describing the structure of the work domain" (Wood, 1997, p. 52), the researcher "must enable the participant to describe the work practice in a natural way" (Wood, 1997, pp. 52-53), and he or she "should also guide the general direction and flow of the interview, while letting the participant freely and naturally express her/his conceptualization of it" (Wood, 1997, p. 53).

During all the interviews, the participant never told me that the videos were different from the real class, or that the camera made her uncomfortable or nervous. The participant herself determined how long the interview lasted because she was free to talk as long as she wanted. All I did was let the participant feel comfortable, and free to interpret the videos from her perspective, and present as much information as possible.

3.5 Data Analysis Methods (Documentary Method)

The "Documentary Method" originated from Karl Mannheim and was developed by Ralf Bohnsack. In the 1920s, Mannheim presented the documentary method as an approach to social science with his draft of the "Documentary Method of Interpretation", which still has significant influence today (Bohnsack, 2014). Later, in the 1950s and 1960s, Harold Garfinkel brought the documentary method back into the social scientific discourse, as he realized the importance of documentary methods as a method to both social science and daily-life procedures (Bohnsack, 2014). Although

Karl Mannheim and Harold Garfinkel both realized the importance of the documentary method, neither of them understood it as a method to guide empirical research (Bohnsack, 2014). In other words, "for Garfinkel as well as for Karl Mannheim, the Documentary Method was significant as a methodological concept in the context of discourse concerning the epistemological substantiation of the social science" (Bohnsack, 2014, p. 217) rather than as a method to guide empirical research.

In the 1980s, Ralf Bohnsack affirmed the value of documentary method in empirical research, and developed it as both a methodology and a method for social science research (Bohnsack, 2014). "Originally, it was used in the context of group discussion and the analysis of talk, but soon it was adopted for the interpretation of a great variety of texts, especially biographical interviews, but also for guided interviews, the interpretation of field notes from participant observation and for the interpretation of pictures and in video analysis" (Bohnsack, 2014, pp. 217-218). As a research method, the documentary method is widely used in a broad of research fields, such as education, migration, organization and cultures, social work, medical work, childhood and human development and so on (Bohnsack, 2014).

3.5.1 Communicative and Conjunctive Knowledge

In order to understand the documentary method, we must understand some important concepts of Mannheim's sociology of knowledge. There are two layers of knowledge that must be understood, as from the perspective of Mannheim (1982) these two kinds of knowledge constitute the structure of duality in our life. The two layers of knowledge are "communicative" and "conjunctive" knowledge (Mannheim, 1982).

In order to explain that more specifically, Bohnsack (2014) took the example of family in this context. The concept of family is relatively independent between different cultures and countries, however, there are some common elements of this concept between different families, such as the number of family members, traditions, religion and income (Bohnsack, 2014). In the context of the documentary method (Bohnsack, 2014), these general components of family can be called communicative knowledge. For other elements in a family, such as the understanding between family members, the common sense and experiences between family members, these are called conjunctive knowledge from the perspective of Mannheim (Bohnsack, 2014).

As well as the concept of family, there are also two layers of knowledge in the concept of teaching. For example, almost every teacher has to teach, do classroom management, and revise the students' work, however, the way they do that is different because every class is different. Those general elements of teaching such as doing teaching activity and classroom management can be called communicative knowledge, while the way how the teacher does the teaching activity and classroom management is called conjunctive knowledge in the context of documentary method.

By distinguishing these two layers of knowledge, Mannheim (1982) reconstructs conjunctive knowledge as tacit or implicit knowledge that guides our practical action. Mannheim (1982) illustrated the character of conjunctive knowledge by analyzing the process of making a knot. The knowledge that guides us to tie our shoes is called conjunctive knowledge because almost all of us know how to tie our shoes (Mannheim, 1982). We all have a similar or the same experience about it, and do not need to explain to others what we mean when we talk about it. Although the action of tying our shoes is performed intuitively, the practical action of tying our shoes is very complicated if we imagine the movements of the hand step by step and explain the process of accomplishment to others (Bohnsack, 2014). It would be an exercise in futility to explain the process of making a knot to others with words, however, if we try to explain this practical process with a picture, the illustration and representation of tying a knot become much easier (Bohnsack, 2014). So, "pictures or images seem to be predestined as media for understanding atheoretical or tacit knowledge" (Bohnsack, 2014, p. 221).

The intuitive performance of tying a knot is based on the tacit or implicit knowledge of the actor (Bohnsack, 2014). "When reconstructing this implicit knowledge, empirical analysis deals with the interpretation of metaphorical representations that means of narrations and depictions of their own practical actions through the actors themselves" (Bohnsack, 2014, p. 221). In other words, when we analyze this kind of tacit knowledge, the interpretation of that should be given by actors themselves and the illustration of that can be constructed with the narrations of actors, as "the objects of reconstruction are the mental images of the actors which are implicated in their narrations, depictions and conversations" (Bohnsack, 2014, p. 221).

Bohnsack (2014) uses tacit knowledge, implicit knowledge or incorporated knowledge to describe the conjunctive knowledge that guides our practical action to be intuitive and automated. We do not need to explain to others what are we talking about when we all have conjunctive knowledge about the same topic (Bohnsack, 2014). For example, almost all teachers know what class management

means when they talk about it. They can understand each other without providing some background information. However, although they can understand each other very well when they have this kind of conjunctive knowledge, they can hardly articulate it because what they know is more than what they can tell. Teachers cannot tell others how they manage a class although they do it very well. This knowledge such as tacit knowledge, implicit knowledge and embodied knowledge are very similar in this case, as they try to describe nearly the same question but from a different perspective. This is maybe the reason why Bohnsack (2014) does not distinguish among them in his work, but instead uses them to describe the character of conjunctive knowledge. And the documentary method, as an empirical research method, is used to understand the conjunctive knowledge that guides our practical action to be intuitive and automatic (Bohnsack, 2014).

3.5.2 Working Steps of the Documentary Method

As there are two kinds of knowledge (communicative knowledge and conjunctive knowledge) in the framework of the documentary method, and the main task of the documentary method is to explain the conjunctive knowledge of those observed phenomenon, in order to understand the observed situation, there are two kinds of meaning (communicative meaning and conjunctive meaning), which constitute the interpretation of certain phenomenon (Bohnsack, 2014). As "the basic differentiation which is constitutive for the documentary method is the differentiation between the communicative or explicit, literal and immanent meaning and the conjunctive or implicit and documentary meaning. In our practical research, this differentiation leads to two consecutive steps of interpretation: the formulating interpretation and the reflecting interpretation" (Bohnsack, 2014, p. 225). The communicative meaning (explicit meaning) is about "what", and the conjunctive meaning (implicit meaning) is about "how" (Bohnsack, 2014). So, "the transition from the immanent (explicit) to the documentary meaning is, as already explained, the transition from asking what to asking how" (Bohnsack, 2014, p. 225).

The first step of interpretation is formulating interpretation that is used to explain the communicative meaning or explicit meaning of those being observed (Bohnsack, 2014). "The basic structure of formulating interpretation is the decoding and formulation of the topical structure of a text" (Bohnsack, 2014, p. 225). "The topical structure is reconstructed by differentiating paramount topics (PT), subordinated topics (ST) and sub-subordinated topics (SST), or even sub-sub-subordinated topics (SSST)" (Bohnsack, 2014, p. 225). Within the steps of topic structuring, "what"

is reconstructed by formulating interpretations of those observed phenomenon (Bohnsack, 2014).

The second step of interpretation is reflecting interpretation, which is used to interpret the conjunctive and implicit meaning of the text (Bohnsack, 2014). As described above, the first step of the interpretation is to explain the explicit meaning, the "what"; and the second step is to reconstruct the implicit meaning, the "how" (Bohnsack, 2014). So, the transition from explicit meaning to implicit meaning is the transition from asking "what" to asking "how"(Bohnsack, 2014). The "how" is understood by Bohnsack (2014) in the framework of documentary method as the framework of orientation which is guiding our practical action. When we do the second interpretation step, we must use comparative analysis to explain the "how" (Bohnsack, 2014). "Comparative analysis is of central importance for the reflective interpretation, because the framework of orientation of a specific case takes shape and can be examined in an empirically controlled manner only in comparison with the framework of other cases: individuals or groups" (Bohnsack, 2014, p. 225). In other words, we can identify how the same topic is dealt with by different individuals or groups only by doing comparative analysis.

In this study, I use the documentary method (Bohnsack, 2014) as the data analysis method to analyse how a pre-service teacher acquires her tacit knowledge of teaching over time. I tried to take two steps of data interpretation (formulating interpretation and reflecting interpretation) to analyse the research data and present this process. The objective of formulating interpretation is to ask "what" and the purpose of reflecting interpretation is to ask "how"(Bohnsack, 2014). "Whereas the reconstruction of the topical order is the basic scaffold for the formulating interpretation, the reconstruction of the so-called organization of discourse is the basic scaffold for the reflecting interpretation of talk and group discussions"(Bohnsack, 2014, p. 225).

Therefore, in this study, the first step of data analysis is to find the topic structure of the interview texts, and the second step is to present how the same topic is dealt with by the participant among different interviews. As the participant in this study spoke about similar ideas or even the same topics in every interview, the reconstruction of topical structure is based on what the participant, rather than the researcher, focused on during the interview. In other words, in this study the participant herself, rather than the researcher, provided the topic structure for formulating interpretation. After reconstructing the topical order of the interview texts, I performed reflecting interpretation by comparing how the same topic is dealt with by the participant between different interviews. Obviously, the central idea of reflecting interpretation is comparative analysis, as only

with comparison can "how" be presented (Bohnsack, 2014).

3.6 Ethical Concerns in Video Data Collection

In this study, I took several measures to protect the research participant and the research setting.

Compared to other countries, such as China, conducting field research in Germany is very complicated; there is a complex procedure that researchers have to go through if they want to obtain permission to do field research, especially in the case of videography. For this study, I first had to find pre-service teachers who are willing to participate in this research. After obtaining preliminary verbal permission from the participants, I had to write a formal document, and ask each participant to sign it, in order to obtain their formal consent. This document included some important information about the field research: the purpose of the research and the data-collection procedures, such as the time duration and frequency of the video recordings. It also covered other important information about the videography, for example, the participants were informed that they can withdraw at any time if, for any reason, they do not want to continue, that the researcher cannot make videos if there are some open classes about the participants, that the videos will only be used for academic purposes and so on.

After getting formal consent from the research participants, I still needed to go through this procedure because it was still not enough to get the field research permission. Besides the permission of the research participants, I also had to get the permission from the pre-service teacher seminar leader, which is necessary because the seminar leader is the responsible person for the pre-service teachers during their training year. After that, I need to submit all the necessary documents about the videography to the information security center in Berlin for the purpose of getting the permission to visit the school. After a month of waiting, I received a letter from this institution, which was formal consent from the German government, so that I can legally visit these schools.

However, although I went through so much, it was still not enough. As the students in the participants' classes were under age 18, I also needed to get the formal consent of their parents in order to make videos. Some important information about my research and the videography was included in the letter to parents. The content of the letter to the parents was similar to that to the pre-service teachers. However, there was some new information in this letter, such as that the object of

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videography is the pre-service teacher, rather than the students, and so on. The whole procedure of getting all the signatures was very time consuming, it lasting for two or three months. After getting all the parent signatures, I am finally allowed to make videos in the participants' classroom.

4. Data Analysis Process

The method of analysis used in this study, commonly referred to as "Documentary Method" (Bohnsack, 2014), was originally developed by Mannheim and further modified by Bohnsack. The basic method can be broken down into two steps, that is formulating interpretation and reflecting interpretation (Bohnsack, 2014). Formulating interpretation is defined by Bohnsack as a "decoding and formulation of the topical structure of a text", which is followed by reconstruction of the topical structure, the core element of the second step (Bohnsack, 2014, p. 225). Formulating interpretation focuses on the main content/ topic of the interview, and reflecting interpretation aims to analyze the mode of presentation (Bohnsack, 2014). The transformation from formulating interpretation to reflecting interpretation is therefore the process from the "what" to the "how" of an interview (Bohnsack, 2014).

Before I started on the in-depth analysis of the interviews collected for this study, I took the time to do a precursory reading of the material. While working on the video-cued narrative reflection and audio transcription, I had noticed certain topics to be a reoccurring theme in the pre-service teacher's interview material. The teacher's interviews were focused on certain topics which she would revisit at almost every interview. By collecting the research data and transcribing the interviews, I thus outlined the teacher's main concerns about her class.

4.0 Pre-interpretation

In this study, pre-interpretation is the foundation of formulating interpretation and reflecting interpretation, as with pre-interpretation we would have a general structure of the interview texts. It is a simple form of "what", which helps us determine the pre-service teacher's main focus concerning her teaching. With that we can know what the pre-service teacher mainly focused on in teaching. In the following I will explain how did I do the precursory interpretation of the material. It consists of three steps. After making the class videos, I immediately worked on the video-cued narrative reflection with the participant. I would ask the pre-service teacher to describe the class dynamics while watching the material I had recorded in class only minutes ago. She was able to pause the video at any time, and talk freely without time limit. During this process, I found the participant often talked about certain issues, such as starting class on time, motivating the students

to actively participate in class, and so forth. As I collected the research data nearly once every month, I found she talked almost every time about similar or even the same topics. This is the first step of pre-interpretation, which gave me a first impression of the participant's main concerns about her teaching.

After the video-cued narrative reflection, I tried to transcribe the interview audios into texts. By doing this, I found the pre-service teacher was really concerned about some topics in her teaching. For example, she mentioned almost in every interview how much time she spent starting the class, and which measures she took in order to make students settle down initially and further maintain a quiet working atmosphere. She also talked about other topics, such as how to assign the group work, and how to reduce the private conversations among students in class. The decoding of the interview material confirmed my initial assumption from the first step of pre-interpretation that the pre-service teacher was really concerned about some very similar or even same topics in every interview. This is the second step of the pre-interpretation.

As it is still not clear what the pre-service teacher's main concerns are, I undertook as third step of precursory interpretation a close reading of the transcribed interview texts, and collected a list of the most often reoccurring topics from the corpus of material. For example, the pre-service teacher talked a lot about how to let the students do preparation work for class in the interview. Based on this topic, I selected the related content from the interview texts, and gave descriptions of their content in form of small annotations, e.g. "students are unprepared", or "too much private conversation in class". I also did the same for other topics that the participant talked about.

While summarizing the interviews it became clear that the pre-service teacher repeatedly brought up eleven topics which seemed of special importance to her in the context of teaching. Those were (1) the problem of starting class on time, (2) students experience trouble understanding the task set for them, (3) students do not actively participate in class, (5) too many private conversations in class, (6) teacher was unable to assign group work for various reasons, (7) students do not pay attention, (8)students become impatient towards the end of class. The last three topics mainly revolved around the teacher's own person, (9) what she believed to be good, adequate teaching methods, and (10) her personal feelings and (11) attitudes towards the teaching profession, and will be discussed in the following chapter. For now I will focus on the eight problems mentioned above. This is the last step of pre-interpretation, with the help of which we can gain a relatively clear understanding of the teacher's main concerns and thus set up a basic framework for the interview

texts.

The reason why I call the situations problems is because the pre-service teacher herself thought that these situations were problems which she had to learn to cope with in class. In other words, from the research participant's perspective herself, the students' behavior belongs to the problems she must learn to deal with in class. Therefore, I define coping with these situations as dealing with problems in class in the context of this study.

On the basis of pre-interpretation, I formulated the topical structure of the interview text by categorizing the whole interview text into topic related parts. The aim of formulating interpretation is to outline which problems the teacher most often had to cope with in class. Compared to pre-interpretation, formulating interpretation describes the teacher's main concerns in a more detailed manner, as it tries to identify main questions on the basis of which we can set up a framework for the interview as such. After the reconstruction of the topical order of the interview texts, reflecting interpretation was performed to analyze how the teacher dealt with a specific reoccurring problem over a longer period of time. Formulating interpretation focuses on describing what happened in the pre-service teacher's class, while reflecting interpretation aims to inquire the "how" behind certain events that took place during class. In this chapter I will identify how the pre-service teacher coped with these problems over time, which consists two steps: "formulating interpretation and reflecting interpretation" (Bohnsack, 2014).

4.1 Formulating Interpretation

4.1.1 A Delay in Starting Class

Usually, at the beginning of the interview the pre-service teacher talked about how much time it took to start the class because it was the first problem that she had to cope with. The students were always very loud at the beginning of class although they knew that the bell had rung. After the class began, the students still did anything they wanted to, for example, to continue to eat or to talk to others. It always took three to five minutes until the students realized that the class had started and that they should stand up and greet the teacher.

At the beginning, the pre-service teacher felt helpless about this situation because she did not know what she should do. What she did was to just wait until the class became quiet, then she said "good morning" to them and really started the class. But after one month, when I visited her class and made the videos again, I found she became more proactive about this situation. She still waited for some minutes until the students became quiet after the bell rang, but she did not start the class immediately after the students were quiet. What she did before starting the class was to write a number on the blackboard, which was the time that she has waited before she could start the class. The number she wrote on the blackboard had a special meaning for the students. It means the teacher would close the class some minutes later or the students have to do more homework after class.

It seems like the teacher tried to discipline students for misbehaving, disciplinary methods have worked on the students because students were not misbehaving like before. In the third video, the pre-service teacher needed to wait for fifteen or twenty seconds before she started the class. Obviously, what she did was useful to cope with this situation. But she did not want to use it too often because she considered another situation that the students would be not motivated if the teacher instructed the students to do their homework prior to class time. Therefore, she only used this strategy when she thought the students were out of control and there was not any other alternative method to use.

In addition, the pre-service teacher also tried to analyze the reasons behind this situation, and find some objective reasons of this problem. She found that, one of the reasons was that, the teacher who teaches the class before her is always still in the classroom after his class is over. The teacher before her discussed questions with students during the recess time, which took the break time of some students. Therefore, the students wanted to finish what they wanted to do during break time at the beginning of class, which is one of the reasons why the pre-service teacher had to wait until they were quiet.

From the videos and the interview, we can see that the whole situation obviously changed a lot when compared to how it was before, as the pre-service teacher could start the class much more easily than before. This is possibly due to the measures she took.

4.1.2 Students Without Direction

In the pre-service teacher's class, some students were always unclear about what to do. In most cases this situation happened when the teacher gave them a task and let them finish it in class. The students did not know what to do and how to do it although the teacher had explained it already. Sometimes the students told the teacher that they understood their task and knew what they should do. We found that they were still unclear on what to do after the teacher left.

The teacher noticed that some students just waited and did nothing in class as they did not know what they should do. The pre-service teacher walked around the classroom and tried to explain the task again when she noticed that some students were still unclear about it. As this was not enough however, she would then ask the students to explain the task back to her afterward to ensure they understood. Another strategy the teacher took was to write the students' class task and homework on the blackboard. The students could then look to it as a reminder of what to do.

The situation changed over time. The teacher found that students began to ask questions about the class task if they did not know what to do which was unprecedented. The pre-service teacher was inspired as she realized the students were learning when they reached out for help than before. Therefore, she began to prepare rule cards for students to use for guidance throughout the day to help make the process clearer.

The pre-service teacher also tried to analyze the reasons behind of this problem. She realized one of the reasons why students were quiet despite not understanding their task was due to shame they felt about asking basic questions. Therefore, the teacher tried to foster a free-learning environment where the students felt comfortable asking questions, as that is why they are in class. Student behavior significantly improved in this regard over time thanks to her efforts.

4.1.3 Low Student Participation

Some students were not actively participating in class, which was another problem she had to deal with. While the teacher tried to help engage them in the lesson, some students had no interest and wanted to be left alone. The pre-service teacher took measures to cope and analyzed the reasons behind this phenomenon.

The teacher found that the reason the students were so quiet in class was that they were not interested in the class tasks. Although sometimes the class task was very easy and almost everyone could say something about it, the students were still very quiet and did not raise their hands. In order to make the students participate in class tasks, the teacher tried to put some pressure on them, as she thought there was no reason for them not to raise their hands. What she did was wait until more students in the class volunteered to answer. This method worked because the students knew that they would get more homework depending on how long she waited for students to participate. This strategy was similar to how she started class on time. It was also useful here as it caused students to become more active in class.

In addition, the pre-service teacher tried to motivate students who are not normally active. She encouraged students when they raised their hands to feel proud of their accomplishment. This helped them feel more inclined to participate in future classes, which the teacher found successful.

The teacher believed another reason why some students were not active in class was because they felt ashamed or embarrassed to ask questions. For example, some students were afraid that they would ask some silly questions, or they would give some wrong answers in class. To reduce the students' worries, the teacher tried to create a relaxed environment in her class, and let the students feel comfortable to ask questions. She also evaluated or gave feedback to the students' performances after they gave the answers, which made the students feel that their participation was important because they got more attention from the teacher. Obviously, the teacher took some measures to cope with this situation and it worked, evidenced by the fact that the students became more and more active over time.

4.1.4 Talkative Students

The class was very loud because of too many private conversations among the students, which had a big impact on teaching as the teacher had to cope with this situation throughout the class period. This problem also caused other issues in the class. For example, the teacher could not start the class on time, as the students would talk amongst themselves. This led to them not understanding the daily task, as they were not listening to the instructor.

The pre-service teacher thought that there were some reasons behind this situation. Some were objective reasons while others were subjective. In order to cope with this situation, she tried to change some external elements such as changing the seating arrangement of students and separating talkative students from each other, as this way the students would have less opportunity to talk to each other in class. This was helpful because the whole situation became much better than before.

Besides that, she tried to establish some rules for the class. Normally when the students chattered too much in class, what she did was to just wait until they were not that loud. It took a long time, waiting until they were quiet. So, the pre-service teacher took more measures to cope with this situation rather than just waiting. She wrote on the blackboard the time that she waited until the class was quiet, then the students became quiet immediately because they knew that they would have to do more homework. This strategy was very useful for this class because it made the class quiet down immediately.

Although some students were talkative and always disturbed the class, every time these students raised their hands, the pre-service teacher chose them because she wanted to motivate them. She also praised their performances after they gave the answers, such as "well done, good answers", and as feedback from that the students became quiet when they were motivated. Obviously, this is the reason for this problem. She also tried to design new teaching methods for this class, as she found that the students would be not so loud if they were interested in what they were doing. For example, when the class task was attractive to them, the students were very quiet because they were really interested in that. In short, the pre-service teacher acquired a deeper understanding about this situation over time, and she also knew what was more suitable for this class.

4.1.5 Unprepared Students

Another situation with which the pre-service teacher had to cope was the unprepared students. Some students were really unprepared for class, which resulted in other problems, like the teacher being unable to start the class on time because some students had to go to the back of classroom to get their textbooks at the beginning of class. Sometimes, after the teacher asked the questions, she even had to wait for some minutes until the students found their textbooks. Obviously, this situation really did disrupt her teaching.

Some students were not prepared, as they always forgot to do their homework. At the beginning, the pre-service teacher tried to threaten the students when she found that most students had not done their homework. However, this strategy did not work very well because the students reacted very aggressively, and complained that they got much more work than before. Later, the teacher found that the reason students were unprepared in class is that they were unmotivated. For example, after class had begun, one student was still walking around the classroom talking to others; he did not have a textbook and other material, either. It seemed like what the teacher was doing had nothing to do with him. But, the teacher noticed that, when she gave more attention to this student, he behaved better. Therefore, she concluded that the students were unprepared because they were unmotivated, and maybe they need more attention in class. Namely, what the teacher needed to do was to motivate the students.

The pre-service teacher's conclusion was right. The students behave much better in class when they are motivated. Compared to before, the seventh video's situation changed a lot. In the first few minutes of class, the students were focused on preparing for the class work instead of talking. They knew the teacher would show them something interesting so they were interested in the class work. Obviously, the teacher had deeper understanding of the students and she learned how to cope with the situation over time.

4.1.6 Unable to Assign Group Work

After doing the group work once, the pre-service teacher found that it was very difficult to do group work in this class, as this class was complicated. There were only two girls in this class, the rest were boys and they were very active in class. When they did group work, some students just sat together and talked during the class time. They did not care what the teacher said, and just did what they were interested in. When they had to finish a group project, some of the students just let other group members do that. This is why it is so difficult to assign group work in this class.

In order to cope with this problem, the pre-service teacher did a lot. For example, she separated talkative students from each other by rearranging their seating, so the students had less chance to talk in class. She found it helpful because the whole class was not as loud as before. She also tried to change the students' study habits, such as letting the students do their tasks by themselves, instead of relying on others, because many of the students in this class let others finish their tasks.

The teacher gave the students tasks, and let them finish them on their own rather than with others. After some time, if the students finished their work independently, instead of relying on others, they would have some opportunities to work together with others. The teacher also knew that it would be boring if the students always did the class task alone, but the problem is, if the students cannot work on their own, but just let others do their work, it does not make much sense to assign group work in this class. Therefore, the teacher did transitional group work in this class to cope with this situation. She let the students work together, but gave every individual student some special tasks, and all the tasks of the individual students consisted the work of the whole group. The students, in this case, would not feel bored, as they still worked with others, but they had to finish their own individual task.

After taking these measures, the situation changed a lot; the students were focusing on their task, and the class was much quieter than before, when the teacher assigned group work again in this class. Actually, for the pre-service teacher, doing the group work was only one of the teaching methods that can be used to make the students more interested in the class. What she really cares about is how to motivate the students so they learn in class.

4.1.7 Inattentive Students

There was a common misbehavior problem with which the pre-service teacher had to cope: some students were inattentive in class. This issue also led to some other problematic situations that the pre-service teacher could not ignore. For example, some students did not know what to do although the teacher had explained their task several times. The reason was because the students did not pay attention to what the teacher said in class, which in turn greatly influenced her teaching.

Some students did not focus on their class work until the teacher told them that there were only a few minutes left. In other words, only when they knew that they had less time to finish their work, would they pay attention to it. Some students did not even know the page number when the teacher asked them to read something out from the textbook. In order to induce the students pay more attention to the class task, the teacher told them that there were only five minutes left, even though they still had ten minutes to finish the task. It worked, because the students could focus on the task much better when they felt a little stress.

Actually, the teacher believed that almost all the students could finish the class task on time. However, some of them needed more time than others because they were inattentive in class. What the teacher did was to remind those students who were inattentive and gave additional tasks to these students who worked quickly. She also tried to be closer to the students in class as she believed they would pay more attention when they knew the teacher was looking at what they were doing. These are the strategies the pre-service teacher took in order to help students pay more attention to their class work.

4.1.8 Impatience at the End of Class

Most of the students in this class were very impatient by the end of class. They were very loud, and often looked at the clock on the wall because they knew the class would end in few minutes. Some of them did nothing, but just waited until the class was over. At the beginning, the teacher felt helpless about that. What she did was to just wait until they were a little quieter, and then give them the homework. However, later, she used the method she always used to cope with this situation. She wrote on the blackboard the time that she had waited until they were quiet, and then the whole class became quiet, as the students knew the class would be over some minutes later, or they would get more homework than usual. This strategy is always useful; however, it is a little passive as a kind of punishment for the students' misbehavior.

The pre-service teacher found the students' concentration level was low in the second half class, especially in the last few minutes, compared with the beginning of the class. Therefore, she believed the students were impatient at the end of class because of their low concentration level. In other words, if the students were still focused on the class, they would not be so impatient in the last minutes. The teacher planned to change her teaching methods in order to make the class become interesting, since she believed the students would still focus on the class in the last minutes if the class is attractive to them.

Obviously, the pre-service teacher believed the real solution to this problem was to motivate the students, and encourage their interest in what they should learn. The evidence also showed that the students would not be impatient at the end of the class if they had a strong interest in what the teacher was presenting.

4.2 Reflecting Interpretation

The second step of data analysis is reflecting interpretation which focuses on a description of the coping mechanisms the pre-service teacher relies on to deal with the reoccurring problems in class mentioned above. It provides us with a detailed picture of the "how", and the "comparative analysis is of central importance for the reflective interpretation" (Bohnsack, 2014, p. 225) since only in comparison and from a diachronic perspective, changes in the pre-service teacher's teaching performance may become apparent. By making a juxtaposition of different interview materials concerning the same topic, we may be able to identify coping techniques the pre-service teacher employs over time to these situations.

4.2.1 A Delay in Starting Class

The teacher frequently had trouble starting the class on time. However, a gradual transition towards the intended goal is visible as she grows in experience. In the following transcriptions, I will describe this process by analyzing both the videos and the interview texts. Let us now examine the data.

4.2.1.1 In the First Video (06 Sep 2013)

It was a Friday morning. The teacher walked into the classroom a few minutes earlier and prepared to teach. After the bell rang, she planned to start the class. But she could not because the students were doing what they wanted and did not care about which class they were in or what they had to do. The whole class was very loud. Obviously, the teacher was not experienced with how to cope with this kind of situation. She just waited about four minutes until the class was a little quiet, and then she finally started the class. In the interview, she also mentioned this situation and commented on it.

Pre-service teacher (06 Sep 2013/ 31-36): "It always takes time, I mean, it never starts at the time when the ring bells. When the bell rings, sorry. And, yeah, it takes time until they know which class they are, what they have to take out, they have to stand up, they have to say hello, for example, always takes time about three or five minutes. Generally speaking, three or five minutes, yep, until three or five minutes".

It is apparent from the videos and what she said in interview, the pre-service teacher seemed unable to handle this situation, at least to some extent because she did not take any other measures but just wait until they were quiet. Normally it takes three or five minutes until they are quiet, that means she has to wait for three or five minutes before really starting the class.

4.2.1.2 In the Second Video (25 Oct 2013)

It was still Friday morning. After the bell rang, the class was still very loud, as it seemed like most of the students did not realize that the class had begun. Some students were walking around the classroom and talking with others, and some of them were still eating and drinking. The teacher appeared helpless and called the names of the students one by one in order to let them know class had started. But it did not work because the students did not care. After a little while, she went to the blackboard and wrote "two minutes" on the blackboard. After that, one of the students said: "She wrote two minutes", then the whole class was quiet and she started the lesson. In the interview, she also said something about that.

Pre-service teacher (25 Oct 2013/7-10; 12-14): "Now, I am still waiting for the students to take all their stuff for the class. And okay, now the class starts. He seems to be really cool, I mean he knows the class started, but he is still like having a smart phone in his hand, he just has a smart phone. Yeah, have you seen it? He was just going around and has a smart phone in his hand. And he still has cable on the table. Now, look the guys and I am still waiting and waiting".

The students did not care about what the teacher did and still did things they wanted to do although they had known class had started. Apparently, the teacher was unhappy when she noticed that one boy was walking around with a smartphone in his hand. However, she did not do anything but wait quietly.

Pre-service teacher (25 Oct 2013/21-22; 26-28; 30-31): "I do not say anything. I am just waiting them to be quiet. And now, I am going to the blackboard and writing '2 minutes'. Yeah, there are two minutes, so, they know that I was waiting for two minutes, and that they have to do homework for two minutes more or we will close the class two minutes later. So they know that we start later and they will have more homework. That is always what I do".

The teacher did not take any measures to cope with this situation until two minutes later. After waiting for two minutes, she wrote "2 minutes" on the blackboard, then the class was suddenly quiet, because the students did not want to get more homework. The students knew the real meaning behind these "two minutes" as the teacher had done it before. She said:

Pre-service teacher (25 Oct 2013/36-38; 40-41; 48-49; 53-54; 76-77): "I will tell them that I have to wait, and I will write on the blackboard how long I have been waiting. And if there are, for example, five minutes, they will do more homework, and if there are just two minutes, they just do less homework. Because this is the time that they have to work, but because they did not work in class, they have to work at home. Yeah, whenever I go to the blackboard and write the minutes, they know that they will have to do more homework. Because one of the students says: 'she writes two minutes on the blackboard', and everybody is quiet. Some of them did the post before we started, and I said: ' when I hear the bell ring, you have to start, and otherwise, do you homework at home.' It was good".

Pre-service teacher (25 Oct 2013/277-279; 284-287): "Whenever I go to the blackboard and write the minutes, like, 'okay, I am quiet'. It is like the conditioning, somebody, you know, like a dog, whenever he hears the ring, or bell, you know, like that. Yeah, I know they want to have the pose, and they know that I would take them two minutes if they take mine, I said, I think, in the second class, I said, whenever you take my time, I am going to take your time. And that is fair, and they know that is fair".

According to what the pre-service teacher said, we can see in the second video that she took some strategies to start the class and it worked. Compared to what she did in the first video, she became a bit more positive in the second video as she took some measures to cope with the situation rather than just waiting until the students were quiet. She tried to stimulate the students by employing some strategies, even small punishments such as giving them more homework if they took too much class time, and it was helpful. Maybe because of her reflection of teaching practice, obviously she made a step forward in handling this situation, because she needed less time before stating the lesson.

4.2.1.3 In the Third Video (15 Nov 2013)

It was really amazing in the third video because the pre-service teacher almost started the class on time. After the bell rang, she said: "Okay, now, let's start, please". She only waited about twenty seconds before the students became quiet, and then she said "good morning" to them. She also mentioned that in the interview.

Pre-service teacher (15 Nov 2013/7-8): "let us see how many seconds we need until they can start. Okay, now, it is about fifteen or twenty seconds".

The pre-service teacher did not talk much about this topic in the interview, maybe because it was not as problematic as before. It is apparent that the students had gotten used to this model because they understood that they were required to do more homework if they were too loud and take too much time before the lesson really started. So, they did not want to act like before in order not to get more homework.

4.2.1.4 In the Fourth Video (17 Jan 2014)

In the fourth video, the old problem arose again. The pre-service teacher still encountered the situation that she could not start the class on time. After the bell rang, the students were still too loud and did whatever they wanted to do, just like before. They were still eating, drinking, walking around and talking in the first few minutes of the class. The pre-service teacher could not start the lesson in such situation. Therefore, she used the way that she always used to make them be quiet. She wrote "2 minutes" on the blackboard, after that the whole class was quiet. She said:

Pre-service teacher (17 Jan 2014/24-25): "Yeah, they know that. They know what that means, because we already did that before, that is why they are like: okay, stop, stop, the homework. You know".

Although this strategy was useful, the pre-service teacher did not always need to use it. Only when she really had problem with the students' behavior, did she use this strategy.

Pre-service teacher (17 Jan 2014/113-115): "Yeah, I do not do it always. But, I mean, if there are

only two or three minutes in the class, I think it is okay. But if takes much more time, then, I mean, one student is late, the other rest students are eating or drinking something, you know".

Actually, the pre-service teacher thought there was another objective reason that also contributed to the fact that she could not start the class on time. The teacher who taught before her always stays in the classroom and talks with students about questions after his class is closed, which always takes students' break time. So, the students still want to do stuff at the beginning of the class, as they were unable to take full advantage of their break. She planed to talk with the other teacher about this situation. Obviously, she gained a deeper understanding of the teaching situation over time.

Pre-service teacher (17 Jan 2014/115-120; 122-126): "And there is actually another fact, the teacher who teaches right before I go to that class, he always stays there five minutes. So, whenever I want to start my class, he is still in the class. And I actually told him not to do that. But, I mean, you saw that today, students always have questions. They want to ask something that is why it always takes much more time in my class. You know, that is why I have to wait much more. Yep, may be, I should talk to that teacher again. So that, he is out of class while I am in, now, you know that I am in. You have to prepare each of your stuff, and then, just put it away. You know. But when they see that teacher is there, it is like, aaah! I can ask a question, and here, the bell ring. And still they are like eating and drinking. And they know the class already started".

4.2.1.5 In the Fifth Video (28 Feb 2014)

In the fifth video, there were two teachers, one is the pre-service teacher and the other is her co-teacher. After the bell rang, the teachers tried to divide the whole class into two teams that would be taught by one teacher in different classrooms, as they thought the students would concentrate much better if the class was smaller. The distribution took almost two minutes because some students had to take their stuff to another classroom. After that, there were only half of the students in the pre-service teacher's class. The new class was not that loud, although there were still some students who were talking to each other. The pre-service teacher said: "Okay, now let's start the class". After a little while she placed her fingers over her lips, "Shhh"! She motioned to the students, and let them quiet down. Then she said, "Good morning, everyone" and the class started at that moment.

In the fifth video, the pre-service teacher did not write minutes on the blackboard to let the students

know to be quiet, instead she gave a signal to the students. In the interview, she said that she did not take her usual approach because she did not have to wait long. From the video we can see that she waited for 40 seconds from the moment that there were only half of the students left to the moment that she said, "Good morning, everyone".

Pre-service teacher (28 Feb 2014/39-46): "Even though I have to work. I mean, if you start something like splitting a group or a class, and you started with taking minutes on the blackboard, for example, this is demotivating. But if I would see that in several weeks they are still really, really loud in class, and we always have to wait for five minutes for them, I would do it again. But for the beginning, I did not want to demotivate them. Yeah, that is why I did not do that today. Even though I have to wait for two minutes, or one minute. And some of students actually are still talking with each other, for example, these students in here. That is why I just say: 'remove your seat, so that you can work on your own'".

From what she said in the interview, we can find that the pre-service teacher reflected deeply about the way she always used the blackboard. She knew that "writing minutes on the blackboard" was a useful way to let the students be quiet, however, she could not always use this way because there were some disadvantages about it. For example, starting the class with it is demotivating for the students. The pre-service teacher did not want to demotivate the students at the beginning of class, therefore, she tried to avoid it when possible. But she also said, "If I would see that in several weeks they are still really, really loud in class, and we always have to wait for five minutes for them, I would do it again". That means the pre-service teacher was trying to measure the value of this strategy. The purpose of her class practice is to motivate the students to learn rather than only make them be quiet. She just wanted to create a good learning environment by keeping them quiet.

4.2.1.6 In the Sixth Video (21 Mar 2014)

In the sixth video, there were only half of the students in the classroom because the others were in another classroom with the co-teacher. After the bell rang, the teacher tried to assign seats. She called the names of the students and had them sit in their seats. But there were still some students who were talking to each other and drinking. After finishing the seating arrangement, she waited for ten seconds before the class was quiet. From the video, we can see that the teacher said, "Good morning, everyone" after about one minute, which means she took one minute to arrange the seats

and start the lesson. Compared to before, she used less time to start the lesson.

In the interview, she only said that they needed to organize it a little better so that the students could take their stuff earlier. But she did not say anything about how to start the lesson on time. Maybe she knows how to handle this situation, or maybe she thought it was not necessary to mention it.

Pre-service teacher (21 Mar 2014/10-11): "We have to organize a little better, so the students know that they have to take their stuff earlier, so that we can start on time".

4.2.1.7 In the Seventh Video (16 May 2014)

After the bell rang, the teacher was still preparing the projector because she did not have enough time to do that during the break. From the video we can see that the teacher spent one minute and 20 seconds preparing the projector. The class was not as loud as before, in fact, during this time, the students were also preparing for their work such as taking their textbook out and finding the other materials that they needed. After the teacher finished preparing, she tried to start the class. We can see that she waited for 30 seconds until the students also said good morning to her.

The pre-service teacher (16 May 2014/2-5): "Okay, even though the class started, I am still preparing the projector. And what is different here is normally we split the class, but today it is together because of the beamer (projector). That is why we decide to put them together, okay, let's see. Now I am still waiting for the first ones to say something".

The teacher put all the students together because she planned to show a film to them. Normally, it would be difficult to control them all and start on time if all the students were in one class. However, the situation was not so bad because the teacher did not spend much time waiting before starting. It seemed like that she could handle this situation well.

4.2.1.8 Summary

Starting the class on time was one of the main concerns of the pre-service teacher's teaching practice because she was always unable to do so. The pre-service teacher paid heavy attention to it and she talked about it in almost every interview. From my analysis we see the situation changes

over time, for example, at the beginning the teacher had to wait for three or five minutes before starting the class as the students were too loud, but later she used less time to start the class because she took action instead of acting passively. Obviously, the strategy that she took was helpful in coping with this situation because she needed less time to start the class.

Writing minutes on the blackboard was a useful way that she used to deal with this problem and it worked as the students knew the meaning behind it. The reason why this strategy is useful is because the students do not want to get more homework. At the beginning the teacher used this way a lot as it brought the result that she wanted. However, after some time she did not use it as often as before as she realized that this strategy had some disadvantages, although it always worked. The teacher thought that starting the class with writing minutes on the blackboard was demotivating for the students because it meant they would get more homework later.

Actually, in the interview the pre-service teacher said that what she really wanted to do was to make the students concentrate in class and learn rather than just make them be quiet by giving more homework. In other words, writing minutes on the blackboard was one of the strategies that she used to create a quiet learning environment in order to make the students concentrate in class and learn. Obviously, she tried to find a balance between her teaching purpose and the strategy that she used. Therefore, only when she really had to use this strategy, would she take it.

4.2.2 Students Without Direction

Some students are always unclear about what they have to do in class. Although the teacher always explains to them what they should do and reminds them about their tasks, they remain unclear as to their responsibilities. We can have a relatively clear understanding about this situation by analyzing the research data.

4.2.2.1 In the First Video (06 Sep 2013)

After starting the class, the pre-service teacher organized a class discussion for the students. The main purpose of this discussion was to select the best layout and share their opinions with their partners. But the actual outcome was not as what the pre-service teacher expected. She said:

Pre-service teacher (06 Sep 2013/90-97): "So, we have a class discussion, the main questions are they have to, no, it is not, they have to look at layouts, and say which is the best, and after that, I want them to show the opinion with their partner, but you will see now, they are not doing that. Is not it? Okay, now, this student raises his hand, but what I want them to do is share with their partner. And just you know, maybe, half of the class is talking with the neighbor and all the others are just looking at the book and do something. So, if you, even though, I say: "now, talking with your neighbor", they do not do it. You know, just work in this way".

Obviously, from what she said we can see that the pre-service teacher was very upset about this situation because the class did not go where she wanted. The students did not know what they were supposed to do, and also did not care about what she said. Even though the teacher said: "now, talking with your neighbor", they did not do it. When she found that the students did other things like looking at the book or raising their hand rather than sharing their opinion with their neighbors, she repeated her directions for the activity. However, it did not work because the students did not listen to her.

Pre-service teacher (06 Sep 2013/121-122; 126-127): "I mean even though I am explaining that what they have to do now, they do not care. Okay, what I am feeling is like, shut up. I want to explain you, what you have to do right now".

Pre-service teacher (06 Sep 2013/129-136): "So, I started explaining and then I realized that it is too loud, and then, I start and I say their names, so, every body knows that, okay, she is mentioning your names, and we have to be quiet. Now, it is a little better. Now they are listening to me, I mean what they have to do, and again, okay, I explain what they have to do, and then I am asking again. So, what is the thing that you have to do, in order to find out if they really know what they have to do, because they always say: "Okay", and they take the sheet and they just do not know how to start, for example, that is why I am asking again, so, what did I say".

The teacher was kind of angry because the class was too loud and the students did not respond to her instructions. She tried to make the students be quiet in order to explain the assignment to them again. After explaining the task once again, she asked them some related questions to make sure that they really knew what they had to do this time. We can find that the teacher reflected upon this situation, as she found that merely explaining the task to them is not enough, but she also needed to strengthen her explanation by asking follow-up questions.

Pre-service teacher (06 Sep 2013/181-186): "What I am doing is just going around and giving them some advice, saying: ' can I help you? Do you know what you have to do? Do you know what you want to write about? How do you want the layout to look like? I am giving you some kind of advice'. Yeah, so that they have a better understanding about they have to do. Sometimes, it's like, they are just waiting and waiting, until they have any opinion or any idea about what they have to do, and there is nothing, and that is why I am giving them advice".

When the students started to do the task, the teacher was walking around in the classroom and trying to help the students by giving them some advice, as she wanted to guide them to a better understanding of their responsibilities. This was her method for clarifying the assignment. When the teacher found that the students did not start their work quickly because they did not really know what they should do, she tried to ask some questions and give some advice to them in order to get them started. She reflected on the situation and tried different ways to help the students have a better understanding about their class work.

4.2.2.2 In the Second Video (25 Oct 2013)

After the teacher really started the class, there were still some students who did not realize that the class had begun and they should pay attention to the teacher. One of the students was moving around the classroom and talking with others, he did not even have the material or textbook. It seemed like he did not know how to behave in class.

Pre-service teacher (25 Oct 2013/ 79-81; 83): "Now, okay, maybe, we should focus on this student, because he just, he does not have the material and he does not have the text book and he is just talking all the time. So, let's see what happened with him. And he is just moving around, like it is really normal."

Pre-service teacher (25 Oct 2013/85-88; 122-123): "But the more I know, the less he does it. He needs a lot of attention. You know, that is why he always does something. Last time, he had to sit here on the front, and it was much better, but I think we have to reorganize the class again, because this constellation does not work, especially in the back. That is just too loud. And this student is also really good in here, he is really active and understands most of what we do".

From what the teacher said, we can find the behavior of this student was not as simple as what we saw from the video. On the surface, this student was unclear about what he had to do in class and just did whatever came to mind. But if we go a little deeper into that, we can find that this student just wanted to get more attention from others. This was the real reason for his behavior and because the teacher knew this, she was able to mitigate it. Obviously, the pre-service teacher was learning more and more about the individual students. She had a much better understanding about the students and knew which seating arrangement was more suitable for them. In other words, she tried to change some external elements of the class according to the characters of the individual students.

Before closing the class, the teacher wrote the homework on the blackboard, as the students always plead ignorance of their homework if the teacher only told them. This is one of the ways that she always used to make the students understand clearly what they had to do.

The pre-service teacher (25 Oct 2013/229-233): "Okay, now, now, I am writing the homework on the blackboard, and, so that no one say that I do not know what I have to do. You know, sometimes, I say just without writing on the blackboard, and they say, aaah! We did not know that because you did not write it down. And that is why I always write it down on the blackboard".

4.2.2.3 In the Third Video (15 Nov 2013)

The teacher planned to do a group work in this class. Before starting the group work, she organized a brainstorming session and let the students do some preparation work for their flyer, as their class task was to design a flyer in a group. The pre-service teacher found that there was no structure during their brainstorming because the students did not know what they had to do, thus they had no results even after some time. So, she tried to give them some advice and let them know what they had to do. She helped the students to organize their brainstorming by telling them that everyone should follow a set of rules and just focus on one task.

Pre-service teacher (15 Nov 2013/156-159): "Before this starts, they have to do a brainstorming, so, they had to think about the logo, they had to think about the headline, they had to think about the questions, and the. They were like, en…en. Okay, what kind of logo and, I thought like, they are spending too much time and there was no result. Yeah".

Pre-service teacher (15 Nov 2013/105-108; 111-112): "Here I see that they have no structure, and then I am interfering and I am saying that each member should have one rule, one focus and then I tell them what they should focus on, so, maybe, this student should focus on the headline and the others on the logo, or the questions, and I do the same for the other group. Yeah, now, I am telling them that each member should have a rule and just focus on one task".

After giving some advice to the students, the teacher let them continue do their group work. The students were active and asking her questions when they were unclear and not sure about their work. The teacher was surprised because normally the students were always quiet and did not ask her questions when they were unclear about the class task. They were always quiet but without results. She said:

Pre-service teacher (15 Nov 2013/226-228): "I am asking for the results, what kind of results they have, and then I am checking, and I am giving advice, I try to help them if they do not know how to say something. For example".

Pre-service teacher (15 Nov 2013/232-233; 235-241; 244-247): "Okay, what I am also really proud of is that they really ask, you know. If they have a question and if they are not sure about the result, they always ask me for the question. "Can you have a check, can you have a look"? Because this is new, other time, they never did that, it was like, they were quiet, and I was like: "Okay, they are working". But when I went through the class, I was like: "what did you do"? They did not even start, but now, I see that they are working. Even if it is not they are asking for any question, this proves that they really are doing something. Because they are not sure about it, because they know they have to present it. But on the other hand, I know they are working on something, and they are really focusing on something, and they feel like, it is important what they do, you know. And I think, this is important".

There was a new development. The students were active in asking questions. This means a lot to the teacher as it proved that the students were learning in class. This really strengthened her. The teacher reflected over this situation and planned to prepare more for the class work such as designing some class task rule cards. With these cards the students can understand the class work much more clearly, because they can follow these guidelines to finish their work step by step. She said:

Pre-service teacher (15 Nov 2013/364-371): "And that is why I said, maybe, it is better to give rule cards, because if you give a rule card, and they have finished the rule card. Like you have to focus on the logo, for example, and they have finished the task, they can put the rule card away, and then they can take another rule card. Like, this time, you have to think about the words. And this is better, because every time, they have to finish some, and they can come to the front, and take another rule card. But this time, they had no rule card, that is why I was like, come on, we had to do something, and hmmm, you know. There was not clear structure. In the best case, you will do better than here, but…".

4.2.2.4 In the Fourth Video (17 Jan 2014)

After explaining the class task to the students, the teacher wrote it on the blackboard in order to be clear about it, as she knew that the students would talk with each other if they did not know what they needed to do.

Pre-service teacher (17 Jan 2014/11-15; 17-19): "Now, I explain to them that they have to do. But I know that it was just oral, that is why I have to write it down on the blackboard, so that they know what they have to do, because it always like "what did we have to do"? In order to, how can I say, not make them talk with the class where they have to work. I think it is better to write down on the blackboard. I know, whenever they are listening to me, they are like, aaah! okay, okay, and after two minutes, they do not know what to do. That is why I have to write it down on the blackboard".

The teacher realized that writing the task down on the blackboard was more useful than only explaining it to them orally because even if she did so, the students still forget about it later and ask other students. In this case, they talk to each other and make the whole class loud. She summarized this rule from her teaching experiences because every time she explained the task to the students, it seemed that they are clear about what they had to do, but after two minutes they start to ask each other about the task. So, she decided to write the task down on the blackboard and let them have no reason to be unclear about it. From what she said we can find that she reflected on this situation and tried new ways to handle it.

After giving the class task, the pre-service teacher moved around the classroom and tried to give some help to the students. She knew that the students would ask others if they were unclear about the task or do not know how to do it. So, she tried to let the students ask the teacher herself rather than others when they really have questions. She said:

Pre-service teacher (28 Feb 2014/140-150): "I know they are going to ask the other students and that is why I want to make them feel, I can ask you because some times they feel shame if they ask vocabulary, which is actually basic knowledge. Like: they are, why are, something like that. And some times, it is like. Maybe, you do not remember that I want to give them a feeling that it is not shame to ask questions. You should feel free to ask because that is the reason why you are here. And Nicas, for example, he always ask for vocabulary, he does not know how to rewrite a sentence for example, then I am trying to help him. Say: "how would you like to do? What do you want to say? You can just use other words. And some times, I help him and give him vocabulary because not giving them any vocabulary is always like, yeah, you can rewrite, rewrite and rewrite words, yeah".

It can be reasoned from what the teacher said that because of shyness sometimes the students do not ask any questions or just ask other students rather than the teacher when they are unclear about their task. They think it is shameful to ask questions, especially for basic knowledge such as vocabulary, which is the reason why the students do not ask her questions when they are unclear about their work. So, she decided to create an environment in which the students feel comfortable and want to ask for help from the teacher because that is the reason why they are in class.

Pre-service teacher (28 Feb 2014/172-174; 177): "And you see when you move around, but not very often, and they see you in this moment, they feel free to ask you, but if you are just sitting there on the table, it is like: ' should I ask you now'? You know. Yeah, I want to let them feel comfortable".

The teacher thought that she should let the students feel comfortable enough to ask for help from her when they were unclear or not sure about what to do. So, she moved around the classroom, but not very often, to provide some possible help for students. Compared to sitting at the table and waiting for them to ask for help, moving around the classroom was much better because the students felt more comfortable in ask questions. Besides this, she also considered how to build a

good environment, in which the students will ask questions when they need.

Pre-service teacher (28 Feb 2014/195-199; 201-207): "Even though students have to know that you are a teacher, sometimes it is better to be on the same level. You know, to be like, I am not like your friend, but you can ask me. That is whenever I sit and you come like that, like a hurricane. They are students, and you are a teacher, but when you sit, or sometimes, what I also do is when I bend down, so they can have eye contact with me. Yeah, not doing like that, because then it is like, I am a teacher and you are a student. Yeah, it is more that they feel much comfortable, I want them to be free to ask, and that they have the felling like that I do understand what they mean because very often is like: oooh! Teachers are like: "why don't you know this vocabulary"? "Why didn't you listen to the task"? You know, I do not want them to feel like that. They should always ask because if they do not ask, they will never know what to do. Yeah. And they will never learn. And I want them to learn".

She wanted to let the students feel that they are on the same level as her, and that they are equal although she is a teacher and they are students. The students should feel free to ask questions in class because they cannot learn if they do not know how to do something. Sometimes she tried to bend down to answer the students' question as in this way she will have eye contact with students, which is very important to build an equal relationship. She also did not want to let the students feel that she was on a higher level, which makes the students afraid of asking questions. She refused to criticize them with words like, "Why don't you know this vocabulary?" or "Why didn't you listen to do the task?" when they did not know what to do. What she really wants to do is to make the students feel free and comfortable to ask questions whenever they need.

She found that there were still some students who were afraid of asking questions, but there are also some students who ask her questions more often than before when they need help. For her, it was a kind of good feedback.

4.2.2.6 In the Sixth Video (21 Mar 2014)

The pre-service teacher gave a class task to the students and explained what they should do. Some students showed that they knew what they should do. However, some students still did not know what to do and asked others about the task. She said:

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Pre-service teacher (21 Mar 2014/197-204): "Okay. Now I see what kind of fault, this is my mistake, actually I have to give them an example, this is what always was, but in this case, I do not really think about that, I am not quite sure why, but I give them the task, and tell them what to do, and some of students say: 'Okay '. But maybe forty percent do not know what to do. That is why it is always important to give an example, but I miss that. That is why some of them actually start and the other ones still ask what they have to do. And this is an interruption since the others cannot concentrate on what kind of questions they want to ask, and the other ones miss a lot of time".

The pre-service teacher thought that she should give an example of the task to the students because in this way they could easily understand what they had to do. But unfortunately, she did not. Maybe because she thought that the students had understood and it was not necessary to explain further. However, the results showed that without example some students were still unclear and asked others. Therefore, giving an example of the task to the students was the way to solve this problem.

4.2.2.7 In the Seventh Video (16 May 2014)

After the class had begun, the pre-service teacher got the projector ready and wrote some vocabulary on the blackboard because the students would use these words in their work later. Otherwise they would not know what to do or how to do it. She said:

The pre-service teacher (16 May 2014/13-15): "Okay, what important is that I introduce some new vocabulary like organic and so on, and they tried to use it in this class. And some times they still have problems because, yeah, I think the words are not really common".

The pre-service teacher knew that the students would have some problems with their work if they did not know some of the words. According to her teaching experiences, she prepared it in advance in order to get them ready for the task. It seems like she tried to prevent problems in class by doing preparation work in advance.

4.2.2.8 Summary

There were some students who were always unclear about what to do. They still did not know the

class task even though the teacher had explained that to them. In order to let them know what to do in class, the pre-service teacher reflected a lot and took different strategies to cope with this situation.

At the beginning, the pre-service teacher found that some students did not know what they had to do in class and even did not care about what she said. What she did was explain the class task again and try to give them as much help as possible. However, it did not work well because the problem was not as simple as she imagined. The teacher tried to analyze this problem and found the reasons behind of that. Some students did not care about what the teacher said because they wanted to get more attention from others, most of them did not know how to do the task and also did not ask the teacher questions because they felt shameful in asking for help from the teacher and some students always forgot about what the teacher said as they were inattentive.

Therefore, the teacher took some measures to cope with the problem. For example, she wrote the class task and homework on the blackboard to remind the students what they had to do. She tried to build a free and comfortable class environment in order to make the students feel comfortable to ask her for help. She even tried to bend down to answer the students' questions to have more eye contact with them in order to let the students feel that they can ask the teacher questions naturally.

On the surface, what the pre-service teacher did was to cope with the problem of the students being unclear about what to do in class. But if we analyze this problem a little deeper, we can find that coping with this problem is not the real purpose of what she did. What the teacher really wanted to do was to let the students learn in class. In the interview, she said, "They should always ask because if they do not ask, they will never know what to do, and they will never learn, and I want them to learn". Obviously, the underlying aim is to make the students learn, therefore, she tried to make the students know what they should do and feel comfortable enough to ask questions whenever they are unclear about something because only in this way can they learn.

4.2.3 Low Student Participation

Some students are not active in class. They do not volunteer to raise their hands even though they know the answers. Let us examine how the pre-service teacher copes with this situation in her class.

After arranging the group work for the students, the pre-service teacher went around and tried to give some help to the students. However, she found that there was only one group in which the students were active and always asked questions. The students in other groups did not ask her questions when they did not know how to do something or even refused to accept help from her because they wanted to do something else. She said:

Pre-service teacher (06 Sep 2013/297-299; 301-303): "And that is interesting, because they are actually, the only one group always asks questions, which shows that they are interested in doing the task correctly, for example. Yeah, I help them. I also help the others. I say: ' what do you want to write or what do you have to do? ' But they say: 'oh oh oh! We know what we have to do'. So, they want me to go, so, they can maybe, talk with each other, I do not know".

Although the teacher tried to help the students and gave advice for their group work, most of them were still not active in the class. They told the teacher that they knew what they had to do if the teacher tried to give them help. But in fact, they did not really know. The teacher thought that the students were not participating because they were not interested in the class task. So the way to make them active is to give them a task they are interested in.

4.2.3.2 In the Second Video (25 Oct 2013)

After starting the class, the pre-service teacher collected the answers for the students' homework. The students were really active in class and there were a lot of students raising their hands, which was what she expected. She said:

The pre-service teacher (25 Oct 2013/65-66): "Oh, they are really active. One, two, three, four, five, more active than the other classes. Right"?

4.2.3.3 In the Third Video (15 Nov 2013)

The pre-service teacher designed group work for the students. Before starting the group work, she let the students prepare. She asked the students some questions about the flyer that they had to do

later. From the video we can find more and more students raised their hands and answered the questions.

Pre-service teacher (15 Nov 2013/31-33; 35-37; 39): "And what I realized is that in the beginning, you will see that, there are just two students who are active. And later, it is going to be more. Let us see, okay, now, you can see that there are more students who are raising their hands, even these students are not that good, because now I give them the opportunity to say something, even they are not that good. Now, I said that again, you see, two students are raising their hands. Okay".

The pre-service teacher thought that there were more students raising their hands because she gave them more opportunities to say something. As the question she asked was not difficult, almost all the students could answer. For example, those students who were not that good at English also raised their hands because they had the opportunity to say something. In other words, sometimes the students are not active because they do not have the opportunity to answer the question. Besides this, from the perspective of the pre-service teacher, some students are very quiet and not active in class because they have no interest in the class task. She said:

Pre-service teacher (15 Nov 2013/51-53): "Actually, there are some students are really good at English, but they are not really interested in class. That is why they are not that active. For example, this student is also very good, but he is very quiet".

4.2.3.4 In the Fourth Video (17 Jan 2014)

The pre-service teacher tried to collect the answers to the class work after giving the students a few minutes to work on it. However, the students were not active as there were only two or three students who raised their hands. The teacher did not immediately ask the volunteers to answer the question. What she did was to wait until there were at least eight volunteers, because she could not find any reason not to volunteer. After a few moments there were more and more volunteers, as the students knew that whenever the teacher is left waiting, they would get more homework.

Pre-service teacher (17 Jan 2014/207-215): "Yes, I know that, I mean it was not a test they had early, but they had to write it down, which means that all the students actually have results on their sheets. And if we say: ' what do you have on your sheet? And you actually just have to read it out',

then, I cannot see any reason not to volunteer. And I do not know how many students are there. I think twenty or twenty one. And I think that half of the class should always raise their hands in that situation. Because maybe they have that opinion like, 'you know, I do not know, I do not have to do something, because I know my grade or'. I know, so, actually I try to change it. I want them to participate in class. I want them to be active".

The teacher guessed that some students thought there was no connection between their academic grade and class performance. Therefore, they do not need to be active in class. However, as a teacher, she wanted the students to participate in class tasks and to be active. In order to cope with this situation, she used the classic way to encourage the students to be active.

Pre-service teacher (17 Jan 2014/221; 223-225; 238-239; 252): "I do not know, it just came like, I do not know. Because I looked at the class, it was like: just two students. That cannot be right. That is why I waited and I said, ' we are going to wait until we have eight volunteers'. And it worked. Yanping, It worked, you know? (She is very happy about that). Because they know whenever I will have to wait, they will get more homework. You know. I do not know if it is correct or not, I am just trying".

Obviously, the pre-service teacher was very excited about her success because more and more students raised their hands after she started to wait. She did not even know how she got this idea, but this strategy worked and it strengthened her very much.

Pre-service teacher (17 Jan 2014/227-234): "And it will be really important whenever I see that a student who is not that active in the class, that he is participating, and then, I can see that he is really giving the answers, and that we can just motivate them to do it again. I think it is really important, Daniel (the name of a student) for example, he was not that active the once before, and I was like, ' Daniel, oh! It is really a good answer', and he was like: 'ooooh! Okay', then, he wants to use it again. You know, I think, this is the way that works. I mean, we cannot expect them to be always really effective and just raised their hand every time".

For the teacher, it is really important that there are more and more students raising their hands to volunteer, especially for those students who were not that active before but try to be more active now. What she did is, whenever those students who were not active raised their hands, she tried to

motivate them by encouraging them. For example, she said, "Oh, that is really a good answer" after the students gave the answer, and in this way the students were motivated and wanted to try again. We can find her method for getting the students to become active has a purpose: to motivate the students and encourage them to learn.

4.2.3.5 In the Fifth Video (28 Feb 2014)

The pre-service teacher thought that sometimes the students were not active because they were afraid of asking questions when they did not know how to do their work. So, she tried to create an environment in which the students felt comfortable enough to ask questions whenever they are unclear because otherwise they would ask other students if they are afraid of asking the teacher. She tried to change the way she reacted to the students, for example, she moved around the classroom rather than sitting at the front of the classroom waiting for the students to ask her. Besides this, she also tried to bend down when she answered the students' question because in this way she could have eye contact with them, which is very important to motivate the students. She said:

Pre-service teacher (28 Feb 2014/140-150): "I know they are going to ask the other students and that is why I want to make them feel, I can ask you because sometimes they feel shame if they ask vocabulary which is actually basic knowledge. Like: they are, why are, something like that. And some times, it is like. Maybe, you do not remember that I want to give them a feeling that it is not shame to ask questions. You should feel free to ask because that is the reason why you are here. And Nicas, for example, he always ask for vocabulary, he does not know how to rewrite a sentence for example, then I am trying to help him, say: ' how would you like to do, what do you want to say, you can just use other words ', and sometimes, I help him and give him vocabulary because not giving them any vocabulary is always like, yeah, you can rewrite, rewrite and rewrite words, yeah".

Pre-service teacher (28 Feb 2014/172-174; 195-199): "And you see when you move around but not very often, and they see you in this moment, they feel free to ask you, but if you are just sitting there on the table, it is like, ' should I ask you now'? You know. Even though students have to know that you are a teacher, sometimes it is better to be on the same level. You know, to be like, I am not like your friend, but you can ask me. That is whenever I sit and you come like that, like a hurricane. They are students, and you are a teacher, but when you sit, or sometimes, what I also do is when I bend down, so they can have eye contact with me".

The teacher also tried to motivate those students who were not normally active by encouraging them. For example, there was a student who did not often participate, what the teacher did was give him more encouragement after he answered the question in class. Her actions were successful and the student participated more often than before.

The pre-service teacher (28 Feb 2014/268-279): "And you see again, Nicos, volunteering to say something about today's class, that was really impressive, because yesterday I took him and he had to write to some sentences about his internship. And they actually had some pictures and they were on the wall, and I wanted them to describe what they can see in the picture, and I actually wanted him to present his photo, and then, it was really good, I mean he made a lot of grammatical mistakes, but he described by himself, what he had to do there and so on, it was really good, and I say: ' that was really good, next time do your own. Do not make me pick you'. And he was really happy after that. That is why today he is really raising his hand on his own. That was really cool. I mean, actually you will never be able to support all the students, you will never have the class where all the students are motivated and are interested in class. But even if it is just a really short development like we see here with Nicos. I think that is it".

In turn, she was motivated by her success. She knew that she could not make all the students motivated and active in class, however, she was encouraged by the positive feedback from the students, which was really important.

4.2.3.6 In the Sixth Video (21 Mar 2014)

Sometimes, after the teacher asked questions, there was only one student raising his or her hand, but the teacher did not pick this student immediately because she wanted other students to answer as well. She said, "I mean I can see here, but it is like no one is raising their hand or saying 'please pick me', but he did not realize that I want to equal participation". Obviously, although the students do not always participate, the teacher still wants to give them some opportunities to do so.

There were two teachers in this class: the pre-service teacher and the other co-teacher. In order to focus the students on their tasks, the teacher separated the whole class into two groups, which were taught by the two teachers in different classrooms. In her group the pre-service teacher did a lot to

make the students be more active, just like she said:

The pre-service teacher (21 Mar 2014/93-107): "Since we have a smaller group, I always try to be really in the center, which means I always go a little bit more to the front and not try to hide myself behind the teacher desk. Yeah, so I move, so that they know she is present, maybe, I am not quiet sure about that, may be, they will concentrate much more because then they will see: Okay, she knows that I am not really active in the class right now. So whenever they feel like she is coming close, they are like: Okay, now I have to focus on. And may be this class needs it. I am not sure something that I try. And also what I think it's really important is that if a student gives an answer, I am always like: ' Aha, yeah, okay, okay, the next one ', maybe it is like: 'Okay, it does not matter if I say something or not '. That is why I try to conclude and look into their eyes, and give them the signature like what you say is really important to me. That is why I go to the front and say: ' yeah, okay, what about you '? Then I move to this direction, so the first student has one, and I go to that direction, then I go to the other one and so on. So that they feel like that I am really interested in what they say".

Since the class became smaller than before, the pre-service teacher tried to be in the center of the classroom rather than stand behind the desk as usual, as she wanted to supervise the students and let them be active and focused. She thought that the students would be more active this way because they felt that the teacher was present. Besides this, she tried to communicate more deeply with the students after they gave answers. Normally she reacted only a little to the students' answer such as 'yep, okay, on to the next one', which would demotivate the students because they thought that what they said was not important. Therefore, the teacher reflected on this situation and changed the way she reacted to the students' answer. She went to the students who gave answers and looked into their eyes to give them the impression that what they said was really important to her. This was how she encouraged the students so that they would participate more often. However, from what she said we know that the goal was not simply to increase participation, but to improve their concentration on their work so that they could learn.

4.2.3.7 In the Seventh Video (16 May 2014)

From the video we can see the students were really active in class, as the pre-service teacher did not have to wait for volunteers to answer questions. The teacher showed a film to the students, which

was a part of the project that they were doing. Maybe because the students were really interested in the project, they actively raised their hands and answered the teacher's questions. The teacher said:

The pre-service teacher (16 May 2014/37-40): "What I really want to say is student like Max for example, he was always much passive in class can say a lot because he really seems to be freak. He likes that very much and he knows every character, and that is why he wants to free himself into the class. And just prove that you know something".

Based on what the pre-service teacher said, the students were really active in class due to their interest in the project. Therefore, what the pre-service teacher planned to do was change her teaching methods so that the students would be more interested in the class task and so be more motivated and focused than before.

4.2.3.8 Summary

One of the problems that the pre-service teacher had to cope with in her class was the students not participating. After the teacher asked a question, there were only a few students who raised their hands, most of them were very quiet and did not volunteer even though the question was very easy and almost every one should be able to give the answer. The pre-service teacher reflected on this situation and found that the main reason why the students were not active was because they were not motivated. There are also some main sub-reasons for that; for example, some students were not interested in class, some students were afraid to participate in class tasks and so on.

At the beginning, when the students did not raise their hands to answer those very easy questions, the teacher waited until there were more volunteers. This strategy did work, however, it did not deal with the root of the problem as the students were not motivated in this way. Therefore, the pre-service teacher tried to change her teaching methods in order to make the work more interesting. For example, she showed a film. As a result, the students were really active and talked a lot as they were interested in the project.

Some students were afraid to participate because they think it is shameful to ask basic questions. What the teacher did was create a free and comfortable class environment, in which the students felt comfortable to ask for help from the teacher. For example, she tried to pay more attention to the

students such as maintaining eye contact with them and letting them know that what they said was really important to her. She also tried to bend down when giving advice to the students for the purpose of letting them feel that they are equal. Besides this, she gave more encouragement to those students who were normally not active after they gave answers. This way was useful because the students felt good about themselves and so, wanted to answer again.

The pre-service teacher tried different measures to encourage class participation. Like she always mentioned in the interviews, all these changes were for one purpose: to foster concentration and learning in the classroom. In other words, increasing participation was the direct goal of her actions, but the more important goal was the indirect result of imparting knowledge and understanding.

4.2.4 Talkative Students

There are some students who have too much private talk in class, which has a big influence on teaching activity. From what the teacher said, this is a big difficulty to overcome in her teaching. The pre-service teacher tried to handle this situation by reflecting on it and taking some measures. Let us examine how the teacher deals with this problem in her class.

4.2.4.1 In the First Video (06 Sep 2013)

It was really loud because there was too much private talk in class. The pre-service teacher wanted to say: "Stop, let us start", as she thought the students would be more quiet in this way. However, she could not do that because there was a co-teacher in class.

Pre-service teacher (06 Sep 2013/6; 41-47): "It is too loud. But I think almost the biggest problem is that there are always two teachers in the class, whenever I see something, the other teacher is going to ask somebody, you know, maybe, I have to recognize that the other teacher is going to ask somebody properly, that something that does not have to do something about in English class, and then you realized that it is really getting loud there, so, I really have problem with the co-teaching, I have to say".

Pre-service teacher (06 Sep 2013/53-56; 58-59; 61-66): "Actually I always tell her what I will do for this class, and I tell her what kind of job she ask to do and what I have to do, but, the way, I

mean, no, I mean, actually she acts as the way we talk about, but it is always different if there are someone in the class and you cannot react in the way you would like to act or behave. Yeah, that is why I mean, may be, you would like to be loud, and just say: ' come on, now, let's stop it'. (She is pounding desk). But you do not do that, okay, the restrictions. Yeah. You really have to control yourself, and the problem is that she is a. I think, I think the teacher about two or three years, so, they really know her, and she is always like she is really tolerant and she does not really care if it is too loud in the class or not. But to me, it is really, it is problem, and I cannot work like that. And so, it is problematic if the only one who is just aggressive 'shut up, stop now'. Something like that, you know".

From what the teacher said, we can find that there was too much private talk in the class and she really had trouble with this situation. However, she could not react to it in the way she wanted because there was another teacher. The co-teacher was a woman who had already taught this class for about two or three years, so the students really knew her. The co-teacher was relatively tolerant of the students; for example, she did not try to quiet them when they were too loud. But for the pre-service teacher, that was a problem because she could not teach when the class was too loud. However, she also did not want to be seen as the mean teacher.

Actually, the pre-service teacher wanted to do something, like pound the desk and tell the students that they should be quiet, but she could not do that in this class because she had to control herself in front of the other teacher. The pre-service teacher thought the real reason for the problem was the external elements such as the conflict in teaching style with the co-teacher, so what she should do is change the external elements of this class.

After really starting the class, the pre-service teacher tried to explain to the students what they had to do. However, it did not work as there was too much private talk and it was really loud. She said:

Pre-service teacher (06 Sep 2013/ 121-122; 126-127; 129-132): "I mean even though I am explaining that what they have to do now, they do not care. Okay, what I am feeling is like: ' shut up, I want to explain you what you have to do right now '. So, I started explaining and then I realized that it is too loud, and then, I start and I say their names, so every body knows that: 'Okay, she is mentioning your names and we have to be quiet '. Now, it is a little better. Now they are listening to me, I mean what they have to do, and again, okay".

The pre-service teacher was a little bit helpless because the students did not care about what she said. She tried to call the students' names to attract their attention, because she thought the students would be quiet when they heard that someone was calling their names. She was really angry about that situation, but what she could do was control herself and tried to let them be quiet so that they could continue to move on.

The pre-service teacher thought that what she did was not useful to change the situation because this class was too complicated. From her perspective, she tried to change the external situation and used some methods that she does not want to use but finds useful, as this was the only way that worked.

Pre-service teacher (06 Sep 2013/318-328): "Yeah, you know, it is really interesting, but I did not really care the situation, I knew that it was too loud, and I knew that they were working, but was like, it does not matter what I do right now, it won't change anything about the situation, so, you really have to change the fundamental things, like as it before, external factors, do not like be quiet or something like that, I do not think it is going to work in this class so useful. Talking with the teacher again, thinking about the solutions, what we can do different ways. If somebody did not do the homework or it was too loud, and she said: ' I do not know, we have to see what we can do '. You know, I do not want to say, you know, like: 'If you are not quiet, then we have to do another English test or something like that', but this is the only way that works. I have to but I do not want to".

4.2.4.2 In the Second Video (25 Oct 2013)

Because the students were talking amongst themselves too much, the pre-service teacher could not start the class on time and sometimes she could not even continue the class. She had to resort to methods that she'd rather not use. For example, when the class was too loud and she could not teach, she would not let them to be quiet, only wait. After a few minutes she wrote the time that she waited on the blackboard, then the whole class was quiet immediately because they knew that it meant more homework. This was the way she handled that situation and it worked.

Pre-service teacher (25 Oct 2013/21-22; 26-28; 36-38 48-49; 53-54): "I do not say anything. I am just waiting them to be quiet. And now, I am going to the blackboard and writing '2 minutes '. Yeah, there are two minutes, so, they know that I was waiting for two minutes, and that they have to

do homework for two minutes more or we will close the class two minutes later. I will tell them that I have to wait, and I will write on the blackboard how long I have been waiting. And if they say, for example, five minutes, they will do more homework, and if there are just two minutes, they just do less homework. Yeah, whenever I go to the blackboard and write the minutes, they know that they will have to do more homework because one of the students say: 'She writes two minutes on the blackboard ', and everybody is quiet".

At first the teacher did not want to use this method. However, it was the only way that worked. She tried to put some pressure on the students because she knew that they did not want to get more homework. So, every time she went to the blackboard and wrote down the minutes that she waited, the students would be quiet immediately.

The teacher also tried to change the external elements of this class. For example, she rearranged the students' seats and separated those students who were talkative from each other in order to reduce the opportunity for private conversation. She leaned more and more about the students as she rearranged the seats according to their special characteristics. She said:

Pre-service teacher (25 Oct 2013/115-120; 122-123): "Yes, I mean, you know the student, here, he was sitting in the back and really loud. He was always disturbing and he was just getting on my nerves, but, since he is there, he is really working hard. Even though, he sometimes asks his neighbors about the task, he really tries hard. And that is good, which proves that the new arrangement is much better than the other one. Because this way, I can see, you know, they cannot hide behind the back of the other students, for example. And this student is also really good here, he is really active and understands most of what we do".

Rearranging the students' seats was useful because in the new arrangement some students behaved much better than before. However, only changing seats was not enough to cope with this problem. In her class, although some students were always annoying and interrupting the class, when they raised their hands, the pre-service teacher still called on them. Instead of punishment, the teacher tried to motivate those students who always interrupted the class, as the students would be quiet if they were motivated.

Pre-service teacher (25 Oct 2013/126-130; 133-135): "So, now, what I do is, even though this student sits in the back and when he raises his hand, I take it. Because that you are just disturbing

the class, that means, I won't take yours. I do not want to punish them, you know, that is what I always do. Even though somebody is really loud, and when he just raises his hand, I always take the person. So that, he still get motivated. When they raise their hand, I take them, I just say, 'Okay, you can give the answer', and if it is good, I just say, ' Wow, well done, very good'. And then, you can just see, they are quiet (laugh)".

4.2.4.3 In the Third Video (15 Nov 2013)

The teacher planned to do the group work again in this class. Before organizing the group work, she separated the students into two groups that would be supervised by two teachers in two classrooms, as there were two teachers this time. The teacher found the situation was much better than before and the students were not so loud when they did their group work. There were fewer students in her class and so, it was easier to supervise them. She said:

Pre-service teacher (15 Nov 2013/319-325): "Because I think the more students in the class, the louder they are speaking. And the louder they are, you really have no control about what is going on even if you have three teachers in that class. That is why I think, that is always important that you do not have too many students, or in this case, not too many. Because in other class, you have, maybe, thirty students, and they work just like, you know, just whispering with each other, but these students are never going to whisper in the group work, they always really loud".

4.2.4.4 In the Fourth Video (17 Jan 2014)

Before starting to teach, the teacher changed the seating arrangement, because she found the students who always talked to each other sat together so that they would get more opportunities to talk in class. In other words, the existing seats arrangement was not suitable. Therefore, it was necessary to have some students change their seats.

Pre-service teacher (17 Jan 2014/64-66; 68-69; 75-79; 159-166): "They actually have a new arrangement. And now, I did not know that. And now, this student, for example, is sitting next to this student, and they are always, like, communicating with each other. I do not think that it really works. But it is new for me. I did not know that before, I have not seen this new arrangement yesterday. Yeah, I mean, I like, in fact the U shape, but some of students, for example, should not be

over there, maybe in the back, but you do not have it on the camera, but in the back, we have much more place where they could sit. And it is just, you know, they have too much opportunity, too many chances to talk to each other, and I think that is problem. Yeah, I mean, maybe, it is worse for some students, but it is better for the other students, you know, that is why I always have to look at what is much more important. But for Anton (another student) for example, I think, for him, it would also be really good, if he would just sit in the front, or maybe, next to another student. Oh! These students, for example, student A and student B, they do not work together, because they always have a lot of things in common, that is why they have a lot of thesis and topics to talk about, which do not have anything to do with the class, you know".

Pre-service teacher (17 Jan 2014/177-181; 183-190): "Yeah, that is good, maybe, we can leave the arrangement like that, but, maybe, we can just, you know, take three or four students, and try to rearrange them in the class. Because I do not think this is working here. I know that this student, for example, always just like looking at the paper on the others, and, you know, just copying it, and not doing anything on their own. It is not a U shape, but, with a U shape, and just a few students on the middle. But what we cannot see on the camera is that we also have a lot of space in the back. So, maybe, we can just take one or two students, and put them there, because I think, maybe, two or three students should also sit on their own. These students are really good here, for example, they are really concentrated, and they are always really quiet. But it does not make sense that they are sitting next to each other. Because you know, it is always better to have one quiet student, and just one who talks, you know, and not having three students who are always talking to each other".

From the perspective of the pre-service teacher, the seating arrangement had a significant impact on the students' class behavior and it was one of the external elements that affected her teaching activity. In fact, she thought that the ideal seats arrangement would be a U shape because this way she could see all the students and supervise them better. However, she was not given the ability to make such drastic changes by herself.

In the interview the pre-service teacher said that she thought that the students could talk in class if they really wanted to share something about their work. However, if what they talked had nothing to do with the class task, it would be a problem because other students could not concentrate in class if it was too loud.

Pre-service teacher (17 Jan 2014/316-320; 323-325): "And you know what I, I do not know if it

has something to do with my opinion. But I do not think that is a big deal that they are talking when they are making their task, until they did their task, you know. For instance, that they are working, and they are just whispering and just asking something. I think that is okay, I do not want to have machines in my class. You know, they can talk with each other. Yeah, if they just want to share something, share one or two sentences, I think that is okay, but if they are just talking all the time, that is problematic. But if they just want to share something, I think, it is okay".

Pre-service teacher (17 Jan 2014/327-332): "As long as they do not stress other students around, you know. Because this student, for example, he does not like it is too loud in the class, because he cannot concentrate, for example, and I have to interrupt, because these students are talking all the time, for example, here, here, and he cannot work here. And that is why I have to do something as a teacher. But on the other hand, I know sometimes they want to share something, I just leave like that".

The students are allowed to talk in class if the discussion is class related, but if the students talk about something else, it would be problematic because the idea is to have the students concentrate on their work by providing a quiet environment. She was not a rigid teacher who does not consider the specific situation, but only wanted the students to be quiet in class. She definitely wanted to create a good class environment by keeping the class quiet. However, her real aim was to let the students concentrate in the class task and learn rather than only keep quiet.

During the second half of class, the students' concentration level was much lower than at the beginning of the class. The class was getting loud and the teacher tried to make the students be quiet by calling their names. It seemed like she was a little helpless. The pre-service teacher thought that the students became loud because they had no interest in the class. She even said that was her fault because she did not change her teaching methods to generate interest.

Pre-service teacher (17 Jan 2014/335-340): "Yeah, yeah, I said like that, ' Max, be quiet, or Danil, be quiet. It was, I can see you, I know you and another one are talking, so, be quiet '. Okay, they are just talking too much. Here, now, it is getting louder (laugh). He is still drinking. Now the whole class is, you know, which minute it is? 36, okay, the concentration is on the low level right now. You can see that, if you compare this situation with the situation in the beginning".

Pre-service teacher (17 Jan 2014/342-348): "Yeah, I think it is my fault, because I could not have

changed the methods. Maybe they had to work in the group, or maybe they had to do something else. But it was like, you have to write something down, and then they had to work with the workbook. I mean, it was not really changing the method. You know, it was actually the same, so, that is why it is maybe my fault. If I have given them something to read, or maybe something they have to write like a letter or something like that, maybe it would be better".

Pre-service teacher (17 Jan 2014/351-358; 360-364): "I think what is important why you change your method is that they are always get motivated because they never know what is going to happen next. And whenever you change the method is like something new is coming. And then, they are concentrated. But if you are just doing the same all the time, they are getting bored, that is normal. You cannot change anything about it. And that is why I think it is my fault. But I actually knew that is going to be like that, because I did not prepare myself very well yesterday. We had some kind of group work, or they had to do some kind of the presentation. Or maybe, yeah, there was, I think, there was, last week, on Thursday, I think, we watched a movie, for example, it was about a plan for a job. And they had some kind of, they had some task. They have to answer why they were watching, and that was really interesting for them. And they were quiet all the time, for example, because we do not usually work with that. The films like that."

Obviously, the pre-service teacher thought the reason why the students talked off-topic so much was because they were not interested in class. If the teacher presents something interesting to the students, they will be focused and attentive. Therefore, the solution was to motivate the students.

4.2.4.5 In the Fifth Video (28 Feb 2014)

After a two-week holiday the students came to class again. The pre-service teacher found that the class was too loud and it was really hard to teach them. She discussed with her co-teacher about this situation and they decided to split the class into two groups that were taught by each teacher in different classrooms. It was an advantage of this particular school because there were two teachers in this class.

Pre-service teacher (28 Feb 2014/6-13): "And yesterday, we actually had a new student in class, and his name is Mario, and he was just chaotic, he could not actually do anything with them. But after that, I just discussed it with Mrs. Schulman. And we decided that we have to split the class,

and now, she is working with ones who are not that good at English, and who missed the class for several weeks, for example. And two of them are really hard to work with, that is why she always has to focus on these two they cannot work in the class. And I do have all the others, which means I do not have just all the best ones who are good at English, but also ones who are not that good".

Pre-service teacher (28 Feb 2014/23-25; 27-28; 30-35): "Yeah, I mean we are going to need some kind of experience. If we see that it does not work like that, and we have to change some of students that we are going to change about. And I think, in whole, this is going to be the class I am going to work with. We actually work like that several times. You know that, right? Have you even been there, just, we have short group. Yeah, we did that before, and we actually experienced that it is much better to do that. And I tell them why we did that. Because yesterday was actually really, really hard for me and for all the other students, it was just stressful. Yeah, and I want to make a transport why we did that. I do not want them fell like, 'Ooooh! maybe just the good ones are moving with Mrs. Schulman or are they punishing or whatever', I just want to make sure that they know that we work more concentrated".

Actually it was not the first time that they divided the whole class into two groups. They had already done it before, and the pre-service teacher found it would be better if the class became smaller because that way the students could concentrate much better. However, the teacher felt the students deserved an explanation for the change, because otherwise they might be confused.

The pre-service teacher had learned more and more about the individual students. She divided the students into two groups on the basis of their character. For example, she tried to separate those talkative students from each other by putting them in different groups.

The pre-service teacher (28 Feb 2014/89-95; 97-100; 102-105; 107; 109-112): " The thing is we just have three students who are always arguing with other students, and who always make chaos. And two of them are in the other class. Whenever I start, the others are just continuing what they actually started and it is like a views. Yeah, that is why it is good that we separate the class. And Ricano, for example, he is always really loud, if another student in this class too, it will be chaotic, and he is in another group. Trassy, for example, she is really loud when her girlfriend, I mean her friend is not here, she is the only girl in this group. Whenever the other girl is also in this class, she is really, really loud, and now she got the possible or the opportunity to make friends with other students. It does not have to be a girl. And I think that is also really important because there will

really be a communication between her and other students in the class. And Tinos, for example, he is also, whenever Madni and Andoni, these two students are really loud, he just did the same. It like, he does not really concentrate on the class. But now he has to sit on his own, he has to write. He really finishes his task. So, in specific groups, it is really important that you do that. Yeah, I mean that there will be time that I have to teach all of them if the other teacher is sick or whatever. And sometimes, we are going to do some kind of group work or presentations, then it is better to not split them. But, yeah, it is just going to be an exception in this case, I think it is much better".

In the interview, the pre-service teacher explained why she wanted to split the class and how she separated these talkative students from each other. Besides this, she also emphasized that the real purpose was to make the students concentrate rather than only keep them quiet. Splitting the class to reduce private talk was the only strategy which could make the students concentrate.

Sometimes it was very hard to teach when they were too loud and talking privately. However, the teacher tried to understand the students because she knew that they did not do it to purposefully spite her. As she said, "I mean they're always talking to each other, but they never do that to stress you, you know, it is not like, they want to get on your nerves, but they do. Because they do not realize that it is really hard as a teacher to always control them in a way, to make them be quiet so others can work". It is not difficult to find the pre-service teacher changed a lot as she tried to understand the students rather than complain when she encountered the same situation.

4.2.4.6 In the Sixth Video (21 Mar 2014)

Since the class was divided into two small classes, the students behaved much better than before, although they did still talk amongst themselves. Whenever the students talked to each other, the teacher used the 'classic way' to deal with it. She did nothing but wait for a few minutes, then wrote the minutes on the blackboard. After that the whole class became quiet immediately.

Pre-service teacher (21 Mar 2014/51-53; 63-68; 70-72): "While I am collecting some of these vocabulary test, they know that they have time to talk to each other, because it is getting loud. You know, that is why I say, 'Just write the last word, do not talk to each other'. It is like they want to move, they want to just stand in front of the class. I do not know, it is like, just do everything but not doing the subject in the class. Okay, now I see that they are talking to each other, again, I am

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sailing, and I am standing in the corner and waiting for them to be quiet. And see how long it takes. Okay, now, one student says something like that: 'Shut up, shut up'. Okay, another is quiet, and I come to the front, from now, I can move on. Yeah. It is like Pavlov, it is like behaviorism. You know, whenever I go there, they have to stop, and they actually stop now, because they know that they have to do it afterwards at home. They were, again".

Pre-service teacher (21 Mar 2014/128-130; 132-136; 138-146): "That it would not matter that much. You know, it is okay. Sometimes they can talk to each other. It is okay, because they are not robots. You know, but you see what I mean. They are really quiet. That is really impressive. I do not know this class like that. I think, that is, maybe that is advantage of this school. So, we have two teachers for one class, but you see that it works. I mean if I have double students in this class, I could not do this class today. Because one student just starts, and the other one move on, and it is like a snowball, you know. It is like. I mean you can control the whole class with twenty students, but it takes much more times because then you can hide yourself behind the other one. I mean if I turn around, and see some students are talking to another one. You never know where it comes from, maybe it is from back, maybe you realize which student it might be, but this way, you actually always know who is talking, you know, and they know it. But the other way is around like, okay, now I can talk to him, because she would realize that, 'It is me'. And then they move on. And then it is like, it was his fault, it was his fault. And what I did now is I want them to sit on separately, but I am going to change it when they get used to this kind of method".

The whole situation became much better than before since they divided the class into two groups. The teacher would not have been able to do the class task if there were twenty students because she would've had to spend more time controlling them. However, the teacher still wanted to teach all the students in one classroom, but only after they got used to this kind of teaching method.

4.2.4.7 In the Seventh Video (16 May 2014)

The pre-service teacher put all the students together in one classroom as she planned to show a film as part of their project. She was worried that the students would be very loud because there would be more opportunities to talk to each other. But the fact proved that the students were not so loud as she would've thought.

The pre-service teacher (16 May 2014/17-21): "Okay, what do we do here is that we watched the film here for the first time without sound, and this is in order to watch carefully, and to write down and to use the words without hearing them first. What I saw is that they are used to do that, they again want to talk to each other. And I have to say that six minutes are very long time for this kind of class, but actually it worked if you compare them to others".

Normally it would be difficult to let the students focus on something for six minutes in class. However, in this lesson the students were not so loud as the teacher expected despite all of them sitting together. Maybe because the students were interested in the film, most of them were quiet and really into the class task.

Compared to before, the class was relatively quiet. Even if sometimes there were some students who were too loud, the students could deal with this problem by themselves. One student said "hush" which made the others quiet. The teacher explained the situation:

The pre-service teacher (16 May 2014/42-48; 50): "Yeah, sometimes, the students have to do that because they know that I do not. And yesterday, for example, it was again the same, and I did not interrupt anyway. And I said, 'Okay, now we have to do two minutes more and four minutes more, and then break'. I did not give them break, they had to work four minutes more even though the other half of class came in and they were really loud, but I did not let them just, you know, be interrupted by the others, they really have to work. Since they know that there are consequences, they are try to calm down the others on their own, which means they just do the job that I have to do. (laugh)".

The pre-service teacher (16 May 2014/82-87; 89-90; 92-94): "Because they, as before, they do that on their own right now, they know that if it takes too much time, then they have to stay and do something more. And since they realized that they, it is like, I think it has something to do that they are interested in sports because there they also do that. In the other classes, if you do that, maybe some one would say something like, 'Just shut up, do not talk'. You know. But in this class it works, when one student say 'hush', then the others are quiet. But still I have to interrupt sometimes, you know, I have to say, 'Trassy, look the front, and Tiney, I want to start', you know. If you do not do it too often, then it is okay, and you really have to be sure that the student is talking in fact. Because if not, they are always arguing with me: it was not me, it was….. You know".

As the teacher has used this classic strategy several times, the students have known what kind of consequence they would get if they were too loud in class. Therefore, some students themselves tried to make those talkative students quiet because they did not want to be punished for others' behavior. It seemed like the students were doing the job that the teacher should do. The classic way that the teacher used to make the students quiet had developed a mind of its own as it switched from the teacher to the students themselves. In any case, sometimes the teacher still had to use it herself.

4.2.4.8 Summary

There were some undisciplined students who talked privately too often in class, which caused some interruptions in the teaching activity. In order to cope with this situation, the pre-service teacher tried to take different approaches. At the beginning, the pre-service teacher was helpless because she could not even teach in such a loud class. She tried to make the students keep quiet, but the students did not care about what she said. Therefore, she resorted to more drastic measure that she had preferred not to do.

She rearranged the students' seats and separated the talkative students from each other. It was useful because the students had less opportunity to have private talk when they did not sit together. Another important strategy that she used was to write minutes on the blackboard whenever the students were too loud. This was a useful way, which always worked, because they knew it meant more work for them. To some extent, these two strategies were useful in handling this situation. However, it cannot deal with the root of the problem. The teacher realized that only changing the external elements was not enough, what she had to do was motivate the students, because she found that the students were quiet when they were motivated. Therefore, the solution to this problem shifted from external to internal.

The pre-service teacher tried to motivate the students by changing her teaching methods as she found the students were really quiet when they were interested in the class task. Since there were two teachers in this class, she also made good use of this existing resource and divided the students into two small classes because it was much easier to supervise the students and the students could concentrate much better when the class was smaller. She also showed her opinion that the most important thing is that the students cannot concentrate in class if they have too much private talk. In other words, what she really wanted to do was create a good learning environment, in which the

students could focus.

From what the teacher said in the interview, we find what she really cared about was how to make the students concentrate in class rather than only making them keep quiet. How to reduce the students' private talk is a sub-problem that she had to deal with in order to make the students concentrate in class and let them learn. In other words, her main purpose was to keep the students interested and learning.

4.2.5 Unprepared Students

Some students always do not prepare for class. This means they take more time to get ready when the teacher asks them to participate in the class task. For example, some students do not take their workbook to class, and some of them have to find their textbooks when they are asked to answer a question.

4.2.5.1 In the First Video (06 Sep 2013)

Most of the students were unprepared for class because they did not do their homework again, and they even argued with the teacher and complained that they had too much homework. Let us see how the pre-service teacher reacted to that situation.

Pre-service teacher (06 Sep 2013/19-29): "They are looking for their workbook, okay, they hand in homework too, and the other homework exactly, and it seems so most of them did not do that again, that is why I give them chance that they can do it again, and give it to me next week. And they are just, 'Yeah', they react aggressively, and they, maybe, I should stop and tell you what is happening. Okay, I can see what they are doing. Okay, they have to do their homework, and they actually studied this topic last week, and most of them forgot that, and then they are arguing with me, because they say that they have too much work to do, and that it changed definitely if you compare it to last year. And then I am telling them that they had the chance to do it again. And right now, they have a six grade, if you have their homework next week, I will give them good grade at that time".

Most of the students continued to not do their homework. The teacher tried to give the students

another chance to let them finish their work and hand it in next week. However, the students were still unsatisfied, reacting aggressively and arguing with the teacher. They said that they had too much work to do citing that they got more homework than last year. What the teacher did was give the students a little 'threat' and told them that they would receive a bad grade now, but they could get a good grade if they handed in their homework next week. The teacher tried to get the students to prepare for class by giving them some punishment.

4.2.5.2 In the Second Video (25 Oct 2013)

Some students did not even take their textbook and other materials to class. Since they failed to prepare, they did not know how to do the class task. Just like what the pre-service teacher described:

Pre-service teacher (25 Oct 2013/79-81; 83; 85-88): "Now, okay, maybe, we should focus on this student, because he just, he does not have the material and he does not have the textbook and he is just talking all the time. So, let's see what happened with him. And he is just moving around, like it is really normal. But the more I know, the less he does it. He needs a lot of attention. You know, that is why he always does something. Last time, he had to sit here on the front, and it was much better, but I think we have to reorganize the class again, because this constellation does not work, especially in the back. That is just too loud".

Apparently, some students were really unprepared for class because they even did not take their textbook to class. For example, one student was moving around the classroom without a textbook, he appeared unprepared. But from the perspective of the teacher, this student was just acting out to get attention from his fellow students. The pre-service teacher tried to analyze the reasons behind the students' misbehavior for the purpose of dealing with this problem effectively.

Some students were unprepared because they were inattentive to the class task. After the teacher asked one student to read out the text, this student took a lot of time to do so because she did not know where her textbook was and which page she had to read. While this was going on the other students put some pressure on her and said things like, "Come on, let's start". But the teacher herself did not do anything because she found that the students could handle this situation by themselves. It seemed like she knew when to ignore and when to interrupt problematic situations in

class.

Pre-service teacher (25 Oct 2013/155-158): "Okay, now, I want a student to read out the text, but she just takes too much time, you know, she is just looking for the textbook and she is looking for the page. The students here are just stressful of the situation and they say, 'Come on, let's start, start'. They put on her the pressure, but I do not interrupt".

4.2.5.3 In the Third Video (15 Nov 2013)

The pre-service teacher and the co-teacher divided the students into two groups that would be taught by each teacher in two different classrooms. They thought it would be easier to supervise the students and make them concentrate in class if the class was smaller, so they tried to teach these two small classes separately. The pre-service teacher read the names of some students and let them go to the other classroom with the co-teacher, however, the students did not take their stuff or do their preparation work immediately. On the contrary, they took almost four minutes doing whatever they wanted such as talking with others and moving around the classroom. The students were not prepared in class because they did not want to be prepared.

The pre-service teacher (15 Nov 2013/61-64; 66-67):"Yeah, I read their name, and some of them have to leave the class with the other teacher, and that is why they feel that they can just do whatever they want. Like. You know, like three or four minutes, it is going to take. Until they leave the room and then we can start the class. See how loud it is, actually they have to say, okay, they have to take their stuff and just move, but they do not".

4.2.5.4 In the Fourth Video (17 Jan 2014)

Since the students were always unprepared, the teacher lost some teaching time. She had to wait until the students were prepared. This kind of preparation work should be finished before class, however, the students always needed time to do it at the beginning of class.

The pre-service teacher (17 Jan 2014/48-50; 52): "They always need time to, you know, to take all the stuff, they never prepared, some of them like, oh! I need my book. I need to go to the back of the classroom to take my book or workbook, for example. And this is what takes much time".

The pre-service teacher and the co-teacher separated this class into two sections again, because they found the students could concentrate much better when the class became smaller. From the videos, we can find it almost took two minutes to split the class. After the teacher finished reading the names off of the list, those students who were transferring rooms spent much time taking their stuff to go to the other classroom. The teacher said:

The pre-service teacher (28 Feb 2014/132-135): "Okay, now you see the first two minutes actually you have to pass until we really, really start the task. Okay, now I am moving in, see? Because I see he just wants to talk to him, he does not want to work what he should do. I am doing the same for the students here".

The pre-service teacher herself realized that it took too much time to split the class. The students should be able to finish this kind of preparation work in a very short time. However, they took almost two minutes. The pre-service teacher also realized that the reason for that is because the students did not want to do it quickly. In other words, the students could do the preparation work quickly, but they did not want to do what they should do because they were not motivated.

4.2.5.6 In the Sixth Video (21 Mar 2014)

As usual, before starting the class the pre-service teacher divided the whole class into two small classes. It took much time to split the class because the students spent too much time taking their supplies with them to the other classroom. She said:

The pre-service teacher (21 Mar 2014/10-12): "Hm, and we have to organize a little better, so the students know that they have to take their stuff earlier, so that we can start on time. So it still like we have to wait until, you know, three, four minutes".

The pre-service teacher realized that it was a problem because she lost a lot of time at the beginning of the class. She knew the reason was that the students spent too much time on the preparation work. Therefore, she should try to organize it better to save time.

From the video, the teacher prepared the projector in the first one and a half minutes of the class to show a film. Meanwhile, the students were also preparing for their work such as taking out their textbooks and finding the materials they needed. Compared with before, the situation changed a lot because the students tried to prepare rather than just walk around and talk in the first few minutes of class. In other words, the students tried to be prepared in class.

4.2.5.8 Summary

There were some students who were always unprepared for class. It was a problem for the pre-service teacher, as it affected her teaching activity. The teacher reflected on this problem and tried using different strategies to cope with it.

Some students did not finish their homework before class. Although the teacher already given them a chance to finish, most of them still did not take advantage of the opportunity. Some students even argued with the teacher and complained that they had too much homework. So, the teacher told the students that they would get a bad grade, but they could get a good grade if they could hand in their work next time. The pre-service teacher used the punishment to motivate the students in order to let them learn, as she had no other option with which to cope with this situation.

It even happened that some students did not take their textbook or materials to class and some of them only pulled out their book once the teacher asked them to read something out of the textbook. These students did not do their preparation work for the class. In order to make the students concentrate better in class, the pre-service teacher and the co-teacher decided to separate the students into two groups so that they could teach them separately. However, the students were not motivated to do their preparation work as they always took too much time to take their stuff and go to the other classroom with the co-teacher. It was really a problem because both of the teachers lost some teaching time due to the students' misbehavior.

But it is worth mentioning that this situation changed over time. The students tried to be prepared for class when they were motivated and interested in the task. For example, the teacher showed a

film in class once, and the students were really motivated and tried to prepare when the teacher was setting up the projector. The teacher mentioned in the interview that she lost teaching time when the students were not prepared in class, which means she wanted to let the students learn more in class by letting them prepare before class.

4.2.6 Unable to Assign Group Work

After trying some group work, the pre-service teacher found it was very difficult for the students. The group work teaching strategy was unsuitable for this class because of the complexity of the class itself. However, she tried to change this situation.

4.2.6.1 In the First Video (06 Sep 2013)

The pre-service teacher did group work in this class to enhance the classroom effect, however, the fact proved that this teaching method did not work in this class, as the teacher was unable to get anything done. The students did not care about what the teacher said and just did whatever they wanted to do. The teacher said:

The pre-service teacher (06 Sep 2013/69-73; 75): "Yeah, I mean, I said, 'Come on ', they will be a little quiet, in this case, or in this kind of group, I would never like to work like that, you might have realized that, this group work does not work in this class, they are sitting in groups, and normally they had a U shape sitting, and then they changed since then it is like, it is horrible, it does not make fun, actually, to teach this class. Maybe, I should talk to the other teacher that they have to sit in a different way".

The pre-service teacher (06 Sep 2013/77-79; 81-82; 90-97): "This student, he is just walking around, and he is looking for something, I do not know what he is doing. Now, he is going to the other teacher and asking something, I do not know whether he has problem or not. Yeah, the teacher is here. And he is going there to ask something, I said, 'Sit down, we start ', and we cannot start, you know. So, we have a class discussion, the main questions are they have to, no, it is not, they have to look at layouts, and say which is the best, and after that, I want them to show the opinion with their partner, but you will see now, they are not doing that. Is not it? Okay, now, this student raises his hand, but what I want them to do is share with their partner. And just you know, maybe,

half of the class is talking with the neighbor and all the others are just looking at the book and do something. So, if you, even though, I say, 'Now, talking with your neighbor', they do not do it. You know, just work in this way".

The class was almost out of control, and only half of the students followed the class plan and did the group work. The pre-service teacher thought the main reason for that was because of an unsuitable seating arrangement. It was very difficult to manage the class when the students sat together. If the students did not sit together and instead did the class task on their own, it would be much easier to supervise them because they would not have so many opportunities to talk to each other and walk around the classroom. Therefore, what she planned to do was change the seating arrangement and make the whole class a little easier to control.

There were only two girls in this class and the rest of them were boys. If they had opportunities to do something together, the boys would make good use of it to be rowdy. So, the teacher planned to change the external elements of this class such as the seating arrangement and work with them in another way. She said:

The pre-service teacher (06 Sep 2013/106-109; 111-113; 121-122; 126-127): "It is actually a good arrangement, but it did not work in this class. You always have to think about the class situation. And there are just too many boys, and too active, for example, then you need to think about the different arrangement. Okay. In this case, yeah, maybe, I should talk to the other teacher. Yeah, because it is really hard, because you always, I mean, first, you argue with this group in the front and then, you know, in the back, and again, in the front, the arguing is not working. I mean even though I am explaining that what they have to do now, they do not care. Okay, what I am feeling is like: Shut up. I want to explain you what you have to do right now".

The pre-service teacher (06 Sep 2013/258-260; 264-271; 315-316): "No, it is not about the number, I mean, there are just twenty students at list. It is okay. But we have a really complicated class here, and do the group work like that, that make the whole situation complicated, I think that is the difficulty about it. Yeah, but actually you can still work with them in a different way, but as it before, you have to change other stuff, I mean external factors like rearrangement of the seats or that, some students do not sit with each other, because their friends are talking about other stuff, yeah, these are factors you can consider and rearrange the whole class, but I am not the class advisor, maybe I should ask her again, if there is any possible and any chance to change. Because in

this way, I will never do the group work again, that is really such situation, because just doing pair work, it is really boring. So, I will let them work in a different way, but if it does not work. What I feel of the situation is like: I am so happy that I survived".

4.2.6.2 In the Second Video (25 Oct 2013)

Because of the previous experience doing group work, the pre-service teacher decided to change the seating arrangement and have the students do the class task on their own. But she did not only change the seating arrangement, she actually tried to build a new class model for the students.

The pre-service teacher (25 Oct 2013/101-105): "Yeah. So, this class, I did a lot of things, it was like, they have to work on their own, and then we always collected it in the class. But did not work with their neighbors. Because I want them to get used to that situation and maybe the next class they have the opportunity to work with their partner. Because otherwise, if I would start like working groups, it would be just too loud, that is why I want to do that best up".

The pre-service teacher (25 Oct 2013/237-253): "Yeah, I do not think that is just only the arrangement, but as it before, what is important is that they have to get used to the new situation, and what I do is that I let them work on their own, because whenever they will have the opportunity to talk to anyone else, they will talk about private stuff. That is why I have to do that step by step. So, which means they have to work on their own for the next, maybe one or two weeks. Then, they are going to do some partner work, and then, maybe in four or five weeks, they can do one a little group work. You know, if it works, we will do it more often. Now they have to do on their own. Because they are going to find out that they are working on someone's own, that just getting boring. You know, after a while, and then they have to recognize it, that I would like to give them opportunity to work in groups. But, if just, if it works, and if not, they have to work like that. And they have to understand, because if I have to make, what can I also do is something what I think now is, after three or four weeks, I can say, since they sit like that and work on their own, they have much better grades, for example, that is what we can today, and if they do not want that trade, the changes, that they have to, like control themselves when they have to work with their partner or with the group".

From what the teacher said she tried to change external elements of this class. Besides this, the

teacher did not plan to continue doing group work in the near future as she expected similarly poor results. The students would have off-topic chats and make the whole class very loud whenever they had an opportunity to sit together. Therefore, she decided to let them do their class task on their own until they could control themselves and do the work independently.

The teacher herself also realized that the students would feel bored if they always have to do their tasks alone. However, she had to wait until the students could work independently, otherwise it would not be meaningful to let them work together. For example, after a few weeks if the students could control themselves and work alone, the teacher would give them some opportunities to work together, but for now they had to do their work on their own. The pre-service teacher tried to create a new teaching model in this class rather than only changing some elements of it.

4.2.6.3 In the Third Video (15 Nov 2013)

What the pre-service teacher firstly planned to do was to cultivate the students' independence in class. The teacher knew that some students were too dependent on each other as they always tried to let others do the class task when they worked together. It is also one of the main reasons why she planned to let the students do their work on their own. However, the teacher found a compromise. What she did was divide the whole class task into parts. The students worked together, however, they had their own job. It was indeed group work, but it was special because the teacher has assigned a specific task to each individual student. She said:

Pre-service teacher (15 Nov 2013/137-142; 163-164; 166-168): "Yeah, I think the problem in the group work especially in this class is that even if you give them a task, they always want the other students to do something, so that they are much more passive and the others are more active. And this is what Max is expecting of this group work, and that is why I have to give a special task. So, they know even you work in a group, you know, you have the own task, and just doing it together makes you are working in the group. Yeah, they have their own task, and after that, they put together and it is still a group work, like. Because if I just say, just do a flyer, you will not get any results, because this student will let the other student do it, and the other student will also ask others to, so, we will never have any result in the end".

Besides this, the pre-service teacher also paid much attention to the allocation of members to each

group. For example, she could not let all the undisciplined students sit together, and she also could not arrange all the students who were good at English to be in the same group.

Pre-service teacher (15 Nov 2013/181-182; 184-190): "Yes, I have to focus on that every group member has got better, better student. I do not want to say better, but who are much better in English. And I also focus on which student is more disciplined and which is less. Because you cannot have a group work with five students who are always really complicated. That is why it is really difficult. I take a lot of time until I have this group. But in this case, we have two students, two students who are problematic, but in this case, it is really good. I have to say. For example, this student, he is always really quiet. And that student, for example, even if you talk loud, he always does not do what he has to do".

The pre-service teacher had enough experience with the students so that she could arrange the group members according to their characteristics. For example, she tried to separate talkative students from each other, as it would be very loud if all the undisciplined students stayed in one group.

After changing the seating arrangement and carrying out the new teaching model, the whole situation became much better than before. The pre-service teacher was encouraged by the students' improved performance.

Pre-service teacher (15 Nov 2013/309-310; 314-316; 375-378): "Okay, what I am seeing is that they are really quiet for a group work. It was strengthening me, not like the weeks before. Do you remember that? Hm (laugh), but I do not know if there would be a difference if you would just take all the other groups. And you would just work in the class, maybe, really, really strengthen again. I am not sure about that. Yeah, I have to say, I am really satisfied with that class, it was okay, just two students went walk the way, yeah, but the others were really into it, and I like it very much".

4.2.6.4 In the Fourth Video (17 Jan 2014)

The pre-service teacher found the new seating arrangement had a huge influence on the students' behavior because some students behaved much better than before. For example, one of the students concentrated much better in class since the teacher changed his seat. She said:

Pre-service teacher (17 Jan 2014/148-152; 156-157): "You know, we actually have one student who is much better than before, okay, maybe, I should go back, so you can see him, I think, during the November or December, he was sitting in the front, and he was so un-concentrated, and he never did the task, and we have a lot of problems with him. But since, he just, you know, he sits on his own, it is much better, he is doing so good there. So, you can see, the arrangement must have a good influence on how the students are working in the class".

The pre-service teacher (17 Jan 2014/183-190): "It is not a U shape, but with a U shape, and just a few students in the middle. But what we cannot see on the camera is that we also have a lot of space in the back, so. Maybe, we can just take one or two students, and put them there, because I think, maybe, two or three students should also sit on their own. These students are really good here, for example, they are really concentrated, and they are always really quiet. But it does not make sense that they are sitting next to each other. Because you know, it is always better to have one quiet student, and just one who talks, you know, and not having three students who are always talking to each other".

From what the teacher said we can find the seating arrangement to be one of the external elements which plays an important role, as it affected the students' behavior and concentration. It is apparent that what the pre-service teacher really wanted to do was make the students concentrate in class by changing external elements.

In the second half of class, the students' concentration level was lower than the first half. The teacher thought the reason was because she did not change up her teaching methods so the students became less interested. In other words, she thought she should use some new teaching methods to keep the class fresh. She said:

Pre-service teacher (17 Jan 2014/342-348): "Yeah, yeah. I think it is my fault, because I could not have changed the methods. Maybe, they had to work in the group, or maybe they had to do something else. But it was like, you have to write something down, and then they had to work with the workbook. I mean, it was not really changing the method. You know, it was actually the same, so, that is why it is maybe my fault. If I have given them something to read, or maybe, something they have to write like a letter, or something like that, maybe it would be better".

Pre-service teacher (17 Jan 2014/351-358): "I think what is important why you change your

method is that they are always get motivated because they never know what is going to happen next. And whenever you change the method is like something new is coming. And then, they are concentrated. But if you are just doing the same all the time, they are getting bored, that is normal. You cannot change anything about it. And that is why I think it is my fault. But I actually knew that is going to be like that, because I did not prepare myself very well yesterday. We had some kind of group work, or they had to do some kind of the presentation, or maybe".

4.2.6.5 In the Fifth Video (28 Feb 2014)

It was a writing class. The pre-service teacher and the co-teacher divided the class into two small classes. They did that because it was very hard to teach all of them in one classroom, further more, there were two teachers in this class, so they made good use of this advantage and taught the two classes separately. The pre-service teacher explained:

The pre-service teacher (28 Feb 2014/23-25; 27-28; 30-35): "Yeah, I mean we are going to need some kind of experience. If we see that it does not work like that, and we have to change some of students that we are going to change about. And I think, in whole, this is going to be the class I am going to work with. We actually work like that several times. You know that, right? Have you even been there, just, we have short group. Yeah, we did that before, and we actually experienced that it is much better to do that. And I tell them why we did that. Because yesterday was actually really, really hard for me and for all the other students, it was just stressful. Yeah, and I want to make a transport why we did that. I do not want them fell like, 'ooooh! Maybe just the good ones are moving with Ms. Schulman or are they punishing or whatever ', I just want to make sure that they know that we work more concentrated".

The pre-service teacher did not assign group work this lesson because she was afraid that she could not get anything done if all the students were in one classroom. Therefore, the co-teacher and the pre-service teacher divided the students into two groups that would be taught by them separately. Just as she said, the purpose was to have the students concentrate on their work better. She had already tried this method before and it proved to improve the students' focus. She also gave the reasons for that:

The pre-service teacher (28 Feb 2014/89-95; 102-105): "The thing is we just have three students

who are always arguing with other students, and who always make chaos. And two of them are in the other class. Whenever I start, the others are just continuing what they actually started and it is like a views. Yeah, that is why it is good that we separate the class. And Ricano, for example, he is always really loud, if another student in this class too, it will be chaotic, and he is in another group. Trassi, for example, she is really loud when her girlfriend, I mean her friend is not here, she is the only girl in this group. And Tinos, for example, he is also, whenever Madni and Andoni, these two students are really loud, he just did the same. It is like, he does not really concentrate on the class. But now, he has to sit on his own, he has to write. He really finishes his task".

The pre-service teacher (28 Feb 2014/107; 109-112; 55-59): "So, in specific groups, it is really important that you do that. Yeah, I mean that there will be time that I have to teach all of them if the other teacher is sick or whatever. And some times, we are going to do some kind of group work or presentations, then it is better to not split them. But, yeah, it is just going to be an exception in this case, I think it is much better. And I also think it is really good about this class being much smaller is. That students, like these two, are sitting in the back, and Kative, for example, raises his hand and can say something because he is really, really shy. Other times, he does not do the volunteer. I give them an opportunity and they do not feel shame when they do any mistakes if the class is small".

From the perspective of the pre-service teacher, the advantage of the smaller class was that those students who were always loud were separated from each other. So, some of them could remain more focused on their work because their partners were not there to distract them. The other benefit was some students became more active because they did not feel it so shameful to volunteer in a smaller class. The pre-service teacher did not assign group work this lesson, but she tried to have the students concentrate more by making the class smaller.

4.2.6.6 In the Sixth Video (21 Mar 2014)

The pre-service teacher found that the students tried to do their work together whenever they sat next to each other. She instructed them to solve the tasks on their own as she believed they would learn little if others constantly solved their problems for them. She said:

The pre-service teacher (21 Mar 2014/148-153; 156-158): "I want to do it like that because yesterday two students or four students were sitting next to each other. And then it is like what I say

is just, 'Do it on your own'. They do partner work, when they do it with partner, and do group work, it does not really work, that is why I want them to do it on their own now and next week for example, I want them to do some partner work, and if it works, then I am going to, yep, maybe, they have the opportunity to sit with someone they like. But I am going to change it, but first all they have to get used to this new kind of class with this constellation, and if I see that they can work together the way that I actually tell them to do. So, then I can change the arrangement of their seat".

The pre-service teacher realized that one of the reasons why she could not do group work in this class was because the students were too dependent on each other. Some students always tried to get others to do their work for them. Therefore, the pre-service teacher always told the students that they should do their work on their own instead of relying on others. The teacher herself also knew that it would be boring if the students always worked alone, however, they had to work alone until they could control themselves and become relatively independent. Only when the students could work independently, would it make sense to let them do group work.

The pre-service teacher tried to make the students become independent by having them get used to doing their class work on their own. She also had a strategy for how to cultivate the students' independence step by step. She said:

The pre-service teacher (21 Mar 2014/160-172; 174-175): "Yeah, and that is why this week and next week, they are going to work like that, then they are going to be a partner work and a group work, and if I see that works, then I can, maybe just put their partner, and if I see that it does not work, then they have to do like that again. And I think what also really important are that is what I do in my another class, that I always tell them that you will get a grade for the thing that you do when you do a group work, and the results for the whole group work. So, you get a grade for the group work for the result, and for the things that you do within your group. So I can see, I tell them that I can see what they are doing, if they are doing something, or if they are just relaxing and letting the others work. And that is what I am going to do next week. I am going to tell them that you have to realize that you will get two grades, one for what you do and the other one for group result, which means they will be much more, they will get more concentrated on what they are doing. Hopefully. Yeah, because if I say just do partner work, then sometimes, what I can see is just they do not do anything because they really try to let the others work".

The pre-service teacher realized that the main reason for this problem was that some students

always tried to rely on others to finish their group work. Therefore, she changed the evaluation mechanism to include two parts. The first part of the grade was an evaluation of the group as a whole while the second part was an assessment of the individual. This new evaluation mechanism would be put to the test in the next few weeks to see if it could improve the quality of group work.

4.2.6.7 In the Seventh Video (16 May 2014)

In this lesson the teacher showed a film to the students and allowed time for discussion. Actually she planned to collect the students' thoughts by letting them do group work, however, she changed her mind because she found that the students still lacked enough independence.

The Pre-service teacher (16 May 2014/28-31): "Okay, now, I give them about two minutes, so they can just write their thoughts, what they thought by taking notes, they actually have to do that on their own, but as you can see, and here they just shared their thoughts. Okay, and even though I said about two minutes, I gave them I think one more minute".

The pre-service teacher (16 May 2014/54-56): "Okay, now, we are correcting in the class, what I actually want to do is they do that in groups, but I think it would take much more time, and I did not like that they are talking so much. I think we would not have come to the end".

She came to this conclusion because the students still tried to share their thoughts with others when they were asked to write their thoughts down on their own. Therefore, she changed her mind and let them do their work alone, because otherwise it would not have come to the end. The teacher tried to use the teaching method best suited for her group of students.

4.2.6.8 Summary

It was very hard for the pre-service teacher to assign group work to this class as the students would talk amongst each other and become uncontrollable. The students just did anything they wanted and did not care about what the teacher said. After analyzing the situation, the pre-service teacher decided to change external elements of this class such as the seating arrangement in order to change the situation. She separated those talkative students so that they would have fewer opportunities to talk to each other.

After changing the seating arrangement, the pre-service teacher let the students finish their work on their own instead of doing group work. She realized the main reason why she could not assign group work was because some students always tried to rely on others to finish. Therefore, besides always telling the students that they should do their work on their own, the pre-service teacher also tried to set up a new evaluation mechanism for the group work in order to cope with this situation. She planned to tell the students that their grades would constitute of two parts. One part of that was the result of the common work of all the group members, and the other part was the result of their individual work. The pre-service teacher thought in this way she could cultivate the students' independence in class.

The pre-service teacher did a lot to cope with this problem. However, trying to assign group work was not the real purpose of what she did. She mentioned in the interview that she tired to change the external elements of this class in order to have the students concentrate better. For example, after rearranging the students' seats, some students concentrated much better than before as they had fewer chances to talk with their friends. Telling the students that they should do their task on their own also helps them to work better in class.

Therefore, we can conclude that what the pre-service teacher did to cope with this problem had another purpose: making the students concentrate in class and learn well. In other words, trying to do group work is only a strategy, which was used to reach the underlying aim of her teaching activity.

4.2.7 Inattentive Students

Some students were inattentive during class. They could not focus on the class task but always spent a lot of time doing something else. For the pre-service teacher, it was a problem because it affected the quality of her teaching and simply served as a distraction. Let us examine how the pre-service teacher coped with this problem.

4.2.7.1 In the First Video (06 Sep 2013)

Some students were always confused about what to do. Although the pre-service teacher always

explained to them what their task was and what they had to do, they were still unclear and did not know how to go about doing it, as they did not pay attention to what the teacher said. The pre-service teacher described this situation in the interview.

The pre-service teacher (06 Sep 2013/129-136): "So, I started explaining and then I realized that it is too loud, and then, I start and I say their names, so, every body knows that, 'Okay, she is mentioning your names, and we have to be quiet '. Now, it is a little better. Now they are listening to me, I mean what they have to do, and again, okay, I explain what they have to do, and then I am asking again. So, what is the thing that you have to do, in order to find out if they really know what they have to do, because they always say okay, and they take the sheet and they just do not know how to start, for example, that is why I am asking again, so, what did I say".

It seemed like the pre-service teacher had realized that the students did not pay attention to what she said, because the students always told the teacher that they already understood their task when she tried to help them, but actually they still did not know how to start their work. Therefore, after explaining to the students the class task, the pre-service teacher asked the students again and again in order to know whether they really understood it.

Some students were so inattentive that they did not start to do their work until the teacher told them that there were only a few minutes left. The pre-service teacher said:

The pre-service teacher (06 Sep 2013/239-246): "They are doing the task, I mean, the smaller the group, the more they are concentrating on the task, but, this group, for example, the front, you can see that they are not concentrating, this student, for example, at the last ten minutes, when I just said, 'You just have ten minutes left '. And he said: 'oh! My god, we have to, we have to complete the whole task right now', but before, they were not. The group, in the back, the same, there were two students they were really concentrating on that, here in the back, right on the camera, these three were working through all through the class, and one in the front did not do anything actually. And you can see".

Obviously, some students did not pay attention to their work until they realized that they did not have much time to finish it. The pre-service teacher tried to put some pressure on the students and let them know that they should do their work as soon as possible. In the interview the pre-service

teacher paid much attention to the students' concentration state in class, because what she expected was to have the students focus on their work.

4.2.7.2 In the Second Video (25 Oct 2013)

In this class, the teacher asked a student to read out loud, but the student took too much time to do it because she even did not know where her textbook was. How inattentive this student was!

The pre-service teacher (25 Oct 2013/155-158): "Okay, now, I want a student to read out the text, but she just takes too much time, you know, she is just looking for the textbook and she is looking for the page. The students here are just stressful of the situation and they say, 'Come on, let's start, start '. They put on her the pressure, but I do not interrupt".

This student took much time to read out the text because she was not paying attention. If she was attentive and followed instructions, she would have known which page to read and not have to search for her textbook. But the teacher did not do anything this time because she found that the other students had put some pressure on this student, and they could handle this situation by themselves. It seemed like the pre-service teacher knew when she should interrupt and when she should ignore.

4.2.7.3 In the Third Video (15 Nov 2013)

The pre-service teacher knew that some students did not focus on their class task until they realized that they only had a few minutes left. So, she tried to give them some pressure in order to have them concentrate in class. She said:

The pre-service teacher (15 Nov 2013/268-269; 277-278): "And now, I am telling then they have to hurry up. And I say, you have about five minutes, even though they have ten minutes. Okay, now, you see, they are hurrying, you know, now they know, okay, we have to be done in five minutes, so, they….".

This was the way that the pre-service teacher used to handle this situation. She was learning the students' particularities. She knew that the students could really focus on their task only when they

realized that they must finish it in a few minutes. So, she put a little pressure on them and told them that there was only five minutes left even thought they still had ten minutes. It worked because after that the students were hurrying to finish the task.

4.2.7.4 In the Fourth Video (17 Jan 2014)

Some students were inattentive in class. They told the teacher that they understood what they should do when the teacher explained the task to them. However, after a few minutes it became clear they did not know their task exactly. The teacher said:

The pre-service teacher (17 Jan 2014/11-15; 17-19): "Now, I explain to them that they have to do. But I know that it was just oral, that is why I have to write it down on the blackboard, so that they know what they have to do, because it always like, 'What did we have to do'? In order to, how can I say, not make them talk with the class where they have to work. I think it is better to write down on the blackboard. I know, whenever they are listening to me, they are like, 'Okay, okay', and after two minutes, they do not know what to do. That is why I have to write it down on the blackboard".

In order to let those inattentive students know what they should do exactly, the pre-service teacher wrote the class task on the blackboard, because otherwise they would ask others, creating opportunities for off-topic discussion. Normally, the pre-service teacher gave the students a reasonable time to let them finish their work, but for those inattentive students, she would give them more time because she knew that they could not finish it within the fixed time. She said:

The pre-service teacher (17 Jan 2014/31-39; 44-46): "Yeah, Tracey actually says, 'Just seven minutes'? And I say, ' Yes, but if you need more time, you will get it '. Because some of them use three minutes, for example, to write down the task, which is on the blackboard. And others, actually, will finish the whole task in seven minutes, I mean, that is a problem. That is why I say some minutes, but if you need more, it is okay. But for the ones who are much quicker, for example, I always have another task to do. Yeah, I had this, there was a task on the blackboard, which, I do not know what kind of words, but there was actually one more task, which I could give all to the students who are much quicker than the others. And if you have looked at the pictures, and if you concentrate on the facts we did that very often, then, they must be able to do that in seven to eight minutes".

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The teacher knew that the students could finish their task in seven minutes if they concentrated on it. However, some students needed more time, as they did not focus on their task. In order to keep balance, the teacher gave the students an average time for their work, but they could get more time if they needed, and for those students who finished their task very quickly, she would give them an additional task. Similarly, for those students who took too much time before starting their class work, what the pre-service teacher did was help them and let them know that they should do their work instead of doing something else in class. The teacher said:

Pre-service teacher (17 Jan 2014/54-60; 98-103): "This one, I mean he is actually very good, but he always needs a lot of time, you know, now he is just talking, just looking to one of his friends over there. And after a while, I am going to him, I do not know when, I am like, ' Do you understand that? Do you need help '? And he said yes. I just write down all the questions. After three minutes, yeah, then you can see how different they are. The other students, like, Max, for example, you have to care about him, because you know, he writes down all the questions, and he can actually do it, yeah, without having look at the time. He is good, but the problem is he always needs a lot of time. You know, until he starts to do something. And whenever I ask him, he is good, but he is always like looking around and talking to other students, looking at the clock, for example. You know, that is why he always needs a lot of time. That is why students like Max, just finish one task in five minutes, and you know, I think it is problematic, but what can we do about it"?

Some students were inattentive in class, which was the reason why they took so much time before starting their work. Actually these students could do their work very well, but the problem was they spent too much time doing other things before doing their work. The pre-service teacher noticed that and she tried to discuss it with those students and gave them some advice. The results proved that her supervision was important for those inattentive students because it changed their behavior a lot.

4.2.7.5 In the Fifth Video (28 Feb 2014)

After explaining the class task to the students, the pre-service teacher moved around the classroom and tried to help them. One of the students did not do the work and just smiled. The pre-service teacher touched his head and told him that he should concentrate on his work. She said:

Pre-service teacher (28 Feb 2014/165-167; 169-170): "(laugh) Yeah. But I can do that with this student, because he is always laughing. He does not know what to do and he is always just like smiling. And you know that I am just making fun. You know, he is so cute, he just wants, you know, they are just fooling around, that is okay, you know, it is an eighth grade, so".

The pre-service teacher found that one student was inattentive, she touched the head of this student and told him to concentrate. She could do that with this student because he was always laughing, so she knew she could be a bit silly with him and let him concentrate in his own way. It appears that as her relationship with the students grew so did her strategies for dealing with them.

4.2.7.6 In the Sixth Video (21 Mar 2014)

Since the students were divided into two small groups, the pre-service teacher tried to be at the center of the classroom because she thought that the students would concentrate more if they found the teacher was close to them. In other words, she tried to supervise them and have them concentrate in class by being close to them. The teacher said:

Pre-service teacher (21 Mar 2014/93-100): "Okay, in here, what I do now is, since we have a smaller group, I always try to be really in the center, which means I always go a little bitt more to the front and not try to hide myself behind the teacher desk. Yeah, so I move, so that they know she is present, maybe, I am not quiet sure about that, maybe, they will concentrate much more because then they will see, 'Okay, she knows that I am not really active in the class right now '. So whenever they feel like she is coming close, they are like, okay, now I have to focus on. And maybe this class needs it. I am not sure something that I try".

4.2.7.7 In the Seventh Video (16 May 2014)

The pre-service teacher showed a film to the students. From the video, we see the students were concentrating on their class work for most of the class as they were interested in the film they watched. However, the students' concentration level was low and they were inattentive in the last few minutes of the class.

The pre-service teacher (16 May 2014/61-66): "Okay, and I think they really like this kind of task because they know that they can do much more and they. What I do not like about is that they just give the answer, and never say the sentences. They do not want to use the language. And that is why I am asking questions so that they can give the answers. It is really hard this time to say something because it works some kind of, right? But in the end it became complicated".

As the students had an interest in this kind of class task, they were attentive and did much more than before. That means changing teaching methods was useful to make the students enjoy and be more involved in class. However, the students were still inattentive and impatient at the end of the class just as before.

4.2.7.8 Summary

There were some students who were inattentive and did not pay attention to what the teacher said in class. This leads to them being unclear about what to do in class. Some students told the teacher that they understood the instructions when the teacher explained, however, they still did not know what to do or how to do it. Therefore, the pre-service teacher wrote their class task on the blackboard and asked the students again and again in order to make sure they really understood what she said.

Some students did not do their work in class until the teacher told them that there were only a few minutes left. In order to have the students do their task as soon as possible, the pre-service teacher tried to put some pressure on them and let them know that they should finish their work soon.

The pre-service teacher tried different kinds of ways to have the students concentrate. She divided the students into two groups as she found the students could work much better when the class was smaller. She tried to be in the center of the classroom as she thought the students would concentrate much better when they found that the teacher was close to them and tried to supervise their work. She also tried to use some new teaching methods such as showing a film to the students and had them discuss it.

The results proved that what the pre-service teacher did was useful in changing this situation because the students' behavior also changed. They were attentive in class when the teacher showed something new in class, and tried to do much more when the teacher was supervising them. Besides

this, the teacher knew the students more and more over time, and the strategy she used to cope with this situation also became more and more flexible.

4.2.8 Impatience at the End of Class

The students were very loud and impatient at the end of class, as they knew there were only a few minutes left. They talked and walked around the classroom even though the class had not ended and the teacher was still teaching. Let us examine how the teacher attempted to remedy the situation.

4.2.8.1 In the First Video (06 Sep 2013)

The pre-service teacher had the students do group work this lesson. During the last few minutes, the class was particularly loud because the students knew that the class would be over soon. Some of them walked around the classroom and looked at the clock on the wall. They were very impatient and just waited for the end of class rather than working.

The pre-service teacher (06 Sep 2013/315-216; 318-320): "What I feel of the situation is like I am so happy that I survived. Yeah, you know, it is really interesting, but I did not really care the situation, I knew that it was too loud, and I knew that they were working, but was like, it does not matter what I do right now, it won't change anything about the situation".

From the video, towards the end of class the pre-service teacher went around the classroom and tried to collect the students' work. It was very loud, but she did not try to make the students quiet because she knew that it would not change anything. She appeared helpless in this situation.

4.2.8.2 In the Second Video (25 Oct 2013)

At the end of the class, the students were as impatient as before because they knew there were only two or three minutes left. They talked and made the whole class very loud. But this time the pre-service teacher tried to do something about it. She said:

The pre-service teacher (25 Oct 2013/219-220; 222-223; 225; 277-279; 281; 284-287): "Okay, now, it is getting loud, because they know that there are just two or three minutes left. Okay. I say, '

It's up to you ', if you are loud, you will have to still wait in here, and if not, you can leave earlier. And now, I am just sitting there, and now wait. See, it works (laugh). That is so cool. Whenever I go to the blackboard and write the minutes, like, 'Okay, I am quiet '. It is like the conditioning, somebody, you know, like a dog, whenever he hears the ring, or bell, you know, like that (laugh). That is what I do with them. Oh! My god. Yeah, I know they want to have the pose, and they know that I would take them two minutes if they take mine. I said, I think, in the second class, I said whenever you take my time, I am going to take your time. And that is fair, and they know that is fair".

The pre-service teacher just said: "It's up to you" to the students. The students got the hint. The students knew that the teacher would take their time if they took her time. For example, the teacher would give them more homework or they would have to stay longer. Therefore, they went quiet immediately. The teacher's strategy was successful.

4.2.8.3 In the Third Video (15 Nov 2013)

The pre-service teacher let the students do some kind of group work this lesson. The surprising thing is the students were really into the class work, even at the end of the class, most of the students were still focused. There were only a few students who were still impatient and loud. However, the whole situation was much better than before. The pre-service teacher was really satisfied with the students' performance.

4.2.8.4 In the Fourth Video (17 Jan 2014)

In the last few minutes of the class, the students were getting loud. The pre-service teacher noticed it and tried to make them keep quiet. She said:

Pre-service teacher (17 Jan 2014/335-340): "Yeah, yeah, I said like that, Max, be quiet or Daneil, be quiet. It was, I can see you, I know you and another one are talking, so, be quiet. Okay, they are just talking too much. Here, now, it is getting louder (laugh). He is still drinking. Now the whole class is, you know, which minute it is? Thirty-six, okay, the concentration is on the low level right now. You can see that, if you compare this situation with the situation in the beginning".

The pre-service teacher tried to have the students be quiet by calling their names one by one. She thought the students were getting loud because their concentration was wavering with the end of class approaching. Therefore, she planned to change her teaching methods to make the students concentrate even at the end of class. For example, she said:

Pre-service teacher (17 Jan 2014/342-348): Yeah, I think it is my fault, because I could not have changed the methods. Maybe, they had to work in the group, or maybe they had to do something else. But it was like, you have to write something down, and then they had to work with the workbook. I mean, it was not really changing the method. You know, it was actually the same, so, that is why it is maybe my fault. If I have given them something to read, or maybe something they have to write like a letter, or something like that, maybe it would be better".

Pre-service teacher (17 Jan 2014/351-358): "No, I think what is important why you change your method is that they are always get motivated because they never know what is going to happen next. And whenever you change the method is like something new is coming. And then, they are concentrated. But if you are just doing the same all the time, they are getting bored, that is normal. You cannot change anything about it. And that is why I think it is my fault. But I actually knew that is going to be like that, because I did not prepare myself very well yesterday. We had some kind of group work, or they had to do some kind of the presentation".

From the perspective of the pre-service teacher, the students were impatient and loud at the last a few minutes because they were bored or unmotivated. Therefore, in order to motivate the students to be interested in class, she would change her teaching methods and provide something new for the students.

4.2.8.5 In the Fifth Video (28 Feb 2014)

It was a writing class and at the last a few minutes the students were as impatient as before. They talked with each other and looked at the clock on the wall very often because they knew the class would end soon. The teacher told the students that they had only three minutes to finish their work. However, this did not change much, as the students were still loud.

After a few seconds, the pre-service teacher asked the students whether they have finished their task

because she wanted to collect their answers. In this moment, the class became relatively quiet, maybe because the students had to focus on the class work when the teacher was asking questions, so, they had less opportunity to do things besides their work. It seemed like the pre-service teacher needed to micro-manage them in order for them to concentrate.

4.2.8.6 In the Sixth Video (21 Mar 2014)

In the last few minutes of class, the pre-service teacher read the time wrong and thought that there was not enough time to let the students do some kind of partner work. The students were impatient and just did anything they wanted, as they knew the class would end in a few minutes. The teacher explained this situation in the interview.

The pre-service teacher (21 Mar 2014/219-231): "Yeah. Okay, let us see. Now because I actually told them that they have to do some kind of partner work, but I look at the watch, and it is just about five minutes or six minutes. Since they sit together and I do not know, it will take about two minutes in this class. And I thought that it does not really make sense. And then they will just talk to each other. And what I did not know is that I thought that they just have three minutes, but they actually have eight. And I was like, okay, because in three minutes I do not want to just change their seats. Then I realized, oh! My god. They have eight minutes. Then they actually could have sit together, and could have started with the task. And since I said, 'Okay, we do not have much time'. They were like, okay, the class is going to the end. That is why they do not even start. Transcy, for example, she starts, she does it on her own. And the others are talking about anything else. It does not have anything to do with the subject right now. And Matthias, he is just coming to the front because, you know".

The pre-service teacher (21 Mar 2014/233-234; 236-239): "Okay, now I am just saying the names of students, you know, it just makes them being quiet. But it does not work. It is like, Nicos, Manus, … like okay. (laugh). Okay, since I realize that it does not work, I go to the students and tell them you should start now, so that they know, ' Okay, now I have to do something '. Because I think they did not realize it. He is still talking to me, you know, now he is talking. Now again, I go to look at each other, to be quiet".

After a few seconds, the pre-service teacher realized that she read the time wrong and actually she

could have them do partner work. Then she tried to make the students keep quiet by calling their names. It seemed like sometimes the students became impatient and loud because they had nothing to do in class. So, they had more opportunity to talk to others or do something else. From the video, we can find after the teacher tried to collect the class work and let the students answer the questions, the students were not so loud because they had to focus on the teacher's question.

4.2.8.7 In the Seventh Video (16 May 2014)

The pre-service teacher was satisfied with this class because it went relatively well most of time. However, at the end of the class, some students were still impatient and loud. She mentioned this in the interview:

The pre-service teacher (16 May 2014/68-70): "I think they were good but not in the end. In the end it was really some kind of chaos. But still, comparing to other times, it was still very good because this class, you know".

The pre-service teacher (16 May 2014/72-74; 76-77): "Okay, minute 38, and now it really became really noisy, because now I gave them the task to what kind of opinion they have, what kind of predictions they did before. And I said that they should do that on their own, but it does not work. It always takes about two minutes until they are really quiet and we can move on. It starts at minute 38, and now it is 40".

At the end of the class the students were still impatient and loud. The teacher lost class time because she had to wait until the students were quiet.

4.2.8.8 Summary

The students were very impatient at the end of class. During the last few minutes, the students walked around the classroom, talked with others and looked at the clock on the wall quite often. In short, they were impatiently waiting for the school bell to dismiss them.

It was very difficult for the pre-service teacher because sometimes what she did was not enough to remedy the situation. For example, at the beginning the pre-service teacher found that the students

were very bored and just waited for her to say "goodbye" at the end of the class. So, she tried to make them quiet, but the students did not even care about what she said.

However, the pre-service teacher kept at it. For example, she told the students that if they took her teaching time, she would also take their time by giving them more homework or withholding dismissal. It worked because the students knew that it was fair and they also did not want to receive these kinds of consequences. Therefore, every time the teacher said: "it is up to you", those impatient students became quiet immediately.

The pre-service teacher also tried to analyze the reasons behind their behavior. She found the students became impatient and loud at the end of class because they were bored and unmotivated. So, she tried to use some new teaching methods like showing a film to the students and providing something new in class. Besides that, she also supervised those impatient students and had them concentrate in class by asking them some questions.

Obviously, the pre-service teacher reflected a lot on this problem and took different measures to cope with this situation. However, on the basis of what she said, we can find that what she did was not only make those impatient students quiet at the end of class, but what she really wanted to do was make the students concentrate in class and learn better.

4.2.9 Conclusion

In analyzing the data it seems like the pre-service teacher tried to deal with eight problems in her class, mentioning these eight topics in almost every interview. The pre-service teacher talked about the class problems and how she coped with them. But if we analyze these topics a little deeper, we see that her goal was not simply dealing with these specific problems, instead they had a root concern: to have the students concentrate in class to let them learn.

During the interview sessions, the pre-service teacher brought up the terms "concentration", "work" and "motivation" in relation to almost every topic she discussed, regardless the problems she had been facing in a particular class setting. She also mentioned phrases such as "they do not work "or "they are working" repeatedly in the interview. What is however the precise meaning of "work" in this context? How are the teacher's concerns to be interpreted? By analyzing the interview data, I

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found the pre-service teacher used these phrases to describe her expectations of the class's attitude towards her teaching, rather than the actual status quo (i.e. while she expected the students to work quietly, they actually did not focus on the work.). For example when starting class, she expected students to quiet down their personal conversations and pay attention to the teacher. Her expectations mirror her idea of a productive learning environment. Later on she realized that a quiet class did not necessarily mean all students were working on their assigned tasks. Some students did not do any class work even if they kept quiet. In other words, the students did not focus on their class work although they did not talk amongst themselves. We can see what the pre-service teacher expected was not only a quiet classroom; instead, her goal was that students would do their work effectively in class. We can therefore conclude that what the pre-service teacher really meant when speaking of "work" was "learning" or "learn".

From the pre-service teacher's perspective, the main reason why the students would not work was that they were lacking in concentration. Consequently, she sought to motivate the students as a possible solution to this problem. A relationship between the terms work, concentration, and motivation can be inferred from the teacher's perspective, as she thought students' levels of concentration would rise once they were properly motivated, and thus motivation would be the key element to successful learning processes (i.e. in her choice of words, "work"). From her view, motivating the students is a possible solution to achieve higher levels of concentration in class, but not the goal of her teaching, because there are several different measures she could take to have students concentrate in class. For instance, she also tried to provide new learning materials and interesting topics in class in order to excite curiosity and attention among students and engage the students' general interest in class work, because if they are interested in class work, they can concentrate better.

I found motivating students is a salient way to help students concentrate better; however, it is not the only possible measure that can be taken to secure students' continued interest. In other words, motivating the students is an important strategy of the pre-service teacher's teaching but not the ultimate goal of instruction. Therefore, I summarized the pre-service teacher's teaching purpose as having the students concentrate in class to help them learn (work) more efficiently. Beside this, she explicitly said that what she did was for the purpose of letting the students work (having the students concentrate in class so that they could learn). In other words, for the pre-service teacher, the purpose of dealing with these problems is not to solely deal with the problems itself.

The change in the class's behavior over time showed that she was capable of dealing with these issues. Due to the measures she took, the students were able to make better use of their time at school. Let us examine how the situation changed.

At the beginning, the pre-service teacher was really unsatisfied with this class because the students did not work well, she was even incapable of teaching at times. For example, in the first video she wanted to let the students do class discussion and share their opinions with their partners, but almost half of the students did not do what the teacher asked them to do. The pre-service teacher said:

The pre-service teacher (06 Sep 2013/90-97): "So, we have a class discussion, the main questions are they have to, no, it is not, they have to look at layouts, and say which is the best, and after that, I want them to show the opinion with their partner, but you will see now, they are not doing that. Is not it? Okay, now, this student raises his hand, but what I want them to do is share with their partner. And just you know, maybe, half of the class is talking with the neighbor and all the others are just looking at the book and do something. So, if you, even though, I say, 'Now, talking with your neighbor', they do not do it. You know. Just work in this way".

The teacher reasoned that the students did not work well, because they did not concentrate. The pre-service teacher herself also felt very frustrated about it, even saying, "What I feel about the situation is that I am so happy that I survived". Obviously, she was really unsatisfied with the students' performance.

However, the situation changed in the second video, possibly due to the measures she took. In the interview, the pre-service teacher said:

The pre-service teacher (25 Oct 2013/99; 122-123; 160; 192-193; 65-66): "Wow, so quiet, do you remember the last class, which was really loud. And this student is also really good here, he is really active and understands most of what we do. How impressive, there is no problem since now, (laugh) I mean, because you see this student and this student, for example, both of them are working really good now. And they would not two weeks ago. Oh! They are really active. One, two, three, four, five, more active than the other classes. Right"?

Compared to the first video, the students worked very well in the second video. As the pre-service teacher explained, the students were quiet and active, they understood most of what they did. In

other words, the students worked much better than before.

In the third video, the pre-service teacher found that the students were really involved in class. For example, they tried to ask for help from the teacher when they did not understand the class work or when they were not sure about what to do. This was a new development. The pre-service teacher said:

The pre-service teacher (15 Nov 2013/232-233; 235-241; 244-247): "Okay, what I am also really proud of is that they really ask, you know, they ask if they have a question and if they are not sure about the result, they always ask me for the question. "Can you have a check, can you have a look"? Because this is new, other time, they never did that, it was like, they were quiet, and I was like, okay, they are working. But when I went through the class, I was like, what did you do? They did not even start, but now, I see that they are working. Even if it is not they are asking for any question, this proves that they really are doing something. Because they are not sure about it, because they know they have to present it. But on the other hand, I know they are working on something, and they are really focusing on something, and they feel like, it is important what they do, you know. And I think, this is important".

The pre-service teacher (15 Nov 2013/375-378): "Yes, I have to say, I am really satisfied with that class, it was okay, just two students went walk the way, yes, but the others were really into it, and I like it very much".

The pre-service teacher was satisfied with the students' class performance as they concentrated on their class work and tried to understand what they needed to do. That was what the pre-service teacher expected of them.

The pre-service teacher reflected a lot on this class and took different measures to have the students learn. The whole situation of this class changed a lot over time. For example, in the fourth video, the pre-service teacher found some students behaved much better than before.

The pre-service teacher (17 Jan 2014/91-92; 148-152): "Yes. They are really quiet. I think the first twenty/twenty five minutes, they are really good, they are really quiet, and they are really working hard. You know, we actually have one student who is much better than before, okay, maybe, I should go back, so, you can see him, I think, during the November or December, he was sitting in

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the front, and he was so un-concentrated, and he never did the task, and we have a lot of problems with him. But since, he just, you know, he sits on his own, it is much better, he is doing so good there".

The pre-service teacher (17 Jan 2014/186-190; 313-314): "These students are really good here, for example, they are really concentrated, and they are always really quiet. But it does not make sense that they are sitting next to each other. Because you know, it is always better to have one quiet student, and just one who talks, you know, and not having three students who are always talking to each other. I still think they are really very calm. They are quiet, you know, it is not like the classes before. Yeah, they are much better".

Those students who did not work in class before could concentrate in class relatively well, which was impressive. In the fifth video, one student who was not active before tried to participate in class work and did so very well because he was motivated. The pre-service teacher felt very good because she realized the class was moving the right direction. She said:

The pre-service teacher (28 Feb 2014/85-86): "For this class, it is absolutely good. I mean, if you are going to stay like that, I will always be really happy teaching them".

The pre-service teacher (28 Feb 2014/209-210; 268-279): "Okay, now I am just sitting in the front because I am seeing that everyone is concentrated, and Tinos, he asks me something, and I just move. And you see again, Nikos, volunteering to say something about today's class. That was really impressive. Because yesterday I took him and he had to write to some sentences about his internship, and they actually had some pictures and they were on the wall, and I want them to describe what they can see in the picture, and I actually wanted him to present his photo, and then, it was really good, I mean he made a lot of grammatical mistakes, but he described by himself, what he had to do there and so on, it was really good, and I say, 'That was really good, next time do your own. Do not make me pick you'. And he was really happy after that. That is why today he is really raising his hand on his own. That was really cool. I mean, actually you will never be able to support all the students, you will never have the class where all the students are motived and are interested in class. But even if it is just a really short development like we see here with Nikos. I think that is it".

In the sixth video, the pre-service teacher, despite some problems, was still relatively satisfied with

this class because she saw that the students were making progress. She said:

The pre-service teacher (21 Mar 2014/111-113): "And that is what I say, I mean they are actually good, since, I mean, a lot of mistakes, a lot of errors, but they are still active, and they are really interested in the topic, and I like it. You know, because they really want to say something".

The pre-service teacher (21 Mar 2014/206-210; 287; 289-290): "And it is actually the first time that I told them that they have to read a longer text within a really short time. But they were able to do that. I was really impressive about that. I had about four minutes or three minutes, and some students actually did it in three minutes, you know, that is really good. Yeah, they do a lot of mistakes, like he do and thing like that. But it is okay. You know, I think that is really important that they are motivated to do something".

The pre-service teacher thought the most important thing was that the students could concentrate in class and learn, although they made some mistakes. Compared to before, those students could concentrate in class much better, due to being motivated to do their class work.

The pre-service teacher's attitude towards this class became more and more positive as she found the students were trying to work hard in class despite there still being some issues. For example, she said:

The pre-service teacher (16 May 2014/37-40; 68-70): "What I really want to say is student like Max for example, he was always much passive in class, can say a lot because he really seems to be freak. He likes that very much and he knows every character, and that is why he wants to free himself into the class. And just prove that, you know something. I think they were good but not in the end. In the end it was really some kind of chaos. But still, comparing to other times, it was still very good because this class, you know".

Apparently, the pre-service teacher was more and more satisfied with the students' performance because she found the students were motivated to do their class work instead of just talking or doing something else. In other words, the whole situation of this class changed over time because the students could concentrate in class and do their class work. Compared to before, those students made much progress.

The results showed that the pre-service teacher was capable of dealing with the problems as the arose. But how did the pre-service teacher cope with these problems over time? In the interview, the pre-service teacher talked a lot about how she coped with the problems she encountered, such as how to make the students quiet and have them be active in class. She gave the reasons and described her thought processes for the actions she took. However, she could not articulate exactly how to have the students concentrate despite the successful end result. I asked her to describe how she managed to do it, but her answers were very vague, for example, she said:

Pre-service teacher (25 Oct 2013/169-171): "I mean, I seem to have the ability, but I do not know what exactly I do, except that I just, you know, stop talking, and just moving the back like the end. And just wait for them to be quiet".

It seemed like she had an ability which allowed her to come to the right decisions regarding the student's concentration. In order to answer my question, the pre-service teacher tried to find the reasons behind her actions. She tried to analyze why she was able to handle these situations. She said:

Pre-service teacher (25 Oct 2013/182-187): "So maybe, I mean maybe, it could just be that I have another relationship with the students now, we are joking much more, you know, sometimes they just tell me the stuff about themselves, maybe, it has something to do with that. They like me more than before, I do not know, but I think there are different facts that we have to consider, maybe, it is actually the situation, the new arrangement of the class, maybe, it is because today is Friday, and it is really early, I do not know".

Pre-service teacher (25 Oct 2013/200-201; 256-260): "You know, we always laugh with each other, and that is important that you can laugh with you students and have a good relationship. Okay, yeah, maybe, so, maybe, that is because at the beginning, I did not know all of their names. That makes me really uncomfortable. I have to tell. And I know, what makes students laugh, I know, what they are getting sad or angry about, and I can handle the situation much more, you know, I know what I have to ignore and where I have to interrupt, and I think this is what makes me confident".

Pre-service teacher (25 Oct 2013/294-300): "Now, I just think, it is how you fell the situation, if

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you fell comfortable, the people, the students are working, and they want to do something, then, I think that your intuition is getting better. Also, you know, it is like, I think I also influence them if I was not that motivated and just be angry and sad about the situation and then come up with a bad facial expression, that they would not work in the class, you know, so, it is always important which you give and what I give you. They are happy, then I am happy, and I am happy, then they are happy".

The pre-service teacher (17 Jan 2014/282-284; 287-288): "I think, I really, I mean, I like all the students in the class, and they are really cool. And I think we have good dialog, I think, it has something to do with that. Maybe, that is why, I mean we can laugh with each other. Yes, I think, it is really important, that is why, maybe, I just feel like, yes, just moving around, just chilled, like that".

The pre-service teacher (17 Jan 2014/378-383): "I think there are a lot of factors. It is not just about me have a huge influence on them. But I also think, that is the other teacher who is always talking to them. In groups, or in private, you know, and they actually learned and they are much more successful in class, in school, if you see that in general. When they are quiet, when they are supporting each other, you know, and do not work against with each other. I think, yes. There are a lot of factors we have to consider in here".

She found some reasons for it. For example, she knew the students more and more; she changed their seating arrangement in her class; she had a better relationship with the students and so on. However, she could not give an exact reason because she herself also realized that there were several different elements that contributed to it.

The pre-service teacher did not know exactly why she was able to have the students concentrate in class, as it was some kind of intuition for her. It was about how she felt in the situation. For example, she knew when she had to interrupt and when she should ignore some situations. However, she could not articulate how she managed to do that. In other words, the pre-service teacher could not articulate the knowledge about how to have the students concentrate in her class, but she could use this kind of knowledge properly. Obviously, for the pre-service teacher, the knowledge about how to have the students concentrate in class has one character: "one knows but one cannot articulate" (Polanyi, 1958). It seems like what the pre-service teacher knew is more than what she could tell.

Based on the data analysis, we know there is a common underlying goal for dealing with the eight problems in class, that is to have students concentrate in class and help them to learn better. Consequently, it seems likely there is a connection between having the students concentrate in class and dealing with these problems. The question remains what the relationship between these factors is. The use of a model might help to visualize and thus describe the relationship between these elements.
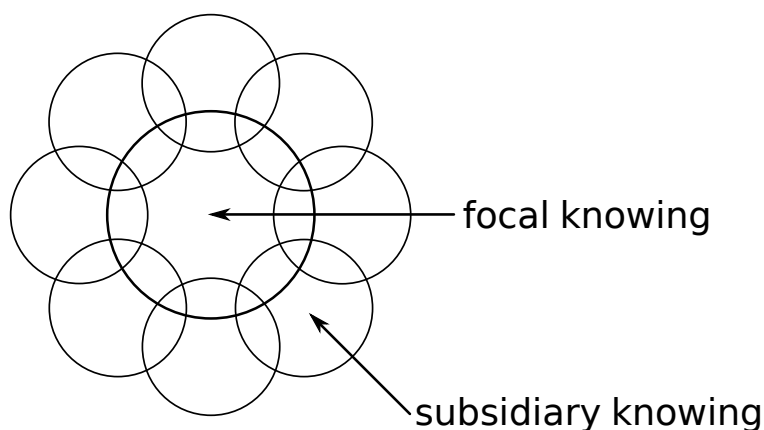
The model above consists of eight small circles and one bigger circle unifying the smaller elements in the middle. The eight small circles represent the eight problems that the pre-service teacher had to deal with in class, and the larger circle in the middle represent the underlying goal of dealing with these problems. Based on the data analysis, I found the pre-service teacher relied on her ability to deal with these class problems to have the students concentrate in class to learn, which means the integration of dealing with these class problems contributed to the underlying purpose. In analyzing the data, I found the pre-service teacher could articulate the knowledge she used to deal with these class problems; however, she was unable to describe the knowledge about how to have the students concentrate in class and help them learn. In other words, she was able to describe how to deal with these problems separately, but she could not articulate how to coordinate these elements to achieve higher levels of concentration.

According to the tacit knowledge theory (Polanyi, 1962), there are two kinds of knowing in one's activity, namely "focal knowing and subsidiary knowing". In this case, the pre-service teacher having the students concentrate in class is a focal knowing as it is the main purpose of her teaching activity, while dealing with these eight class problems is subsidiary knowing because it is the

strategy which the teacher used to reach the underlying aim of her teaching. Therefore, we can say the pre-service teacher relied on dealing with these class problems to reach her underlying purpose. The realization of the underlying teaching purpose is the integration or coordination of dealing with these class problems.

As both the pre-service teacher's focal and subsidiary knowing change over time, a chronologically ordered analysis shows us that the pre-service teacher was indeed able to articulate how she analyzed the class problems. She used different strategies to cope with problems as she was confronted with them (step-by-step), could however not explain how she coordinated the single steps from a more holistic perspective (focal knowing). As I have presented in the part of dealing with reflecting interpretation, the pre-service teacher could describe her reflection process of coping with class problems from class to class. However, she was hardly ever able to articulate why and how she reached this focal knowing.

In the interview, when she talked about how to cope with these eight class problems, she described how she learned from experience; and how she tried to use different methods depending on the individual characteristics of the student or students she was dealing with. In other words, in teaching practice, she would reflect on how to handle the class situation better, and she would be able to identify and describe the reflection as such. Yet, she was unable to articulate how to coordinate these elements until she became more accustomed to teaching, so that the activity became an automatic process which allowed for dynamic and spontaneous reactions to interruptions. I use the adjectives "automatic" and "spontaneous" to describe a state in which the teacher mainly focused on having the students concentrate in class to let them learn, and she did not have to think about how to deal with these class problems at the same time. It seems likely to conclude that knowledge about coping strategies is explicit knowledge the teacher can access at any moment, while knowledge of how to coordinate subsidiary elements is a kind of tacit knowledge to which she has no direct access per se. We can say the knowledge about how to cope with the class problems separately is explicit knowledge while the knowledge about how to coordinate the subsidiary elements to reach the focal knowing is tacit knowledge. We may arrive at a conclusion by making the relation between focal and subsidiary knowing explicit, i.e. that focal knowing is the coordination of subsidiary knowing.

The teacher in this study not only developed her focal knowing, but also how to cope with problems in class. From the reflecting interpretation of the research data, we know the teacher developed her

knowledge about how to deal with class problems through reflection. She reflected on how to cope with class problems, then tried to coordinate possible strategies in order to reach the underlying goal of her teaching until the whole teaching activity became an automatism. When she reached this state, she did not have to think about how to cope with the class problems, but she would know how to deal with them tacitly. Therefore, I think focal knowing is the coordination of subsidiary knowing.

As the pre-service teacher could not articulate how to coordinate these elements but could describe how to deal with these elements separately, we may conclude that the knowledge of how to have the students concentrate in class to help them learn is tacit knowledge, while the knowledge about how to deal with these problems separately is explicit knowledge.

We can then expand our previous conclusion as to say that tacit knowledge is the coordination of explicit knowledge. Tacit knowledge is used to describe the process from subsidiary knowing to focal knowing in one's activity, and is therefore a dynamic process. Reflection was used in this study to describe the development of subsidiary knowing; however, this does not mean that the teacher indeed reflected on her teaching methods during class, but in-between classes. While she was teaching, her main focus rested on how to coordinate these subsidiary elements rather than how to cope with the particulars. While teaching, she mainly focused on how to have the students concentrate in class rather than how to cope with these class problems.

This conclusion is based on tacit knowledge theory and the empirically grounded description of how a pre-service teacher acquired her tacit knowledge over time. It may be useful in understanding the process of acquisition of such kind of teaching knowledge. For example, teachers try to practice and acquire some basic teaching skills, then try to coordinate these basic skills until they teach intuitively. When they reach this point, they can do teaching intuitively, they seldom have to think about the basic skills required to teach, because they can use these basic skills tacitly. They also have little knowledge of how these basic skills contribute to their overall teaching. That their knowledge of the matter is mainly the tacit kind is also the reason why they may teach well in practice, but find it hard to describe the exact process when being asked.

As I have described, when the pre-service teacher was teaching, she mainly focused on how to have the students concentrate in class, but not on how to cope with the problems which she mentioned in the interview, because she coped with these problems tacitly. In the dynamic process from

subsidiary knowing to focal knowing, the pre-service teacher knew subsidiary particulars tacitly. However, why does the subsidiary knowing have the characteristic of explicit knowledge in this case? As I have explained, the pre-service teacher reflected on how to cope with class problems from class to class rather than during class. This means when she talked about how to cope with problems in the interview, she had at least some focal awareness of these particulars. When she paid attention to how to deal with class problems, this tacit knowledge become more explicit. Therefore, she was able to describe and articulate how to cope with these problems.

5. Teaching Practice, Belief, Instructor's Attitude and Feelings towards Teaching

As I have described in the chapter of "Data Analysis", when I doing "Video-cued Narrative Reflection" (Raingruber, 2003) and transcribing interview audios into text, I found the participant talked about very similar and even the same topics in every interview. Before doing "formulating interpretation" and "reflecting interpretation" (Bohnsack, 2014), I did a "pre-interpretation" in this study. With that we can have a basic understanding about what the pre-service teacher mainly focused on in her teaching. The pre-service teacher focused on some common topics in the interview, about eleven of them were very similar or even identical in almost every interview. Eight of them were about the class problems that she had to deal with, while the remaining three topics were about her teaching belief, her attitude towards teaching, and her feelings about teaching.

Therefore, by following the steps of the data analysis method—the "Documentary Method" (Bohnsack, 2014)— I try to present what she focused on in her teaching (formulating interpretation) and interpret how the pre-service teacher coped with what she focused on in her class (reflecting interpretation). In the last chapter, I presented how the pre-service teacher coped with the eight main class problems over time. Now I will focus on interpreting the other three topics (her teaching belief, her attitude towards teaching, and her feeling about teaching) that she focused on in the interview and present how these elements change over time.

5.1 The Definition of Teaching Belief, Instructor's Attitude and Feelings towards Teaching

(1) The Feelings of Teaching

Teachers' feeling of teaching is an important research topic, despite there not being so much related research about it in the educational area. There is no common definition for feelings. Actually, it is really difficult to define "feeling", as there are many overlaps among these similar concepts such as feeling, emotion, affectivity and so on (Scherer, 2005). Sometimes people themselves also do not know exactly what they really mean when they ask the question "what is an emotion?" because they are not sure if they really mean feeling or emotion (Scherer, 2005). Nias (1996) in her paper titled

"Thinking About Feeling: The Emotions in Teaching" also did not define the concept of feeling although she discussed a lot about the importance of teachers' feeling. From her perspective, feeling, emotion and affectivity share the same meaning because she used teachers' emotions to describe their feeling (Nias, 1996). However, Scherer (2005) "distinguished emotion from other affective phenomenon such as feelings and moods" (p. 699) by giving a component process definition of emotion.

In this study, I do not attempt to distinguish among feelings, emotions and affectivity and give a definition of feelings, as the research participant herself did not make it clear about what she really meant in the interview. For example, I am not sure whether she really meant her emotions about teaching when she spoke about her feelings. Therefore, I classify expressions such as "I am really satisfied", "I am happy" and "I feel good" as her feelings about teaching but it covers more meanings. In other words, feelings also include other affective phenomenon such as emotions and affectivity.

Emotions and feelings are very important for teaching and teachers because we can hardly separate teachers' feelings from their teaching activity, we also cannot separate their emotions from their values and attitude towards teaching (Nias, 1996). "The emotions are rooted in cognition, then one cannot separate feeling from perception, affectivity from judgment" (Nias, 1996, p. 294). For example, "one cannot help teachers develop their classroom and management skills without also addressing their emotional reactions and responses and the attitudes, values and beliefs which underlie these" (Nias, 1996, p. 294).

Hargreaves & Tucker (1991) argued the importance of teachers' feeling by analyzing the nature of guilt as one kind of feeling a teacher might have. In their study, they discussed two kinds of guilt: persecutory and depressive, and identified four guilt traps of teaching, such as "the commitment to care, and the open-endedness of teaching" (Hargreaves & Tucker, 1991, p. 491). By identifying these guilt traps, Hargreaves & Tucker (1991) also presented some solutions for it, for example, teachers should build communities to set professional standards by themselves. Blase (1986) did a qualitative study to identify the source of teachers' stress. Teachers in this study are allowed to freely explain the meaning of the stress from their perspective (Blase, 1986). The author analyzed the categories of teachers' stress and presented the relationship between them and their teaching performance (Blase, 1986). The research results corroborate that "organizational, student, administrative, and teacher-related factors were most frequently related to teacher stress" (Blase,

1986, p. 33), and "work stress was linked to strong negative feelings in teachers" (Blase, 1986, p. 33).

In this research, I am focusing on the changes in a pre-service teacher's feelings towards her teaching and the influence of her feelings on the acquisition of tacit knowledge over time. I also try to explore the relationship among her feelings, beliefs, attitudes and teaching practice in order to know how these elements affect the acquisition of tacit knowledge over time.

(2) The Belief of Teaching

Belief has been an important research topic in the field of education. There are a lot of educational researchers who do related research about a teacher's belief. But what is belief? Although there is more and more research about this concept, there is no clear and mutually agreeable definition of belief.

Rokeach (1968) defined belief as "any simple proposition, conscious or unconscious, inferred from what a person says or does" (p. 113). Nisbett and Ross (1980) interpreted belief as "reasonably explicit 'propositions' about the characteristics of objects and object class" (p. 28). Harvey (1986) defined belief as "a set of conceptual representations which signify to its holder a reality or given state of affairs of sufficient validity, truth, and/or trustworthiness to warrant reliance up it as a guide to personal thought and action" (p. 660). We can find that these definitions and interpretations of belief are abstract and diversity. In other words, the concept of belief is still very fuzzy.

Borg (2001) summarized some common features of the definition of belief. She thought that there were four characteristics in common among the definitions of this concept.

 "1. The truth element—drawing on research in the philosophy of knowledge, a belief is a mental state which has as its content a proposition that is accepted as true by the individual holding it, although the individual may recognize that alternative beliefs may be held by others. This is one of the key differences between belief and knowledge, in that knowledge must actually be true in some external sense.

2. The relationship between beliefs and behavior—most definitions of belief propose that beliefs dispose or guide people's thinking and action.

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3. Conscious versus unconscious beliefs—on this point there is disagreement, with some maintaining that consciousness is inherent in the definition of belief, and others allowing for an individual to be conscious of some beliefs and unconscious of others.

4. Beliefs as value commitments—many definitions of belief recognize an evaluative aspect to the concept, and this is not surprising as the word itself originates from the Aryan word lubh, meaning 'to like or to hold dear', from which the word love also originates (Oxford English Dictionary, 1989)" (Borg, 2001, p. 186).

She summed up these characteristics and gave a summary of this concept. "A belief is a proposition which may be consciously or unconsciously held, is evaluative in that it is accepted as true by the individual, and is therefore imbued with emotive commitment; further, it serves as a guide to thought and behavior" (Borg, 2001, p. 186).

"All teachers hold beliefs, however defined and labeled, about their work, their students, their subject matter, and their roles and responsibilities" (Pajares, 1992, p. 314). But what is teachers' belief? As "the beliefs are studied in diverse fields has resulted in a variety of meanings, and the educational research community has been unable to adopt a specific working definition" (Pajares, 1992, p. 313), there is still no clear definition of teachers' belief in educational field.

However, a lot of educational researchers try to make this concept more clear in regards to education by doing related research. Pajares (1992) examined the different definitions of belief in different areas and how the researchers explain this concept in regards to education. Brickhouse (1990) examined "how teachers' belief about the nature of science affects their classroom practice" (Brickhouse, 1990, p. 53). Brickhouse (1990) also described the relationship between teachers' belief and their teaching activity. Ertmer et al. (1999) explored how "teachers' belief about the role of technology" (p. 54) affects the implementation of that in the classroom. Ernest (1989) presented a model about how teachers' teaching belief strongly affects teachers' teaching practice in mathematics class.

We can find the popularity of research in belief in the area of education based on the related literature about this concept. In this study, I take Borg's (2001) summary of belief as guidance to

explore how this conscious or unconscious proposition guides and affects the teacher's classroom practice—but from a different perspective.

I focus on examining the relationship between a teacher's belief and the development of tacit knowledge. In other words, I tried to explore how the teacher's belief affects the development of tacit knowledge in classroom practice.

(3) The Attitude towards Teaching

The concept of attitude is a very popular topic in a variety of research areas. "Despite the long history of research on attitudes, there is no universally agreed-up definition" (Olson & Zanna, 1993, p. 119). Researchers define attitude from different perspectives and present various descriptions and interpretations of attitude. "Notwithstanding these differences, we think that most attitude theorists agree that (a) evaluation constitutes a central, perhaps predominant, aspect of attitudes, (b) attitudes are represented in memory, and (c) affective, cognitive, and behavioral antecedents of attitudes can be distinguished, as can affective, cognitive, and behavioral consequences of attitudes" (Olson & Zanna, 1993, p. 119).

Based on these agreements of what attitude is, the researchers do a lot of related research about this concept in order to make it clear. For example, in the educational research area, Koballa & Crawley (1985) presented how attitudes toward science affect its teaching and learning. Wong & Fraser (1996) explored the connections "between students' perceptions of their chemistry laboratory environment and their attitudes towards chemistry" (p. 91). In their research, significant connections between these two elements were found (Wong & Fraser, 1996). Besides the related research about exploring the relationship among attitudes, in teaching and learning, there are also some researchers who try to present the changes of teachers' attitudes. Day (1959) described the changes of the new teacher's attitude towards teaching activity and children "after their initial teaching experience" (p. 326). Hogben & Petty (1979) surveyed some first-year primary teachers and some final year university students "in order to determine the nature of attitude changes during teacher education and in the first teaching year" (p. 212). Obviously, the researchers attempted to do the attitude-related studies from different perspectives.

In this study, I adopt these three common characteristics of the definition of attitude (Olson &

Zanna, 1993) as principle to reveal the pre-service teacher's attitude towards teaching. I attempt to explore the changes in a pre-service teacher's attitude towards teaching during her teacher training year but from a different perspective, because what I am focusing on is how her attitude towards teaching affects the acquisition of tacit knowledge, and how the attitude is affected by other elements such as her teaching belief, teaching practice, and teaching emotions.

In summary, I tried to describe changes in the pre-service teacher's teaching belief, feelings of teaching and attitude towards teaching in one teaching year and present the relationship among them. Let us examine the non-linear relationship among her teaching practice, teaching belief, feelings about teaching and her attitude towards teaching by analyzing the changes of these elements over time.

5.2 In the First Video

The pre-service teacher was not satisfied with the students' class performance in the first video as there were too many problems in the class. For example, she did not start the class on time, most of the students had not done their homework again and even argued with the teacher, she could not control the class, the students were too loud, the group work did not work and so on. She felt very frustrated with it. In the interview, she expressed her feelings about it. She said:

The pre-service teacher (06 Sep 2013/69-73): "I mean, I said, 'Come on' they will be a little quiet, in this case, or in this kind of group, I would never like to work like that, you might have realized that, this group work does not work in this class, they are sitting in groups, and normally they had a U shape sitting, and then they changed since then it is like, it is horrible, it does not make fun, actually, to teach this class".

The pre-service teacher (06 Sep 2013/289; 315-316): "Yeah, the real situation was like, oh! My god, it is too loud. What I feel of the situation is like, I am so happy that I survived".

Apparently, the pre-service teacher felt horrible about the students' class performance. She described her teaching activity as a disaster because she really did not enjoy it. She even said that she was so happy at the end of the class that she had survived it, which indicates that she was very unhappy with her teaching in the class. However, she did not lose confidence, as she still believed

that she could change the situation by taking some measures like rearranging the students' seats, changing the teaching methods and so on. Let us see what she said.

Pre-service teacher (06 Sep 2013/70-73; 75; 106-109): "I would never like to work like that, you might have realized that, this group work does not work in this class, they are sitting in groups, and normally they had U shape sitting, and then they changed since then it is like, it is horrible, it does not make fun, actually, to teach this class. Maybe, I should talk to the other teacher that they have to sit in a different way. Yes. It is actually a good arrangement, but it did not work in this class. You always have to think about the class situation. And there are just too many boys, and too active, for example, then you need to think about the different arrangement. Okay, in this case, yeah. Maybe, I should talk to the other teacher".

The pre-service teacher (06 Sep 2013/264-272; 306-309): "But actually you can still work with them in a different way, but, as it before, you have to change other stuff, I mean, external factors, like rearrangement of the seats or that, some students do not sit with each other, because their friends are talking about other stuff, yeah, these are factors you can consider and rearrange the whole class, but I am not the class advisor, maybe, I should ask her again, if there is any possible and any chance to change. Because in this way, I will never do the group work again, that is really such situation, because just doing pair work, it is really boring. So, I will let them work in a different way. But if it does not work, yeah, okay, I am going around and around and around. And I tried to help them. They though it was incorrect and I think they want to start again, and then, I do not know, I think I tried to motivate them, and they have to move on the task".

According to what she said in the interview, we find the pre-service teacher also expressed something about her teaching belief. For example, she thought that a quiet class environment was necessary for teaching and that the teacher should consider the students' individual characters before arranging their seats; the teacher should try to use new teaching methods in class so the students do not become bored; the teacher should try to motivate the students in order to encourage them to learn. Besides this, the pre-service teacher thought the main reasons why the students had unsatisfactory class performance was owing to her improper teaching methods and the seating arrangement. Therefore, she believed that she could work with them in a different way by changing those external elements.

Although, there were so many problems in this class, the pre-service teacher still held a positive

view of her teaching practice because she still had confidence that the problematic situation would be changed. In this case, her teaching belief is like some kind of prior knowledge, which exists before her teaching practice because she still held the belief that she can change the situation although she was not satisfied with the students' class performance. It seems that she already held this kind of teaching belief before entering into the classroom to teach. She could have gotten her teaching belief in different ways such as her own experience as a student in school, her courses in university and so on.

5.3 In the Second Video

In the second interview, the pre-service teacher felt much better about her teaching practice, as she made some changes to it. Although there were still some problems, such as the students being too loud; the students being impatient at the end of class; some students were not active in class and so on, the whole situation changed a lot when compared with before. This is due to the measures the pre-service teacher took. For example, she wrote the time she had to wait for the class to become quiet again on the blackboard. It worked because the students knew the meaning behind the time that she wrote on the blackboard.

She noticed that the whole situation became much better than before but she did not know exactly why, as there were several kinds of elements that contributed to that. For example, she developed a good relationship with the students; she changed the seating arrangement and let them do their class work alone; she knew more about the students. In a few words, she felt much better about her teaching.

Her attitude towards teaching also became more and more positive because she got positive feedback from what she did. She held the belief that she could change the situation by changing some external elements, and the results proved that what she did was useful. Just like what she said in the interview:

The pre-service teacher (25 Oct 2013/18; 264-267): "Yeah, yeah, I like them, they are so cool (laugh). Yeah, I mean that I have to surf on the beginning, and that is why I, I mean I was not willing to change anything, since they sit in this group constellation, you know, I was not even thinking about doing something, because I knew that it won't work. And since we have this

arrangement, so much better. And really has fun".

The pre-service teacher (25 Oct 2013/256-260): "Okay, yeah, maybe, so, maybe, that is because at the beginning, I did not know all of their names that makes me really uncomfortable, I have to tell. And I know, what makes students laugh, I know, what they are getting sad or angry about, and I can handle the situation much more, you know, I know what I have to ignore and where I have to interrupt, and I think this is what makes me confident".

We found the pre-service teacher's attitude towards teaching had changed over time. For example, at the beginning she said that it was horrible to teach the class because it was almost like a disaster, but now she enjoyed it, and became more confident about teaching. That means her teaching practice had some influence on her attitude towards teaching because the feedback she got from her teaching practice affected her attitude towards teaching. Similarly, her attitude towards teaching also had something to do with her belief about teaching because they affect each other during the teaching practice. Let us examine the changes in her beliefs about teaching.

In the second interview, the pre-service teacher made certain that she could change the situation by taking some measures because she had gotten some positive feedback from what she did. At the same time, she also got some new ideas about teaching from her teaching experiences as follows.

The pre-service teacher (25 Oct 2013/101-105): "Yeah. So, this class, I did a lot of things, it was like, they have to work on their own, and then we always collected it in the class. But did not work with their neighbors. Because I want them to get used to that situation and, maybe the next class, they have the opportunity to work with their partner because otherwise if I would start like working groups, it would be just too loud. That is why I want to do that best up".

Obviously, in the second interview, the pre-service teacher expressed something new about her teaching belief. For example, she thought that she could not do the group work in this class directly because it did not work when she tried it this way. Therefore, what she planed to do was to change the situation step by step. Firstly she let the students do their class work alone instead of together because otherwise some students did not do their work themselves but just tried to let others do it for them. However, she planned to give them some opportunities of doing the group work if she found that the students could do their work themselves rather than letting others do it for them.

Besides this, the pre-service teacher also found that motivation was very important to deal with the class problems, as she got some positive feedback from her teaching experiences. She thought that the main reason why the students behaved problematically was because they were lacking motivation. So, she tried to motivate the students in order to let them learn and move on. She said:

Pre-service teacher (25 Oct 2013/126-130; 132-135): "So, now, what I do is, even though, this student sat in the back and when he raises his hand, I take it. Because that you are just disturbing the class, that means, I won't take yours. I do not want to punish them, you know, that is what I always do. Even though somebody is really loud, and when he just raises his hand, I always take the person. So that, he still get motivated. They are disturbing the class, and then they have to sit in the back and do anything else. When they raise their hand, I take them, I just say, 'Okay, you can give the answer', and if it is good, I just say, 'Wow, well done, very good'. And then, you can just see, they are quiet (laugh)".

Based on her teaching experience, the pre-service teacher realized that teaching is an action in which teacher and students affect each other. The teacher should not only expect that the students make some changes, but that the teachers themselves should also change the way they teach. For example, if the teacher is unmotivated and angry, the students also cannot work well in this case. What the teacher can give to her students is always very important. Apparently, the pre-service teacher tries to reflect on her teaching activity on the basis of her teaching experience. The reflection of her teaching activity contributes to the changes of her belief on teaching. She mentioned that in the interview:

Pre-service teacher (25 Oct 2013/294-300): "Now, I just think, it is how you fell the situation, if you fell comfortable, the people, the students are working, and they want to do something, then, I think that your intuition is getting better. Also, you know, it is like, I think I also influence them if I was not that motivated and just be angry and sad about the situation and then come up with a bad facial expression, that they would not work in the class, you know, so, it is always important which you give and what I give you. They are happy, then I am happy, and I am happy, then they are happy".

5.4 In the Third Video

In the third interview, the pre-service teacher expressed her feelings about teaching. She was really satisfied with this class because the situation changed a lot if you compare it with before. She also got more confidence from her teaching practice. She said:

The pre-service teacher (15 Nov 2013/309-310; 375-378): "Okay, what I am seeing is that they are really quiet for a group work, was really, it was strengthening me, not like the weeks before, do you remember that (laugh)? Yeah, I have to say, I am really satisfied with that class, it was okay, just two students went walk the way, yeah, but the others were really into it, and I like it very much".

The pre-service teacher was satisfied with the students' performance, as she found that most of the students were quiet and really into the class work. It seemed like what she expected was a quiet learning environment, in which the students were concentrating. Although there were still some problems such as some students who were not active in class, the whole situation was much better than before.

The pre-service teacher liked this class more and more when she noticed there were some positive changes. Her attitude towards teaching also became more positive, as she realized that she could really change the situation by taking some measures. Just like what she said as follows:

The pre-service teacher (15 Nov 2013/309-310; 375-378): "Okay, what I am seeing is that they are really quiet for a group work, was really, it was strengthening me, not like the weeks before, do you remember that (laugh)? Yeah, I have to say, I am really satisfied with that class, it was okay, just two students went walk the way, yeah, but the others were really into it, and I like it very much".

She had a more positive attitude towards her teaching practice because she was inspired by the students' performance. It is not difficult to find that teaching practice affected her attitude towards teaching, and her attitude towards teaching also had influence on the changes in her teaching practice. In other words, teaching practice and attitude towards teaching affect each other during the teacher development process.

In the interview, the pre-service teacher also expressed some opinions about her teaching belief. For example, she thought that the individual students' learning ability was different. Therefore, as a teacher, she should consider this element and provide some special help to individual students. She said:

The pre-service teacher (15 Nov 2013/255-262): "Because you need to consider that every student has a different need. Some students need more time, some students need less, and you cannot compare this student who is always really active and always quick to one student who needs time to understand what she or he has to do. If I say, think about five questions, you cannot expect that he has done in five minutes, you know, maybe, he needs ten minutes, maybe, he needs fifteen minutes about the result is going to be the same as this student. That is why I think it is always better to give them enough time to do that".

She expressed the idea that due to the difference of individual students' learning ability, some students need more time than others to finish their tasks. However, as a teacher, she wanted to give equal treatment to all the students. The pre-service teacher tried to give more time to those students who could not finish their work on time; and for those who were very quick to finish their work, she gave them some additional tasks. It seemed like the pre-service teacher realized that she should teach the students according to their aptitude and give equal treatment to all the students.

Apparently, the pre-service teacher got some new teaching beliefs from her teaching practice over time. Let us examine them. In the first two interviews, she expressed some ideas about her teaching beliefs, such as a quiet learning environment being important for teaching; the teacher should motivate the students in order to engage them in class; the teacher should not only try to change the students, the teacher should also try to change herself in the class and so on. But in the third interview, she expressed something new about her teaching belief. For example, she thought that the teacher should design the teaching activities according to the characteristics of individual students. It is something about how the teacher treats the students equally and individually in class.

It is not difficult to find there are some connections between her teaching belief and teaching practice. Her teaching belief guided how she behaved in classroom, and her teaching practice also contributed to the changes of her teaching belief. The teaching belief describes what kind of class she wants to have, and the teaching practice aims to realize her teaching belief and make it into practice. At the same time, her teaching practice modifies her teaching belief and renews it.

5.5 In the Fourth Video

As usual, the pre-service teacher felt much better than before about her teaching, as she noticed there were always some positive changes in this class. She mentioned her feelings towards teaching in the interviews as follows.

The pre-service teacher (17 Jan 2014/282-284; 278; 287-288): "I think, I really, I mean, I like all the students in the class. They are really cool. And I think we have good dialog, I think, it has something to do with that. Maybe, that is why, I mean we can laugh with each other. Yeah, I feel comfortable. Yeah, I think, it is really important, that is why, maybe, I just feel like, yeah, just moving around, just chilled, like that. I still think they are really very calm. They are quiet, you know, it is not like the classes before. Yeah, they are much better".

According to what the pre-service teacher said, we can find she was satisfied with the students' performance. She felt comfortable in class and also built a good relationship with the students. Obviously, her teaching practice affects her feelings towards teaching. Similarly, her teaching practice also contributed to the changes in her attitude towards teaching over time. As the pre-service teacher said in the interview, she liked the students more and more and felt comfortable in class because they had good dialog; she became more confident because she was satisfied with the students' performance. It is not difficult to conclude that her teaching practice has strong influence on the changes of her attitude towards teaching.

In the interview, the pre-service teacher also expressed something new about her understanding of teaching. She thought the main reason why the students behaved problematically was because they lacked motivation, in her experiences the students behaved properly if they were motivated in class. Therefore, she tried to change teaching methods because she believed that the students could be motivated if they were interested in the class task. It seemed like one of her teaching beliefs was that the students could concentrate on their work if they were motivated in class. She said:

The pre-service teacher (17 Jan 2014/227-234): "And it will be really important whenever I see that a student who is not that active in the class, that he is participating, and then, I can see that he is really giving the answers, and that we can just motivate them to do it again. I think it is really important, Daniel (the name of a student) for example, he was not that active the once before, and I was like, 'Daniel, oh! It is really a good answer', and he was like, ooooh! Okay, then, he wants to use it again. You know, I think, this is the way that works. I mean, we cannot expect them to be always really effective and just raised their hand every time".

The pre-service teacher (17 Jan 2014/351-354): "I think what is important why you change your method is that they are always get motivated because they never know what is going to happen next. And whenever you change the method is like something new is coming. And then, they are concentrated".

The pre-service teacher mentioned a lot about her beliefs towards teaching regarding the above. She believed the real reason why the students did not follow her instructions was because they were not motivated. In other words, the pre-service teacher thought that she should motivate the students, so that they would have a good performance. Obviously, from her perspective, the students can concentrate in class when they are motivated.

Apparently, the pre-service teacher's belief has a strong influence on her teaching practice. For example, when those students who were not active normally tried to give some answers in class, what the pre-service teacher did was encourage them and motivate them, as she believed that these students would become confident and even want to try again after being motivated. The pre-service teacher also believed that giving something new to students was also very important because it was one of the ways that could be used to motivate students. In this case, her teaching belief provided some kind of guidance for her teaching practice, and the relationship between teaching belief and teaching practice was like the relationship between theory and practice

5.6 In the Fifth Video

In the fifth interview, the pre-service teacher was satisfied with the students' class performance. It seemed like she gained more confidence from her teaching practice when she realized that she could work with these students much better than before.

The pre-service teacher (28 Feb 2014/85-86): "For this class, it is absolutely good. I mean, if you are going to stay like that, I will always be really happy teaching them".

Obviously, due to the students' good performance, the pre-service teacher had good feelings about this class. That means there are some connections between her feelings of teaching and her teaching practice. When she was satisfied with her teaching practice, she would have good feelings of

teaching and if she had good feelings about teaching, she would become more confident and want to improve her teaching again. It is a kind of feedback loop because these two elements have a great influence on each other.

Although there were still some problems in her class, the pre-service teacher always held a positive attitude. She said:

The pre-service teacher (28 Feb 2014/114-115; 117-121): "Yeah, do you remember what Acni actually said? When I tried to close the door. He said, 'I should not be so kind to other students'. Yeah, yeah, but he said that I should not be too kind to all the students. But which means that he actually thinks that I am kind to them too. And that is really important to me. They do nothing that I want to give them bad grades, or that I do not like them. He knows that I like them, and this is some kind of reflection for me. That is why I like too".

The pre-service teacher (28 Feb 2014/123-126): "Yeah, I mean they always talking to each other, but they never do that to stress you, you know, it is not like, they do not want to get on your nerves, but they do. Because they do not realize that it is really hard as a teacher to always control them in a way, to make them be quiet so others can work".

The pre-service teacher's attitude towards teaching also changed over time. She still liked the students, even though sometimes they misbehaved in class. She believed that the students did not do it on purpose, as they were still too young and did not realize it was really hard for the teacher to control the class. When she realized that the students knew that she was very kind to them, she was touched by what the students said. That means she desired understanding from the students. Obviously, she's involved in a deeper relationship with the students and tried to understand them more.

The pre-service teacher also expressed something about her teaching belief in the interview. She thought one of the reasons why some students were not active in the class was because they were too shy and felt shame in asking for help from the teacher in class. She noticed that the students would ask help from other students, so, she tried to build an environment in which the students could feel free and comfortable to ask questions. She said:

The pre-service teacher (28 Feb 2014/140-145): "I know they are going to ask the others students

and that is why I want to make them feel, I can ask you because some times they feel shame if they ask vocabulary which is actually basic knowledge. Like they are, why are, something like that. And some times, it is like. Maybe, you do not remember that I want to give them a feeling that it is not shame to ask questions. You should feel free to ask because that is the reason why you are here".

The pre-service teacher (28 Feb 2014/172-174; 177): "And you see when you move around, but not very often, and they see you in this moment, they feel free to ask you, but if you are just sitting there on the table, it is like, should I ask you now? You know. Yeah. I want to let them feel comfortable".

Besides this, the pre-service teacher thought that the students and the teacher should be on the same level in class. She did not want to hold the idea, as others do, that the students were always students, and the teacher had a higher status than students in class. For her, only when the students feel free and comfortable to ask questions to teacher, can they learn, which is what the teacher expects. She expressed this opinion in the interview.

The pre-service teacher (28 Feb 2014/195-199): "Even though students have to know that you are a teacher, some times it is better to be on the same level. You know, to be like, I am not like your friend, but you can ask me, that is why whenever I sit and you come like that. They are students, and you are a teacher, but when you sit, or some times, what I also do is when I bend down, so they can have eye contact with me".

The pre-service teacher (28 Feb 2014/201-207): "Yeah, not doing like that, because then it is like, I am a teacher and you are a student. Yeah, it is more that they feel much comfortable, I want them to be free to ask, and that they have the felling like that I do understand what they mean because very often is like, Oooh! Teachers are like: why do not you know this vocabulary? Why did not you listen to the task, you know, I do not want them to feel like that. They should always ask because if they do not ask, they will never know what to do. Yeah. And they will never learn. And I want them to learn".

As the pre-service teacher said, the students and the teacher are equal and on the same level, so, the teacher also has to follow the standard that is set up for students. For example, if the teacher expects that the students speak quietly in class, she or he also has to whisper when she or he talks to the students. The teacher should firstly set a good example to the students, then, the students can follow

her steps and whisper, otherwise she could not persuade the students to whisper when they have to talk with others. Just like what she said in the follow:

The pre-service teacher (28 Feb 2014/183-186; 188): "Yeah. (laugh) Okay, what I do here for example, let us go back, he is raising his hand, yeah, now I am saying: raising your hand. Yeah. I am trying to speak as quiet as possible, so that all the other students know, okay, because some times it is just like when you speak loudly, they think that they can ask loudly too. Now I want to talk to these students, and they ask me, I also try to whisper".

Obviously, the pre-service teacher's teaching belief not only guides the teaching practice, it can also be renewed by teaching practice because the teacher can always get something new from a real class. She tried to put her teaching belief into practice, but at the same time, she also got some new understandings from her teaching experience. This is also the relationship between teaching belief and teaching practice in this case.

5.7 In the Sixth Video

The pre-service teacher liked the students more and more although they still made some mistakes in class. She could feel that the students were really interested in the topic that she taught. She said:

The pre-service teacher (21 Mar 2014/111-113; 242-243): "And that is what I say, I mean they are actually good, since, I mean, a lot of mistakes, a lot of errors, but they are still active, and they are really interested in the topic, and I like it. You know, because they really want to say something. They are too active, sometimes, but cute active".

The pre-service teacher's teaching belief also changed over time. Some times the students were loud and made mistakes in class, but from another perspective that shows the students were active and had interest in their class work. For the pre-service teacher, what she really cared about was whether the students concentrate in class or not. If the students were really into the class, it was not so bad when they were a little loud or made some mistakes. Obviously, she changed her teaching belief, as she tried to understand the same situation from different perspectives.

The pre-service teacher's attitude towards teaching also changed a lot over time. Compared to

before, she held a more positive attitude towards teaching, as she could understand the same situation from different perspectives. For example, sometimes the students asked many questions when she was explaining to them what they should do. On the surface, the students interrupted her teaching activity, but it also showed the students were really interested in the class work. Therefore, she tried to explain more to the students and make things more transparent because otherwise the students' curiosity would interrupt the class. She tried to understand the students' behavior in a positive light. Just as what she said in the interview:

The pre-service teacher (21 Mar 2014/190-195): "Okay, so just while I am telling you this, that they always question what they want to know, and they always interrupt the class, and because they want to know why they are doing stuff, which means they are interested, but they want to know why they do that. Which means you have to do a lot of things more transparent. For me, as a teacher, that means that I have to give them much more information about why we do things in order to prevent interruptions like that".

Besides this, as a young teacher, the pre-service teacher could understand the students relatively better than the older teachers. She had more patience and realized that the students had some problems due to their age. Actually, she also had a similar situation when she was a student in school. Her peers misbehaved in class because they were too young to control themselves very well. Therefore, she tried to give the students more space and be more patient with them. She said:

The pre-service teacher (21 Mar 2014/263-264; 308-309; 311-316; 318-322): "And I think they are some times cute, but on the other hand, you see even though they are fifteen years old, they some times act, you know, like eight years old. Yeah, but they do have other hobbies. They have other problems, they are fifteen years old, their body is changing, you know. Their hormones are, you know. And that is why some teachers, for example cannot work with this kind of students because they do not have, they are not really patient. They are like, aah! I am a teacher, I am forty or fifty years old, and they have to work, they cannot just work with students are act like elementary school students. But I think I do have since I am not that old. Maybe I do it better, understand better, better understanding of what they are going through. Because when I talk to other pre-service teacher or teachers, we are the same age, they always think the same. We always think like: I think it is important to give them space, not to react when they say something, because some times, you know it does not have to do something with you, as a teacher. But just the hormone is talking".

5.8 In the Seventh Video

In the seventh interview, the pre-service teacher thought there were not so many problems with this class, otherwise she'd have told me about them. That means she was satisfied with this class as it worked to some extent. Although the class still had some issues, there was a lot of positive change that could not be ignored. She said:

The pre-service teacher (16 May 2014/64-66; 68-70): "It is really hard this time to say something because it works some kind of, right? But in the end it became complicated. I think they were good but not in the end. In the end it was really some kind of chaos. But still, comparing to other times, it was still very good because this class, you know".

From what she said we found that she was satisfied with the students' performance except for at the end of class, as some students were very impatient for it to end. But she still thought that it worked better when compared to before, which means she had good feelings about her teaching.

Due to the students' good performance, the pre-service teacher also had a very positive attitude towards teaching. She liked the students more and more and understood them much better than before. Just like what she said:

The pre-service teacher (16 May 2014/108; 112-113): "Yeah, I like this student's answer so much, so good (laugh). Yeah, it is really hard this time, I do not know what to tell you".

The pre-service teacher believed the students would get motivated if they were interested in the class topic. One of the students was normally passive, but he was very active in class when he was really interested. He tried to free himself in class, as he knew a lot about this topic and could talk more about that. For the pre-service teacher, what's important is how to motivate the students by getting them interested in class.

The pre-service teacher (16 May 2014/61-62; 37-40): "Okay, and I think they really like this kind of task because they know that they can do much more and they. What I really want to say is student like Max for example, he was always much passive in class, can say a lot because he really seems to be freak. He likes that very much and he knows every character, and that is why he wants to free

himself into the class. And just prove that, you know something".

Obviously, the pre-service teacher's teaching belief was enriched by her teaching practice, as she could always acquire some new understanding about teaching from her teaching experience. She realized that the students could easily concentrate on class work when they got motivated, and they would get motivated if they were interested in the class work. Therefore, she tried to make the class more interesting in order to let them concentrate in class and learn.

5.9 Summary

On the basis of the analysis above, obviously these elements (teaching practice; the feelings of teaching; teaching belief and the attitude towards teaching) change over time during the teacher professional development process. However, the changes of these elements are not independent. The teaching belief, the feelings of teaching and the attitude towards teaching, these three elements affect changes on teaching practice, but at the same time, these three elements also affect each other over time. But what is the relationship among these elements?

Firstly, we have to say the relationship among these elements is nonlinear and complex. I tried to use a framework to describe this nonlinear relationship. There are four elements in this case that we should analyze: teaching practice, feelings of teaching, attitude towards teaching and teaching belief. Based on the data analysis, we know teaching practice is mainly about how the pre-service teacher deals with the class problems in order to make the students concentrate in class, and the changes of her teaching practice reflect the process of her professional development. During the professional development process, she acquires her tacit knowledge of teaching by dealing with these class problems over time. There are also some elements such as her teaching belief, her feelings of teaching and her attitude towards teaching, which affect the acquisition of tacit knowledge. Therefore, the core of this model is about the development of tacit knowledge, and the other three elements are the related issues that affect this development process.
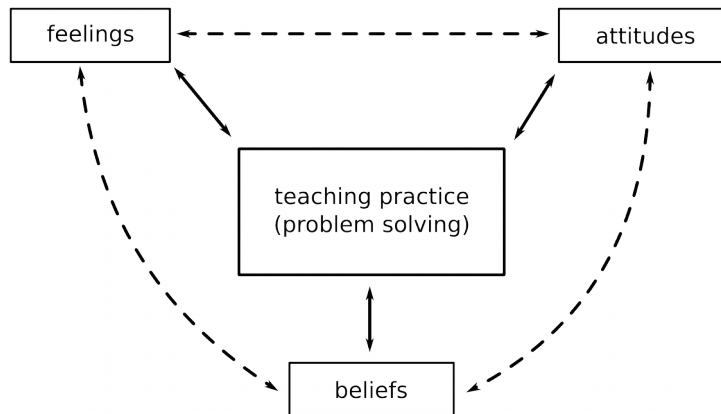
Secondly, let us examine the complex relationship among these elements. Based on the model above, it is not difficult to find that these elements affect each other, but how exactly do they influence each other? Maybe we can present this relationship by describing these three elements separately.

(1) Teaching Belief

During the interview, the pre-service teacher expressed something about her teaching belief. I summarized her teaching beliefs as follows:

1. The role of a teacher is to have the students concentrate in class and let them learn.
2. Every student can be educated but in their own way.
3. A quiet learning environment is absolutely necessary for effective teaching.
4. The students will concentrate in class when they are motivated.
5. The students will be motivated when they are interested in class work.
6. Individual students have different learning ability.
7. The teacher should treat every student equally.
8. The teacher should provide the proper external class settings according to the characteristics of the students.
9. The students and the teacher are on the same level in class.
10. The teacher should set the same standard for herself if she wants the students to follow class rules.

11. Encouragement is useful to motivate students.

In this case, teaching beliefs are like some kind of prior knowledge, which exists before teaching practice. In other words, the pre-service teacher already has some kind of teaching belief before doing teaching work. For example, in the beginning the class was almost out of control, she was very frustrated about that. However, she still believed that she could work with the students in another way by taking action. Her existing beliefs encouraged her to change the situation and move on. Maybe she acquired these beliefs from university courses, maybe from her own schooling experience, but in any case, she had some teaching beliefs before entering into the classroom.

Based on my analysis, I found that her teaching beliefs changed during the professional development process. She formed some new teaching beliefs from her teaching practice, and her existing teaching belief was also modified by her teaching practice. For example, in the beginning the pre-service teacher held a belief that a quiet learning environment is required for teaching, therefore, she paid a lot of attention to class management. She took several kinds of measures to make the students were quiet in class, such as writing minutes on the blackboard if she waited for the class to quiet down. This strategy worked very well because the students knew that they would get more homework from the teacher if they took too much class time talking amongst themselves.

However, after some time the pre-service teacher did not use this strategy as often as before, although it is a really classic way to make students keep quiet in class. In practice, the pre-service teacher realized that her purpose was to make the students concentrate and let them learn rather than only make them quiet. Although writing minutes on the blackboard is a really useful way to cope with this problem, it still has some negative influence on the students. For example, starting the class by telling the students that they would do more homework really demotivated them. Therefore, she used this strategy only when she had no other choice. Obviously, her belief and practice affected each other during her professional development process. The pre-service teacher acquired some new beliefs from her practice, and then she tried to realize these beliefs by changing the way she teaches.

Besides this, her feelings and attitude towards teaching also contributed to the changes in teaching belief during the professional development process. For example, after making some changes, the whole class situation became much better than before. The teacher was satisfied with the students'

class performance, and her attitude towards teaching also became more positive. She became more confident and believed that she could do more and go further, as she had already received some positive feedback from what she did.

The other point about teaching belief that I have to mention here is that teaching belief has a tacit dimension in this case. In this study, the pre-service teacher believed that the goal of teaching is to have the students concentrate in class and let them learn. In teaching practice, she tried to deal with problems that arose in order to facilitate the students' learning. Obviously, the aim of her teaching practice was to realize her teaching belief. But the pre-service teacher couldn't articulate how she realized her teaching belief in practice. She could get the students to concentrate in class, but not describe how. It seems like the relationship between belief and practice in this case is like the relationship between "know-that" and "know-how". Teaching belief is like "know that", which guides teaching practice, however, the pre-service teacher cannot articulate the "know how" even if she knows how to do it in practice.

Actually, I think this phenomenon is very normal, as teaching belief is like some kind of dream or theory about education in this case. Teaching practice is a way to realize the dream and put the theory into practice. "Know that" plays the role of theory and "know how" plays the role of practice. However, the transformation from "know-that" to "know-how" refers to something about tacit knowledge because there are a variety of ways which can be used to put theory into practice, and different teachers will take different paths to realize their teaching belief. There is no fixed rule that can work in every situation, as the related knowledge that each individual teacher uses is personal. Further more, a real class situation is very different and complicated, so, what the teachers do is recognize the individual problems of the class and try to coordinate these elements together in order to reach their teaching beliefs.

(2) The Feelings of Teaching

Her feelings towards teaching also changed over time during her professional development process. On the whole, the pre-service teacher had better feelings about teaching over time, as she was more and more satisfied with the students' performance. However, how her feelings changed cannot be separated from the changes of other related elements such as her teaching practice, teaching belief and her attitude towards teaching.

In this case, the pre-service teacher's teaching practice had a strong influence on her feelings towards teaching, which is very obvious because there is almost a direct relationship between teaching practice and the feelings towards teaching. For example, if the teacher finds the students misbehave too much in class, she cannot be happy about that.

There are also some indirect relationships between feelings towards teaching, teaching beliefs and attitude towards teaching. In this model, teaching practice (problem solving) is the core part of this relationship because teaching practice influences the other elements directly and the other elements affect each other indirectly. For example, when the teacher made some progress in her teaching practice, she was more confident and believed that she could do much better in the next class. At the same time, she also had better feeling about her teaching. Similarly, when her attitude towards teaching changed, her feelings towards teaching also changed at the same time. Actually, feelings & attitude towards teaching and teaching belief cannot be separated from each other in this case because they are on the same chain and their changes almost occur at same time.

However, feelings towards teaching also have some special characteristics in this case. Based on my analysis, I found feelings towards teaching also have a tacit dimension, as the feelings of teaching affect teaching practice, teaching belief and the attitude towards teaching tacitly. Just like what the pre-service teacher said in this case:

Pre-service teacher (25 Oct 2013/294-300): "Now, I just think, it is how you fell the situation, if you fell comfortable, the people, the students are working, and they want to do something, then, I think that your intuition is getting better. Also, you know, it is like, I think I also influence them if I were not that motivated and just be angry and sad about the situation and then come up with a bad facial expression, that they would not work in the class, you know, so, it is always important which you give and what I give you. They are happy, then I am happy, and I am happy, then they are happy".

The pre-service teacher (25 Oct 2013/256-260): "Okay, yeah, maybe, so, maybe, that is because at the beginning, I did not know all of their names that makes me really uncomfortable, I have to tell. And I know, what makes students laugh, I know, what they are getting sad or angry about, and I can handle the situation much more, you know, I know what I have to ignore and where I have to interrupt, and I think this is what makes me confident".

From what the pre-service teacher said, we found her feelings towards teaching are like some kind of intuition that influences her teaching practice, and this intuition also affects her teaching belief and teaching attitude at the same time. However, she could not articulate how her feelings towards teaching affect her teaching practice and other elements. Actually, intuition is also one kind of interpretation of tacit knowledge (Polanyi, 1958) from the perspective of some researchers. In this study, I find that feelings towards teaching have some kind of tacit dimension and it affects teaching practice, teaching belief and attitude towards teaching tacitly over time.

(3) The Attitude towards Teaching

The pre-service teacher's attitude towards teaching also changed over time during her professional development process. Like her feelings towards teaching and teaching belief, her attitude towards teaching was also affected directly by her teaching practice and indirectly by the aforementioned. For example, the teacher's attitude towards teaching became positive if the students' performance was good, and her attitude would become positive if she had good feelings about teaching. Similarly, her attitude towards teaching also became negative if she found that her teaching belief was not effective. The core element of this relationship is still the teaching practice, however, I have to point out that the attitude towards teaching also has a tacit dimension in this study.

Compared to before, the pre-service teacher's attitude towards teaching became more positive and she also liked the students more and more. However, the pre-service teacher herself did not know exactly the reasons of that, as there were several elements that contributed to it. For example, she said:

The pre-service teacher (17 Jan 2014/282-284; 287-288; 313-314): "I think, I really, I mean, I like all the students in the class. They are really cool. And I think we have good dialog, I think, it has something to do with that. Maybe, that is why, I mean we can laugh with each other. Yeah, I feel comfortable. Yeah, I think, it is really important, that is why, maybe, I just feel like, yep, just moving around, just chilled, like that. I still think they are really very calm. They are quiet, you know, it is not like the classes before. Yeah, they are much better".

The pre-service teacher (21 Mar 2014/111-113): "And that is what I say, I mean they are actually good, since, I mean, a lot of mistakes, a lot of errors, but they are still active, and they are really interested in the topic, and I like it. You know, because they really want to say something".

From what she said in the interview, we can find that her attitude towards teaching changed a lot during her professional development. But she could not articulate exactly what the reasons are for that. She thought that she had a better relationship with students and they could laugh together. She also got to know the students more and more over time. However, she did not know exactly why because there were many elements to it. In other words, the changes in her attitude involved the combination of a lot of elements, which is the reason why she could not articulate the reasons.

In summary, the teacher's development is a process in which the teacher acquires her tacit knowledge of teaching over time, and there are also some elements such as feelings towards teaching, teaching beliefs and attitude towards teaching that affect the acquisition of tacit knowledge tacitly.

6. Conclusions

In this chapter, I present a summary of my research and the main questions of this study. I will describe the contribution of this research to the understanding of tacit knowledge and teacher professional development. I will also discuss the limitations of this research.
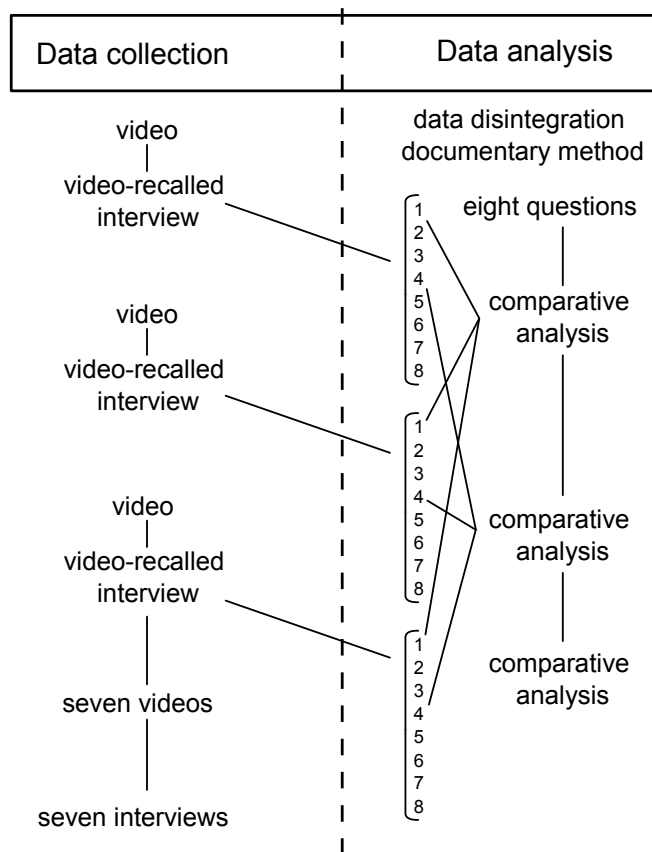
6.1 Summary of the Research

This research is based on a practice-led approach. "If the research leads primarily to new understandings about practice, it is practice-led" (Candy, 2006, p. 1). In this study, I took a practice-lead approach to explore how a pre-service teacher acquired her tacit knowledge of teaching from practice during her training year. This covered two topics: one was the process of the acquisition of the tacit knowledge, and the other was the teacher professional development process. In this paper, I give an empirically-based understanding of the acquisition of tacit knowledge, but this conclusion cannot be separated from the teacher's development, because my research participant is a pre-service teacher (Referendarin), and the acquisition of tacit knowledge occurs during the process of her professional development. In this study, I still call the participant a pre-service teacher, although the role she played is more than that (for example she did the roll full-time in the school, she did the evaluation of the students' work, etc).

This was a very difficult study to carry out, primarily due to the difficulty in finding research participants. Most of the pre-service teachers do not want their classes to be videotaped, even if they are interested in the project. Aggravating this was the time consuming nature of the data collection process which served to further dissuade potential participants.

As I explained in the chapter on research methods, in this study I used a "video-cued narrative reflection" (Raingruber, 2003) method of data collection to gather information about the participant's teaching practice. In order to get the research data, I firstly had to make videos of the class. After the recording finished, I immediately did the interview with the participant. During the interview, the participant watched through the videos I made while I invited her to describe to me what was happening. She had much autonomy during the interview, as she could pause the video at

any time and tell me something about what was an important moment from her perspective. Each session lasted for almost two hours and the whole data collection process lasted for one academic year.

I chose the "Documentary Method" (Bohnsack, 2014) as the data analysis method in this study. I took this method because the "Documentary Method" focuses on exploring the "know how" of the research phenomenon (Bohnsack, 2014), which is also what I focus on in this study. Actually, in the chapter on research methods, I have given a relatively detailed description of this method and the reason why I chose it in this study. The figure below shows the data collection and data analysis process I followed.

Data collection	Data analysis
video	data disintegration documentary method
video-recalled interview	1 2 3 4 5 6 7 8 — eight questions
video	comparative analysis
video-recalled interview	1 2 3 4 5 6 7 8
video	comparative analysis
video-recalled interview	1 2 3 4 5 6 7 8
seven videos	comparative analysis
seven interviews	

The field research lasted for one academic year from Sep. 2013 to May 2014. I collected the research data once a month, except for certain special circumstances such as when the students had tests, or the research participant was ill. I collected seven videos in one academic year, and therefore also did seven video-cued recall interviews. Based on the "Documentary Method" (Bohnsack, 2014), I reconstructed the structure of the interview texts by doing the two steps of data analysis:

"formulating interpretation and reflecting interpretation" (Bohnsack, 2014).

By doing "video-cued narrative reflection" (Raingruber, 2003) and transcribing the audio recording of the interview into text form, I found the participant talked about very similar, or even the same group of topics in every interview. On the basis of what the participant focused on during the interview, I reconstructed the structure of these topics and did the "formulating interpretation" (Bohnsack, 2014). There are eleven topics in almost every interview text: eight of them are about the class problems that the teacher had to deal with (for example being unable to start the class on time, the students were not active and so on). And the other three are about her feelings, beliefs and attitude towards teaching. After the formulating interpretation, I did the "reflecting interpretation" (Bohnsack, 2014) by analysing how her responses to these topics changed over the interviews. So for each topic I compare the participant's responses across all seven interviews and present those changes by describing how she dealt with it on each occasion. This is the data collection and analysis process of this study.

After finishing the data analysis I was able to draw some empirically-based conclusions about tacit knowledge. However, these conclusions are not isolated from the professional development process as the research object of this study was a pre-service teacher and her acquisition of tacit teaching knowledge occurred during her professional development. Moreover, by doing the data analysis, I found there are some connections between her acquisition of tacit knowledge, her feelings towards teaching, her teaching beliefs and her attitude towards teaching. I even found that her feelings towards teaching, her beliefs and her attitude all have a tacit dimension in this study. I therefore think it is necessary to discuss the teacher's professional development from the perspective of tacit knowledge, as in this study professional development is the context of the development of tacit knowledge, and the development of tacit teaching knowledge is one part of professional development. Before systematically discussing the research results, let me introduce these empirically-grounded understandings of tacit knowledge and of teacher professional development.

(1) The Nature of the Acquisition of Tacit Knowledge

The first research result relates to the acquisition of tacit knowledge. In this study I described how a pre-service teacher acquired her tacit knowledge of teaching from her teaching practice. By doing the data analysis I found that the pre-service teacher mainly tried to deal with eight problems in her class, but that those problems had something in common between them. In the interview, the pre-

service teacher expressed something about her underlying aims when dealing with the class problems. As I have explained in the chapter on data analysis, the underlying aim of the pre-service teacher was to have the students concentrate in class so they would learn. In other words, she tried to deal with these eight class problems so the students could learn. The other character was that she could describe in detail how to deal with these eight problems in class, but could not articulate how to get the students to concentrate, or how to make them learn, although she could do that properly. It seems that what the pre-service teacher knew was more than she was able to express.

Based on the data analysis and the understanding of tacit knowledge theory, this empirical study put tacit knowledge theories to the test, and my analysis found almost all of the elements of tacit knowledge theory that Polanyi described. Polanyi (1962) argued that there are two kinds of awareness (focal awareness and subsidiary awareness) and two kinds of knowing (focal knowing and subsidiary knowing) in every activity. We attend to focal knowing by relying on our awareness of subsidiary knowing (Polanyi, 1962). In this study I found, for the pre-service teacher, dealing with these eight detailed class problems was the subsidiary knowing, and having the students concentrate in class was the focal knowing in her teaching practice, as she relied on encouraging the students to learn by dealing with the class problems. In other words, having the students concentrate in class so they will learn relies on dealing with the class problems, which, from the perspective of tacit knowledge theory (Polanyi, 1962), is the relationship between focal knowing and subsidiary knowing. From this I was able to draw a conclusion about the relationship between focal and subsidiary knowing: focal knowing is the coordination of subsidiary knowing.

I also found that the pre-service teacher could not articulate how dealing with the problems she encountered achieved her goal of having the students concentrate, although she could do that, but she could reflect well on how to deal with each class problem individually. As a result I modified this conclusion to: tacit knowledge (tacit knowing) is the coordination of explicit knowledge (explicit knowing). Tacit knowledge or tacit knowing here means the dynamic process of the coordination of subsidiary knowing to focal knowing. It is also the process from subsidiary knowing to focal knowing in one's activity.

(2) Teacher Professional Development

In this study, I also drew some empirically-based conclusions about teacher professional development, but from the perspective of tacit knowledge. As I have described, by reconstructing

the interview structure (formulating interpretation), I found there are eleven very similar, sometimes the same, group of topics discussed in every interview. Eight of them are about the class problems that the pre-service teacher had to deal with, and another three are about the pre-service teacher's feelings, beliefs, and attitude towards teaching. I presented the changes between these topics by comparing and analyzing how the same topic is dealt with across different interviews (reflecting interpretation), and I found that these three elements have some connections with the acquisition of tacit knowledge, and they themselves also have some kind of tacit dimension in this case.

Firstly, the pre-service teacher's beliefs, feelings, and attitude towards teaching changed over time. Secondly, these also affected the acquisition of tacit knowledge during her development process. Similarly, the pre-service teacher's acquisition of tacit knowledge also had an influence on these three elements. But from the perspective of the teacher's professional development, I want to use other words to describe her acquisition of tacit knowledge: 'teaching practice' and 'problem solving'. Actually, these terms have the same meaning here because both of them refer to what happened in the classroom and how the teacher responded in class. In this case what the pre-service teacher did was try to have the students concentrate by dealing with the class problems, which was the main content of her teaching practice. Therefore, I use the terms teaching practice or problem solving to summarize the other eight topics about problem solving in order to make clear the relationship between the acquisition of tacit knowledge and the other three related issues.

In this way, there are four elements: teaching practice, feelings towards teaching, teaching belief and attitude towards teaching. I presented the relationship between them in the last chapter. I found that three of these elements (feelings of teaching, teaching belief and attitude towards teaching) not only affect the acquisition of tacit knowledge, but they themselves also have a tacit dimension. In other words, all of these elements have the character of tacit knowledge: "one knows something but one cannot articulate it" (Polanyi, 1958). These four elements affect each other during the teacher's development, but the relationship between each of them is different. From the data analysis, I found that teaching practice affects the other three elements directly, but the other three elements affect each other indirectly. In other words, the relationship between teaching practice and the other three elements (feelings towards teaching, teaching belief, and attitude towards teaching) is direct, and the relationship among those three elements themselves is indirect.

The other character is that these three elements also have a tacit dimension themselves. For example, in this case I found that teaching belief guides teaching practice, which means that

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teaching practice is the outworking of a teacher's belief. Beliefs exist before practice and it is about "know that", which outlines what the teacher plans to realize in her teaching; and teaching practice is about "know how" because it puts belief into practice. The relationship between belief and practice is like the relationship between theory and practice. Likewise, teaching practice also influences teaching belief because a teacher can always gain something new from her teaching practice, which helps to modify and renew her beliefs.

Similarly, feelings towards teaching and attitude towards teaching also have a tacit dimension. The pre-service teacher expressed her feelings towards teaching as being some kind of intuition that guided her to cope with the class situation. She knew what it was but could not articulate her feelings. Actually, intuition is one of the interpretations of tacit knowledge from the perspective of some researchers, as it has the character of tacit knowledge: "one knows but one cannot articulate" (Polanyi, 1958). The pre-service teacher's attitude towards teaching changed over time during the process of her professional development, however she could not articulate why it changed because there are a lot of elements which contributed to it. The changes of her attitude towards teaching are the result of the combination of several elements. So, she knew it but she could not articulate.

From this perspective, I think teacher professional development is a process in which the teacher tries to realize his or her teaching beliefs through teaching practice and acquires tacit knowledge of teaching from that practice. It is also a dynamic process in which the teacher's knowledge, ideas, beliefs, emotions, and attitude change and affect each other over time. I will discuss this dynamic process later.

6.2 Contributions to Knowledge

This study makes two special contributions to the field of pedagogy. Firstly, it builds an empirical framework for understanding tacit knowledge. With the model presented in this study we can have an empirically-grounded understanding about how a pre-service teacher acquires the tacit knowledge of teaching from his or her practice. Secondly, in the area of teacher development, this study describes a pre-service teacher's professional development process, but from the perspective of tacit knowledge. With that we can have a relatively detailed understanding of how a pre-service teacher develops her teaching expertise over time.

6.2.1 The Acquisition of Tacit Knowledge

Based on the tacit knowledge theory of Polanyi (1962), I developed an empirically grounded framework to understand the acquisition of tacit knowledge. There is in fact already a lot of interpretation and description about tacit knowledge, which try to give some clear understandings of this concept. However, very few of them try to reveal the mechanism of tacit knowledge itself. In other words, until now we have not known the mechanism of tacit knowledge. Surely we cannot have a relatively clear understanding of tacit knowledge if we do not know how it develops or how a person acquires it.

In this study, I presented an empirically-grounded model about the understanding of tacit knowledge, which is based on the empirical research. I tried to record the process of how one pre-service teacher acquires this kind of knowledge through her teaching over time. After doing the data analysis by following the steps of the "Documentary Method" (Bohnsack, 2014), I found there were various discipline problems the pre-service teacher had to deal with in her class. Regardless of which issue she was dealing with, however, there was a common aim behind all of her responses: get the students to concentrate so that they are able to learn. In other words, dealing with the eight types of class problems that she came across was the strategy that she used in order to have the students concentrate in class and learn.

As well as the problems that she had to deal with, having the students concentrate in class was also a problem that she had to cope with, however, this problem is different from the others she dealt with. During the interview, the pre-service teacher talked a lot about how to deal with the eight types of problems she encountered, she even described her process of reflection on it. For example, what kind of strategies should be used to quieten the students in class, how to make the students participate in class, and so on. However, she could not articulate how to have the students concentrate in class so they would learn. She thought that it was some kind of intuition, which depends on how you feel in the situation. It seemed like what the teacher knew was more than she could articulate.

It is obvious that her knowledge about how to have the students concentrate in class has something to do with tacit knowledge, as it has the character of it: "one knows but one cannot articulate"

(Polanyi, 1958). On the contrary, the knowledge that the teacher used to deal with the eight types of class problems has the character of explicit knowledge, because she could say a lot about it. In this case we can say the knowledge she used to make the students learn was tacit knowledge, and the knowledge about how to deal with the eight problems is explicit knowledge. But what is the relationship between these two kinds of knowledge here? And how did the pre-service teacher develop her tacit knowledge of teaching? Let us examine this relationship on the basis of tacit knowledge theory and the data analysis of this study.

Polanyi (1962) explains the mechanism of tacit knowledge with the awareness in one's learning. He thinks that there are two kinds of awareness: one is focal awareness and the other is subsidiary awareness (Polanyi, 1962). These two kinds of awareness are also the foundation of his proposal for two kinds of knowing (focal knowing and subsidiary knowing) (Polanyi, 1962). But what are these two kinds of awareness in one's activity?

Let me explain this by taking the pre-service teacher's teaching as an example. In this study, the pre-service teacher tried to deal with class problems in order to have the students concentrate. Obviously, in this activity, she had awareness both of dealing with these problems and having the students learn. However, the awareness of dealing with class problems is different, as having the students learn in class was the main purpose of her activity, while dealing with the class problems was not the object of that but the strategy. Polanyi (1962) calls the awareness of having the students learn "focal awareness", and the awareness of dealing with the class problems "subsidiary awareness", because the teacher attempted to have the students learn by relying on her awareness of dealing with these class problems. Just like the example that Polanyi cites of when we use a hammer to drive a nail, "I have a subsidiary awareness of the feeling in the palm of my hand which is merged into my focal awareness of driving in the nail" (Polanyi, 1975, p. 33). That is the relationship between these two dimensions of awareness in this activity.

Based on these two dimensions of awareness in one's activity, Polanyi analyzes one's learning from the perspective of knowing. He thinks "there are two kinds of knowing which invariably enter jointly into any act of knowing a comprehensive entity. There is (1) knowing a thing by attending to it, in the way we attend to an entity as a whole and (2) knowing a thing by relying on our awareness of it for the purpose of attending to an entity to which it contributes…We may call 'knowing by attending to' a focal knowing, and 'knowing by relying on' a subsidiary knowing" (Polanyi, 1962, p. 601).

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Polanyi (1962) explains the mechanism of tacit knowledge by interpreting two dimensions of awareness, two kinds of knowing and the relationship between them. He also explains the reason why someone cannot explain their tacit knowledge by giving the interpretation of two kinds of knowing in one's activity (Polanyi, 1962). We do in fact know how to do things like riding a bicycle or swimming, but we cannot articulate how to do it because we do not know how we coordinate those complex muscular actions (Polanyi, 1962). Or even though we know how to perform these actions "as a whole" (Polanyi, 1962, p. 601), we still cannot break it down into its individual parts. "We perform a skill by relying on the coordination of elementary muscular acts, and we are aware of having got these right by accomplishing our skillful performance. We are aware of them in terms of this performance and not (or only very incompletely) aware of them in themselves…as we are generally unable to tell what particulars we are aware of when attending to a coherent entity which they constitute" (Polanyi, 1962, p. 601), so, we cannot tell others how to carry out these skills.

From the interpretation above, we can have a relatively clear understanding about the reason why we cannot convey our tacit knowledge to others. Someone might say that knowing how to teach is different from knowing how to ride a bicycle or knowing how to swim. I have to admit that teaching is different from these other skills as it uses the mind more than muscles. However there is something in common between these muscular acts as both of them include two kinds of awareness (focal and subsidiary) and two kinds of knowing (again, focal and subsidiary).

Polanyi argues that, "tacit knowing can, indeed, be identified with understanding, if understanding is taken to include the kind of practical comprehension which is achieved in the successful performance of a skill. This being allowed for, understanding may be recognized as the faculty, cast aside by a positivistic theory of knowledge, which the theory of tacit knowing acknowledges as the central act of knowing" (Polanyi, 1962, p. 605). Therefore, in this sense, the teaching skills "the diagnosing of physiognomies, the performance of tests, the use of tools and probes, and the meaningful uttering of denotative words, are so many acts of understanding complex entities" (Polanyi, 1962, p. 605).

Now let us examine why the pre-service teacher could not articulate how to have the students concentrate in class although she could still achieve it. As well as riding a bicycle, there are also two kinds of awareness and two kinds of knowing in the pre-service teacher's teaching. When she is doing her teaching, she has awareness of both having the students concentrate in class and dealing

with the problems in class. However, these two kinds of awareness are different. Her awareness of having the students concentrate is the focal awareness, because making the students learn is the main object of her teaching, and her awareness of dealing with the eight class problems described above is subsidiary awareness, as dealing with these problems is not the object of her teaching but strategies to achieve it. There are also two kinds of knowing in her teaching activity: focal knowing and subsidiary knowing. In this case it is not difficult to find that having the students learn is focal knowing and dealing with the class problems is subsidiary knowing, as the pre-service teacher attempted to make the students learn by relying on her awareness of dealing with these problems. In other words, making the students learn is an entity, which is achieved by dealing with these eight categories of class problems.

But how does the subsidiary knowing contribute to the focal knowing in one's learning? Polanyi writes, "we perform a skill by relying on the coordination of elementary muscular acts, and we are aware of having got these right by accomplishing our skillful performance" (Polanyi, 1962, p. 601). When we perform a skill, our elementary muscular acts function as subsidiary knowing, and the accomplishment of our skill works as focal knowing. The integration of muscular acts to the accomplishment of the skill is how subsidiary knowing contributes to focal knowing here.

But how does subsidiary knowing contribute to focal knowing in the pre-service teacher's teaching? Let us examine the relationship between focal knowing and subsidiary knowing in this case. Based on the data analysis, I use a model to explain the relationship between having the students concentrate in class and dealing with the problems she encounters during teaching.
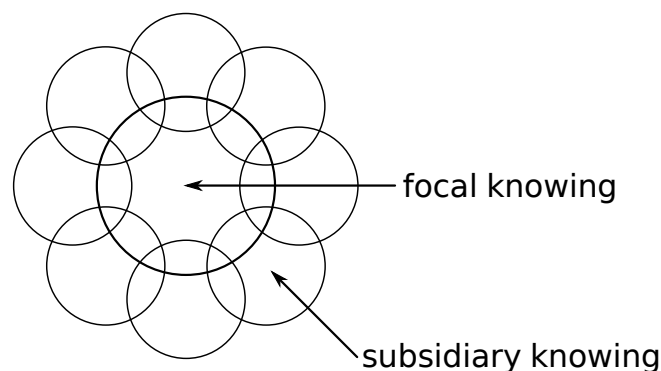
In this model, there is one large circle surrounded by eight smaller circles. The small circles represent the eight class problems that the pre-service teacher had to deal with, and the large circle represents the teacher's underlying aim (having the students concentrate in class to let them learn). Based on the interpretation above we know that making the students learn is focal knowing here, and the awareness of that belongs to focal awareness. Dealing with the eight categories of problems is subsidiary knowing and the awareness of that is subsidiary awareness.

It is not difficult to find that subsidiary knowing is the element that contributes to the entity of focal knowing, and focal knowing is the coordination of subsidiary knowing in this activity. That is the relationship between focal and subsidiary knowing in her teaching activity. Actually, this conclusion conforms to the interpretation of Polanyi about how subsidiary knowing contributes to focal knowing in one's learning. But it is not detailed enough because it does not present the development process of tacit knowledge. So, let us examine the dynamic process of how a pre-service teacher acquires her tacit knowledge of teaching over time.

In the pre-service teacher's teaching, having the students concentrate in class functioned as focal knowing, but there are several kinds of elements that contribute to focal knowing as subsidiary knowing, for example dealing with the eight types of class problems. The pre-service teacher relied on subsidiary knowing to reach her focal knowing, which means her focal knowing is the coordination of her subsidiary knowing. The other point is that the teacher could articulate a lot about her related knowledge of how to cope with these class problems separately, such as what kinds of strategies should she use to keep the students quiet in class, or what kind of seating arrangement was more suitable for this class. However she could not articulate the knowledge that she used to have the students concentrate in class, although she could do that. If we analyze the character of these two kinds of knowledge from the perspective of tacit knowledge theory (Polanyi, 1958), the knowledge about how to handle the class problems belongs to explicit knowledge, as the teacher could articulate that, while the knowledge about how to rely on dealing with class problems to have the students learn is tacit knowledge because the teacher knew it but she could not articulate it.

However, we also have to analyze the focal knowing and subsidiary knowing of her teaching in chronological order because her teaching developed over time. Based on the data analysis, I found that both the focal and subsidiary knowing of her teaching developed over the course of the study.

For example, at the beginning, the pre-service teacher was unable to cope with these problems, the class was very loud and she could not start on time. However, after gaining some experience, she could cope with these problems much better than before as she reflected upon the problems a lot and tried to analyze their reasons in order to use proper strategies. As the teacher gradually developed those strategies, the situation began to change, and by the end of the study the students focused much better in class. As she reflected on her approaches, both the focal and subsidiary knowing of her teaching improved over time.

Obviously, as time went on the pre-service teacher's ability to cope with the class problems improved, and at the same time so did the students' overall concentration level. The teacher reached her focal knowing as she reflected on dealing with these problems. Clearly there is some connection between making the students learn and dealing with the class problems. However the relationship between them is not direct and linear. On the basis of the data analysis and the understanding of tacit knowledge theory (Polanyi, 1958), in this case making the students learn relies on dealing with the class problems, and the realization of focal knowing is the coordination of these subsidiary elements. In other words, in this activity focal knowing is the coordination of subsidiary knowing. The knowledge about how to rely on dealing with class problems to make the students learn is tacit knowledge, and the knowledge about how to deal with the class problems is explicit knowledge. Therefore, tacit knowledge (tacit knowing) is the coordination of explicit knowledge (explicit knowing).

Another point I have to emphasize here is that the coordination of subsidiary knowing to focal knowing is a dynamic process rather than a quiescent state. I use this conclusion to describe how, in this study, the dynamic process of subsidiary knowing contributes to focal knowing. In other words, tacit knowing is a process, in which the coordination of subsidiary knowing contributes to focal knowing. Polanyi writes that, "it seems appropriate to extend the meaning of 'tacit knowing' to include the integration of subsidiary to focal knowing. The structure of tacit knowing is then the structure of this integrative process, and knowing is tacit to the extent to which it has such a structure. So if (as it will appear) all knowing ultimately relies on a tacit process of knowing, we shall say that, ultimately, all knowledge has the structure of tacit knowledge" (Polanyi, 1962, p. 602).

Polanyi (1962) himself defines the tacit knowledge as a process rather than a result. Therefore, "knowing a thing by relying on our awareness of it for the purpose of attending to an entity to

which it contributes…can be said to be tacit" (Polanyi, 1962, p. 601). This is the process by which we attend to focal knowing by relying on our subsidiary knowing. In this study, the conclusion I summarized from the research data is a description or interpretation of the structure of tacit knowing. It describes the process of how the teacher relied on dealing with class problems to have the students concentrate.

However, when I refer to the teacher's reflection on subsidiary knowing, I do not mean that she reflected while teaching. Rather, she reflected from one class to the next. As I described above, the teacher reflected on each subsidiary part (such as how to deal with the problems she encountered during the lesson), and over time coordinated these pieces of subsidiary knowledge together to become focal knowledge when she was teaching. In other words, it is "reflection-on-action" (Schön, 1983) rather than "reflection-in-action" (Schön, 1983), as the teacher did not generally do direct reflection while teaching. Instead, she reflected on dealing with one problem or another over time. Therefore, we cannot use the term "reflection-in-action" (Schön, 1983) to explain how the participant developed her tacit knowledge over time. Here I use 'reflection' to describe the learning process of the basic parts that constitute the teaching activity, and 'coordination' to describe the process of how the teacher integrated these basic parts together until the whole activity became automatic and intuitive. Therefore, this conclusion can be also used to describe how the teacher acquired her tacit knowledge over time.

Based on this empirically grounded understanding of tacit knowledge theory, we can discuss some previous understandings of tacit knowledge in the chapter of literature review. Compared with those different descriptions and interpretations of this concept, these understandings are relatively deeper and more detailed. For example, Gill (2000) presented a model for understanding Polanyi's tacit knowledge theory. This model tries to analyze the cognitive mechanism of tacit knowledge, as Gill (2000) understands Polanyi's tacit knowledge theory from three dimensions: the awareness dimension, the bodily dimension and the cognitivity dimension. On the basis of Gill's model, Morgan (2008) presented a concept map of Polanyi's personal knowledge theory.

However, here we only present Morgan's concept map of Polanyi's personal knowledge theory rather than do these two models separately, as Morgan's model is on the basis of Gill's. The following is Morgan's understanding about tacit knowledge theory.

Polanyi's Personal Knowledge Theory
Concept Map
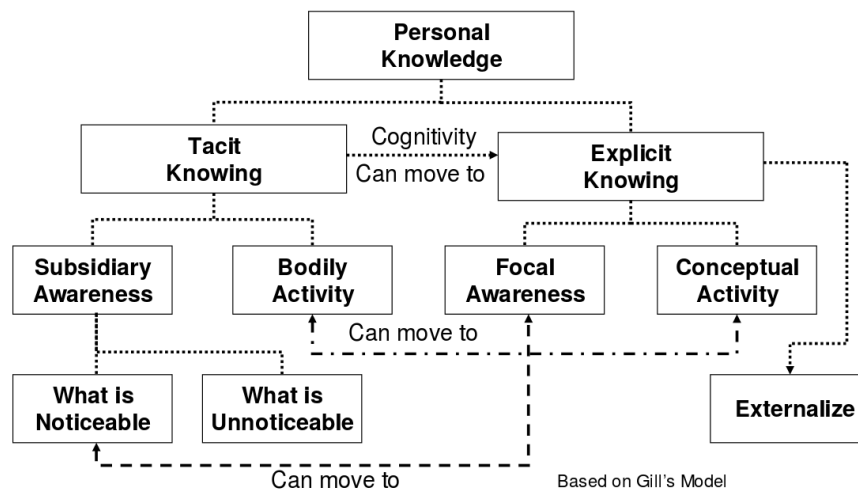
Morgan's (2008) model for understanding Polanyi's personal knowledge theory

This concept map is very similar to Gill's model, as they present some common conclusions about the theory of tacit knowledge: personal knowledge has two dimensions, one is tacit knowing and the other is explicit knowing; tacit knowing is created with subsidiary awareness and bodily activity while focal awareness and conceptual activity produce explicit knowing; one can only get explicit knowing from tacit knowing with cognitivity process.

However, Morgan's model has some additional insights not found in Gill's. For example, Morgan (2008) thinks our subsidiary awareness also has two dimensions: what is noticeable and what is unnoticeable. Explicit knowing can be externalized, as it is noticeable and can be articulated with words. But when we pay focal attention to subsidiary knowing, subsidiary awareness becomes noticeable and subsidiary knowing can be also externalized, as it becomes explicit rather than tacit in this case. Another point in this model is that Morgan (2008) thinks that bodily activity and conceptual activity can move between each other, which means that not only can bodily activity and subsidiary awareness produce tacit knowledge, but tacit knowledge can also be created by conceptual activity and subsidiary awareness. As discussed, Morgan (2008) argues that tacit knowing not only exists in a performance requiring skill, but can also be found in mental understanding.

Let us discuss Gill's model and Morgan's concept map in relation to our own study of tacit knowledge. In this study I found in the participant's teaching all the elements of tacit knowledge

that Polanyi (1962) argued for, which include two kinds of awareness (focal and subsidiary awareness) and two kinds of knowing (again, focal and subsidiary knowing). In her teaching, the goal of her focal knowing was to get the students to concentrate in class, and she used her subsidiary knowing to support this by dealing with the discipline and behavioural problems she encountered during the lesson. Although dealing with those was not the main goal of her lesson, the strategies she employed were indispensable in achieving her goal. Similarly, her awareness of having the students concentrate in class so they could learn was focal awareness, while her awareness of dealing with the class problems was subsidiary awareness.

As I have explained previously, the process from subsidiary knowing to focal knowing is a dynamic process, and this process is also called 'tacit knowing'. The conclusions I draw here also conform to what Polanyi argued about the meaning of tacit knowing, as from his perspective, "it seems appropriate to extend the meaning of 'tacit knowing' to include the integration of subsidiary to focal knowing. The structure of tacit knowing is then the structure of this integrative process, and knowing is tacit to the extent to which it has such a structure" (Polanyi, 1962, p. 601). Therefore, tacit knowing in this study is the process, in which the pre-service teacher relied on dealing with the class problems to have the students learn. As dealing with these problems functions as subsidiary knowing in this activity, based on the relationship between dealing with the class problems and having the students learn, I can draw the conclusion that tacit knowing (tacit knowledge) is the coordination of subsidiary knowing.

From the perspective of Gill (2000), our subsidiary awareness and bodily activity produce tacit knowing, and explicit knowing is created with focal awareness and conceptual activity. I have to admit that the conclusion that the subsidiary awareness and bodily activity produce tacit knowing is reasonable, as from the perspective of Polanyi, "we can say conversely that all subsidiary elements function as our body does in bearing on conscious experience. Anything bearing subsidiary on the focus of our attention can be said then to function logically as part of our body" (Polanyi, 1968, p. 91). In other words, the parts of our body function as subsidiary elements, which contribute to focal knowing, and the process that subsidiary elements contribute to focal knowing can be called tacit knowing.

However, as Morgan (2008) shows in the concept map above, tacit knowing is not only about our bodily activity, it also includes conceptual activity like understanding. As I have explained before,

from the perspective of Polanyi, understanding can be thought of as the central component of tacit knowing because understanding includes both practical comprehension and mental reasoning. In other words, tacit knowing is not only about practical performance; instead it also refers to conceptual activity. To this extent, Morgan's concept map expands upon Gill's foundation of our understanding of tacit knowing.

Therefore, we can say that the nature of tacit knowing is understanding, which includes practical understanding, such as practical skills, and conceptual understanding, such as how to teach. Apart from this, I do not think it necessary to discuss tacit knowing and explicit knowing in one's activity separately. As tacit knowing is a dynamic process, when we pay more attention to subsidiary knowing, the meaning of the activity will be destroyed. Let me explain this by taking the participant of this study as an example. In her teaching activity, dealing with the class problems was explicit knowing because she could articulate what she was doing with words, but relying on dealing with these problems to have the students learn was tacit knowing, as she could not articulate that knowledge. Ordinarily her focal awareness was on having the students learn, but when behavioural or other problems came up in class, her attention, and thus her focal awareness, shifted to dealing with those. This shift in focus was away from having the students learn, and thus the change rendered that activity meaningless. That is also the reason why one cannot articulate these particulars during the process of tacit knowing.

In other words, I think both bodily activity and conceptual activity function as subsidiary elements that contribute to focal knowing in one's activity, and tacit knowing is the integration of subsidiary knowing to focal knowing. It also does not make much sense to analyse the relationship between bodily activity and conceptual activity, as "the body is a subsidiary thing which bears on the mind that is it's meaning. The problem of the body-mind relation is that no examination of a person's neural processes (however meticulously carried out) can make the neurophysiologist share the person's sensations and thoughts" (Polanyi, 1968, p. 90). That is also the primary reason why I did not analyse how the participant's body movement contributes to her teaching activity in this study.

Dealing with class problems normally constitutes subsidiary knowing, but in this case the participant could articulate in words how she would deal with any such problems, so, it had the characteristics of explicit knowing. But why is subsidiary knowing also explicit knowing in this case? As Polanyi argued, "What is subsidiarily known is tacitly known…but tacit knowing cannot be strictly opposed to focal knowing because the process of tacit knowing includes our knowing of

the subsidiary particulars in terms of the entity to which they contribute and to which we are focally attending" (Polanyi, 1962, p. 602). Therefore, when we have focal awareness on subsidiary particulars, "the tacit character of knowing can be reduced by switching our attention to the particulars. We replace then, to this extent, tacit knowing by explicit inference, and in this sense tacit knowing can be opposed to (focally known) explicit inferences" (Polanyi, 1962, p. 602). As during the interview, the participant had focal awareness of the particulars about how to deal with the class problems, the tacit knowing of the subsidiary particulars was reduced and replaced by explicit knowing. That is the reason why the subsidiary knowing of her teaching activity has explicit characteristics in this study. It conforms to what Morgan (2008) presents in the concept map of personal knowledge, that subsidiary awareness can become noticeable when we pay primary attention to subsidiary knowing. At the same time, it also shows that when we have focal awareness of subsidiary knowing, the meaning of the whole activity would be destroyed, which is the reason why we cannot make our tacit knowledge explicit.

Wulf (2012) used mimesis to describe the learning mechanism of tacit knowledge. He thinks we learn the basic parts that constitute the whole activity mimetically (Wulf, 2012). After mastering these basic skills, we try to coordinate these elements together until the whole activity becomes automated and intuitive (Wulf, 2012). He also emphasizes that the mimetic learning mainly refers to corporeal performance such as body movements, and activities such as mental reasoning are almost non-mimetic because they involve reflection (Wulf, 2008). I think his theory makes sense if it is used to explain how we learn corporeal activities such as a ritual performance or a collective group performance. However, learning to teach is much more complex than learning to dance as it involves substantial mental thought and reflection.

Although in this study the pre-service teacher may have learned elements of her teaching from other colleagues in the school, or possibly from a seminar she attended that was run for pre-service teachers, for the most part she learned to teach by herself. If she learned anything through the former ways, it would be categorized as indirect, rather than direct, mimesis. Although there was always a co-teacher in her class, that teacher never actively guided her subject's teaching. The co-teacher mainly assisted through collecting the students' homework, answering their questions, and the like. Sometimes they divided the whole class into two groups and taught the students in different classrooms. But they never taught together, and the pre-service teacher did not directly learn how to teach from the co-teacher.

There might be indirect mimetic learning in the pre-service teacher's professional development, such as the memory of her own teachers in school, or teaching strategies she obtained from seminars and lectures in university. However, I think mimesis was not her primary learning mechanism. She principally reflected on her own teaching and learned from her own experience, and then tried to coordinate these parts together to reach the whole teaching activity.

6.2.2 Teacher Professional Development

Based on the data analysis, I was able to draw two empirically-based conclusions related to teacher professional development. Firstly, teacher development is a whole entity, although researchers try to categorize it into parts, such as knowledge, skills, beliefs, attitude, and so on. Teacher professional development is the combination of the different parts and characteristics rather than the characteristics *per se*. Secondly, from this study I found that development is context specific, personal and tacit. Teacher professional development is a process in which a teacher acquires her or his tacit knowledge of teaching over time. It is also a process in which a teacher's knowledge, beliefs, attitudes and feelings affect each other over time.

(1) Teacher Professional Development is a Whole Entity

The research participant in this study was a pre-service teacher who was in her first and second training years. In terms of timing, she was a beginner, as she was still a pre-service teacher. So, the research results of this study are about how a beginner learns to teach in the teacher training program. Let us see what happened in a beginner's class.

Like all teachers, the teacher in this study had problems in her class she had to cope with. In the interview, she talked about these problems and how she coped with them. By doing the data analysis, I found there were eight distinct categories of problems: she could not start the class on time; the students were not clear about what they had to do; they were not active in class; there was too much private talk and chatter; the students arrived unprepared; the teacher could not assign the group work; the students were inattentive; and they were very impatient at the end of class. We can see that some of these problems are about classroom management or class control, but not all of them, for example the students' lack of clarity about what to do, or their lack of participation in class.

The pre-service teacher had to cope with eight different class problems in order to teach successfully. During her teaching, she also acquired knowledge by dealing with them. In other words, her professional development was also the process of acquiring knowledge by dealing with class problems.

Researchers have presented models about the process of teacher professional development, which I have summarized in the chapter of literature review. In these models, they divide the whole teacher development process into stages, and describe the characteristics of each stage. For example, Berliner (1988) proposes that there are five stages of development from beginner to expert, and teachers have different features in each developmental stage. According to Berliner (1988), in the first stage, teachers are beginners, they have to learn rules about teaching and their teaching behaviour is inflexible in the first year. Teachers in this stage tend to follow the rules and teaching methods that are given to them, which means they can do little reflection, and thus develop few useful methods, from their own teaching experience (Berliner, 1988).

Katz (1972), Fuller & Bown (1975) and Burden (1980) also propose similar models to Berliner (1988) about teacher development. They present some teacher development theories by dividing the whole development process into stages and describing the characteristics of each stage. From their perspective, teachers in different developmental stages meet different challenges, and they learn new teaching knowledge and skills in each stage. For example, Katz (1972) considers that teachers in the first stage have to learn how to survive in class, and they are mostly concerned about themselves rather than their students. Fuller & Bown (1975) and Burden (1980) also claim that only after mastering the required abilities of the last developmental stage can teachers move on to the next.

To some extent, these theories can explain how teachers develop over time. However, these models ignore one important point that teachers' teaching abilities develop as a whole rather than following a logical step-by-step model. For example, according to Fuller & Bown (1975), in the third developmental stage student teachers are only concerned about their own teaching performance and not about their pupils. If this were literally true, how can they be effective teachers? Based on this empirical study, I believe student teachers attempt to deal with class problems by considering related elements from the outset of their teaching. They will choose to deal with the more seriously problems first, but they also consider other elements or problems at the same time, as teaching

practice is a whole entity rather than one of isolated parts.

We find that the teacher development process is not a straight line in which all the characteristics of teaching develop at the same speed. It depends on individual teachers, and some teaching abilities can develop more quickly than others. Teacher development is a whole entity: it includes a lot of elements, and the result of the development is the coordination of these elements in teaching activity rather than the elements themselves. Therefore, we cannot simply say a teacher is on the first or the third developmental stage only because she or he exhibits some characteristics of that development stage. Learning to teach is not like learning to swim in that you can only move on to the second step after mastering the first. In a real class situation one has to show, to a greater or lesser extent, characteristics in each stage, because teaching is a whole entity which requires use all of the elements. Teacher development is also a whole entity, during the teaching practice the teaching abilities develop over time but as a whole.

The pre-service teacher in this study is a good example of that. She was very clear about her teaching priorities from the beginning: having the students concentrate in class to let them learn, although to do this she had to cope with, and manage, a chaotic class. In the class she had to consider a lot of elements, and try to coordinate these elements together in order to teach successfully. As a result, her teaching ability developed as a whole over time. I think the standard of each developmental stage therefore depends on the extent to which a teacher is motivated to improve her or his teaching, rather than how many steps they can tick off. For example, classes with experienced teachers can still suffer from basic problems. The professional development process of the teacher in this study indicates that teaching is the coordination of all the elements, in class. The development of a teacher depends on how well the teacher coordinates these elements in class, rather than how many steps she or he completes.

As each teacher is an individual, his or her development process also varies and the current theories cannot be simply used to explain and understand how each individual teacher develops, although we can use them to outline the broader, basic framework of teacher development. I think more attention should be given to explore and identify the more detailed process of teacher development. For example, we should identify how teachers acquire their teaching knowledge from practice instead of only describing what they acquire over time. In other words, we should make a greater effort to give a more detailed description about this process in order to present how teachers go from one developmental stage to another.

In summary, what I attempt to emphasize is, although the characteristics of each developmental stage are different, a teacher's professional development is a whole entity, as it changes over time but it changes as a whole. There are some detailed characteristics of a teacher's behaviour in each development stage; however, the nature of teacher development is the coordination of these characteristics rather than the characteristics themselves. We cannot simply assume that teacher development includes some stages, and the teacher goes onto the next stage once they have completed all the requirements of the previous stage, as the development is a dynamic process in which the teacher develops as a whole.

(2) Teacher Professional Development is Context Specific, Personal and Tacit

This study also presents some empirically-based conclusions about teacher professional development. Based on this study, I define teacher professional development as a process in which teachers acquire their knowledge of teaching over time. In this process, the knowledge of teaching that a teacher acquires is personal, context specific and tacit, which means different teachers have different teaching knowledge, and their professional development is also an individual act. Because of this, although all teachers develop in their practice, the way they develop is context specific, personal and tacit. Just like the pre-service teacher in this study said:

The pre-service teacher (16 May 2014/114-123): "Yeah, I just do something, that is true, but if it works, fine with me. I am not sure that if there is really some kind of rule, or some kind of universal method that you can just introduce and then everything is okay. I do not think so. I think it has something to do with the personality of the teacher. It has something to do with the mood of the students, with the topic, with the methods, with if they have training or not, if they have problems with their family or not. Or problems with themselves, there are a lot of factors that you have to consider. Even if it is warm or cold in the classroom, we had that situation some weeks ago. It was too warm, I think it was about 31 or 32 degrees in class. And they were not able to work, it was too warm, you know, for example".

From what the pre-service teacher said, it is obvious that the knowledge a teacher has is personal and context specific, because there is no abstract universal knowledge of teaching that can just be applied in every class. The teacher must consider a number of factors before using strategies to cope with class problems. And individual students make so-called common class problems different

across different classes. What the teacher needs to do is to analyse the individual reasons behind each issue and take specific measures to cope with it.

We have to admit that teacher professional development is an individual development program in which a teacher acquires his or her personal, context specific and tacit teaching knowledge over time. However, the development of teaching knowledge is not isolated because there are a number of related elements that affect the acquisition of knowledge, such as teaching beliefs, feelings towards teaching and attitude towards teaching. These elements have influence on the teacher's acquisition of tacit knowledge. But how do they affect the acquisition of tacit knowledge during a teacher's professional development process? Let us discuss the relationship between them. Below is a diagram of a framework that can be used to describe this nonlinear relationship between the elements. By using this we can have a relatively clear understanding of the development process of this pre-service teacher.
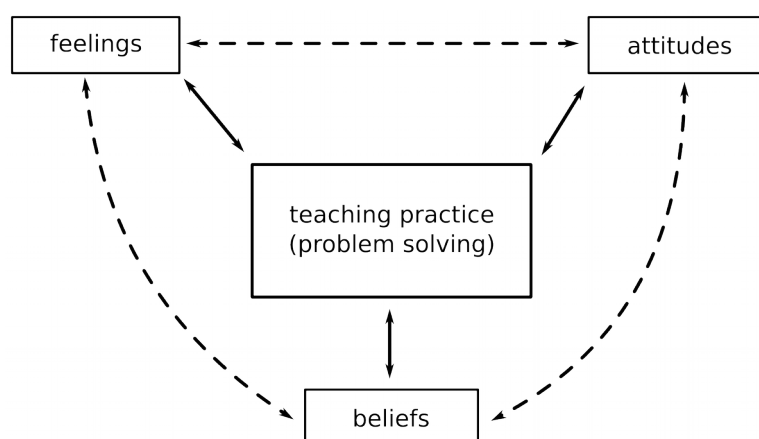
As I have explained before, in this case, dealing with class problems in order to have students concentrate was the main focus of the pre-service teacher's efforts. Therefore, I use the term 'problem solving' to describe the core element of her teaching. It is obvious that the relationship among these four elements is nonlinear and complex. These elements connect to each other and affect each other during the development process. However, based on data analysis I found teaching practice affects the other three elements directly while the other three elements affect each other indirectly.

Teaching practice and teaching belief affect each other directly. In this case, the teacher's beliefs guided her teaching practice because her beliefs were a kind of prior knowledge that already existed

before the she entered the classroom. In other words, the teacher's beliefs determined what kind of class she wanted to have and what kind of goals she wanted to realize. However, the influence of beliefs did not last forever because her beliefs changed during process of teaching any time she found that they did not work in class. Similarly, her teaching beliefs were also renewed as she gained more insight through reflection on her practice.

In this case, her teaching practice and feelings towards teaching also affected each other directly. For example, if the teacher successfully used a strategy to deal with a problem in class, the extra confidence would positively affect her feelings. Similarly, her teaching could also be influenced by her negative feelings towards teaching. There was also a direct causal relationship between her teaching practice and attitude towards teaching. For example, after she gained more experience, she developed new insights into teaching and her attitude changed accordingly. Similarly, changes in her attitude towards teaching also contributed to a change in her teaching activity.

However, in this case, teaching beliefs, attitude towards teaching and feelings towards teaching affect each other indirectly and tacitly. For example, feelings towards teaching do not affect beliefs and attitude directly, as feelings towards teaching affect teaching practice directly, and teaching practice affects the other two elements directly. So, feelings towards teaching still affect beliefs and attitude, but in an indirect and tacit way. In other words, teaching practice plays an intermediary role in this relationship. This is the reason why the other three elements affect each other indirectly and tacitly in this study. In order to make the relationship among them clearer, in the diagram above I use dotted lines to describe this indirect and tacit relationship in this framework, and solid lines to explain the direct relationship.

Another point is that, based on the analysis of the relationship between the acquisition of tacit teaching knowledge and the related elements described above, I found that not only did teaching knowledge have a tacit character, but teaching beliefs, feelings towards teaching, and attitude towards teaching all had a tacit dimension, too. In this study, the teacher's beliefs determined her teaching practice. In other words, beliefs guided teaching practice because they acted as a standard that she wanted to attain through her practice. The relationship between beliefs and practice is like the relationship between theory and practice. Teaching beliefs relate to "know that", while teaching practice is more "know how". From this perspective, we can say that a teacher's professional development is a process in which a teacher realizes his or her beliefs by making "know that" become "know how".

Feelings towards teaching also have a tacit dimension in this case. The pre-service teacher described her feelings as a kind of intuition that affected her practice. In this study, her feelings also guided her practice in class. Sometimes, the pre-service teacher made problem solving decisions relying only on her feelings. She could not articulate why she used a particular strategy to deal with a given problem because it was a kind of intuition. The teacher did not know why, because her feelings merely told her that she should respond in that way. Actually, some researchers believe that feelings and intuition are kinds of interpretation of tacit knowledge. Polanyi himself adds that "all our knowledge of mental processes, like feelings or conscious intellectual activities, is based on a knowledge which we cannot tell" (Polanyi, 1969, p. 195).

In this study, attitude towards teaching also exhibited some tacit characteristics. The pre-service teacher's attitude changed over time and she liked the students more and more. However, she could not precisely articulate the reasons behind that. She knew there were factors that contributed to it, but she could not pinpoint what they were. The reason for this was because the changes in her attitude were a combination of the effects of the several different elements that we described above.

In summary, we can say that teacher professional development is a process in which a teacher acquires the tacit knowledge of teaching over time. It is also a process in which teaching beliefs, attitude towards teaching and feelings towards teaching affect the acquisition of tacit teaching knowledge, tacitly. It is obvious that tacit knowledge is an important character for a teacher's development because all the elements in this development process have a tacit dimension and they affect each other tacitly, over time.

6.3 Limitations of the Study

In this study, I presented an empirically-based understanding about the acquisition of tacit knowledge by exploring how a pre-service teacher over time acquired the tacit knowledge of teaching. I also gave some empirically grounded understandings about teacher professional development from the perspective of tacit knowledge. However, there are some limitations to this study.

As I have described, most teacher development theories claim that teachers gradually acquire a

degree of expertise or knowledge through their experience. This knowledge guides their teaching to become automatic and intuitive, although teachers cannot explain or articulate it. Researchers have emphasized the characteristic of this kind of knowledge, but almost all of them do not identify the process of how teachers acquire this knowledge or ability in the first place. Obviously, the development of tacit knowledge is an important part of a teacher's development. In this study I identified and described how a pre-service teacher acquired her tacit knowledge of teaching during her professional development process. But I did not delve into the changes in other parts of the teacher's development.

Professional development is a dynamic process which consists of several parts and the product of professional development is the combination of the development of those individual parts. For example, Burden (1980) thinks there are seven main categories of professional characteristics of teacher development: "(1) Knowledge of teaching activities (2) knowledge of teaching environment (3) changing images about teaching (4) professional insight and perception (5) approach to curriculum and instruction (6) professional confidence, security and maturity (7) willingness to try new teaching methods" (Burden, 1980, pp. 6-7). From this perspective, I did a relatively deep exposition of the development of teachers' knowledge. I also explored the development of images about teaching, professional confidence, security and maturity in teaching by presenting the changes in teaching beliefs, feelings towards teaching, and attitude towards teaching in the participant. But for other categories such as professional insight and perception I did not seek to directly highlight them in this study, although there are some overlaps among these categories of professional characteristics.

Another point is the results of this study came from a single case: a pre-service teacher in a middle school in Berlin. She had a masters degree of education and taught two subjects (English and History) in a sports school. The class I did field research in was her English class, there were 21 students, and only two of them were girls. Obviously this is an individual case because it is highly context related. The reason I conducted a single case study was due to its special advantage in allowing me to explore in depth a highly context related unique situation. However we cannot avoid the inherent disadvantage that research results from a unique case are themselves unique. In other words, the conclusions reached in this paper describe how an individual teacher acquired tacit knowledge through her teaching practice, and the model that is used to explain and understand this result is also unique because the eight small circles used in the diagram of this model, and pictured

above, indicate the eight types of class problems that the teacher had to cope with in her lessons.

Therefore, caution needs to be exercised when trying to generalize the model in this case to other teachers. For example, for some teachers there are only six main problems that he or she has to cope with, and so there would only be six small circles in their models. But for others, there maybe more than ten, and the number of the small circles in their model would reflect that. Besides this, as different teachers have different class problems, what the small circles indicate would vary, too. To some extent, the research result of this study can be generalized to understand the development of tacit teaching knowledge. We can use this conclusion to explain how teachers acquire their tacit teaching knowledge from practice, because no matter how many or what kind of class problems a teacher has to cope with, the way he or she acquires tacit knowledge is by doing reflection on their problem solving and trying to coordinate these elements (that is the problems solving) together to reach the goal of their teaching until the whole activity becomes intuitive and spontaneous.

7. References

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