The REFLECT Project in Norway: interactive pedagogy using email

TORLAUG HOEL & SIGRUN GUDMUNDSDOTTIR
Norwegian University of Science and Technology, Trondheim, Norway

ABSTRACT Given the constraints in teacher education at the Norwegian University of Science and Technology, (NTNU), one-to-one interaction via email between the student teacher out on teaching practice and a professor or a university supervisor is a favoured approach. The case studies from NTNU describe how student teachers learn to reflect over episodes from the classroom in a structured interaction with their supervisors. The cases formed part of the European REFLECT project. The article also discusses the processes of reflection and preparation to use free writing over email as a way of opening up resources. We have connected all these analyses, interpretations and the more overarching ideas to build on an interactional principle (Hoel, 1995, p. 13). In this project, the email messages had a double function. First, the writing in itself was intended as a tool for the student teacher's own thinking. Secondly, email is intended to enable communication between the student teacher and their tutors. On the basis of our research findings, we believe that structured email communication can make an important contribution in teacher education. One-to-one communication is time-consuming but may be appropriate for those student teachers who need assistance in connecting theory to practice, as a supplement to the individual supervision they are given at the school where they are on teaching practice. There is also a place for one-to-one communication in distance teaching and the in-service education of experienced teachers.

Introduction

The interactive feature of the Internet has the potential to make an important contribution to solving a perennial problem in teacher education: advising student teachers while they are on teaching practice. The current practice in most European countries is that student teachers are spread out in schools throughout the region nearest to the university. In Norway it often takes the university supervisor a whole day to visit them if they are in
a school far from the university. Therefore, student teachers are generally left in the schools with their cooperating teachers. Teaching practice is usually considered to be a critical period in a young teacher's career. It is the time more than any other when student teachers need guidance and a sympathetic ear.

The REFLECT project was a research collaboration between four European universities: the Norwegian University of Science and Technology (NTNU) in Norway, the University of Exeter in England, the University of Utrecht in the Netherlands and the University of Barcelona in Spain. The project was funded by the Targeted Socio-Economic Research Programme of the European Union. The aim of the project was to use telematics and tele-guidance to promote reflective skills among student teachers. The partners used different technological approaches: Exeter trialled video conferencing, Utrecht tried out a listserv and Barcelona tried out one-to-one email interactions between student teachers while on teaching practice, and their tutors at the university campus. Given the constraints in teacher education at NTNU, the focus of the project was on one-to-one interaction via email between the student teacher out on teaching practice and a professor or a university supervisor. The case studies from NTNU describe how student teachers learn to reflect on episodes from the classroom in a structured interaction with their supervisors. A major drawback was that student teachers and teacher educators are not generally known for their computer literacy.

**Theoretical Framework**

The theoretical model that is the foundation for our work is a reflection model (see Figure 1) developed by Korthagen (1985, 1988) at the University of Utrecht. It describes the spiralling process of reflection over practice. It proceeds in five clearly defined steps and each has two dimensions, students' and teachers'. For the students, step one is a description of the action. Here student teachers describe in detail a specific episode in the classroom. The teacher assists by providing relevant experiences. Step two for students involves 'looking back' on the event. The teacher's role is to accept the students' contribution while steering them towards practice. The students' step three is identifying fundamental pedagogical principles in that episode. Here, the teachers' contribution is to assist the student in connecting implicit vague feelings to the here and now in explicit and concrete terms. Step four for students is generating alternative strategies, while the teachers continue their support. Step five brings both teachers and students back to
step one of a new cycle. The spiralling reflection process described by Korthagen (1985, 1988) can be understood in terms of Vygotsky’s zone of proximal development (1978).
The Zone of Proximal Development

Vygotsky (1978) defined this zone as the distance between the ‘actual developmental level as determined by independent problem solving and potential development as determined through problem solving under adult guidance or in collaboration with more capable peers’ (p. 86). Moreover, being in the zone implies that ‘the mind is not fixed in its capacity but provides a range of potential. The mind, therefore, is both elastic, in that cognitive growth may take different directions depending upon the socio-cultural environment in which it occurs, and unbounded in terms of its extent for potential for growth’ (Smagorinski, 1995, p. 196). The mind is elastic in that thinking depends on the socio-cultural environment and the assistance given by adults and more capable peers. Tulviste (1991) has argued that thinking develops according to the types of activity people in a given culture engage in. Through engagement in culture-specific activities, people develop higher mental processes that are appropriate in solving culture-specific tasks. In other words, higher mental processes have no general operations, only culture-specific processes (Hundeide, 1985). The unbounded mind means that the upper ranges of the zone are constantly evolving as individuals find themselves facing new challenges.

All classroom activities take place within a specific cultural context that embodies them with meaning. Reflection is also a kind of higher mental process, what is often called an ‘intellectual tool’, enabling teachers and student teachers to systematically think about and reflect on what they did. It takes place in a context, in a particular classroom and over a specific episode or a series of episodes. If a description of an episode from the classroom is to be considered as a part of the reflection model, and if this data is to serve as evidence to support a claim about the extent to which student teachers’ reflections about their practice have developed, then two things are important. First, there needs to be some idea of the optimal end point of reflection, and assumptions need to be made about what kind of data serves as evidence of progress through the steps in the model. This optimal end has been called telos (Smagorinski, 1995). Although they don’t
call it telos, Tharp & Gallimore (1988) are also thinking of an optimal path when they emphasise the role subject matter knowledge has in defining progress through the zone. The five steps of the reflection model suggest a path that the reflection process should take for the student to reach the goal of the reflective practitioner.

Vygotsky's construct equally applies to learning at all ages (Tharp & Gallimore, 1988). To understand learning in the zone, three concepts are important: situation definition, intersubjectivity and semiotic mediation. Observing events in the classroom, student teachers and experienced teachers have been known to define the situation differently, that is, deciding what is going on in a particular classroom situation (Berliner & Carter, 1989). Experienced teachers appear to be more perceptive to what is important in classroom situations than novice teachers, and they show more sensitivity to subtle characteristics of classroom tasks than their less experienced colleagues. The teacher training situation establishes the basis for the zone of proximal development in learning to teach. Out in the schools, on a teaching practice assignment, student teachers work with experienced teachers who supervise them. In addition they have a university supervisor who also often sees classroom events in a different way.

Once the student teachers reach an understanding that enables them to define situations that is in tune with the experienced teachers’ and tutor’s definitions, they have achieved intersubjectivity. This is not merely a matter of adding up knowledge; it is a qualitatively different understanding of the situation than that which was previously held. Intersubjectivity is negotiated through semiotic mediation, i.e. through a dialogue between the experienced teachers and tutors on one hand, and the student teachers on the other. It is through their interaction that the student teacher’s notion of what needs to be done goes a step further, and with the tutor’s support begins to approach the tutor’s notion of the situation. In their interaction, the tutors and the student teachers share their realities by describing the situation in words and thereby ‘trade on each other’s truths’ (James 1962, cited in Rommetveit, 1988, p. 187). Intersubjectivity is achieved when these realities overlap.

**Semiotic Mediation**

Vygotsky argued that individual responses emerge from the collective life. Moreover, he suggested that intellectual development takes place on two planes: first the inter-mental plane, that is, between people in social and cultural interactions, and secondly the intra-mental plane, that is, the internalisation of the inter-mental processes. This implies that higher mental functions such as thinking, reflection, reasoning, problem solving or logical memorising are carried out in collaboration with others in social and cultural settings (the inter-mental plane). Language, both written and spoken, plays a central role in the internalisation of higher mental processes.
Communication about the experiences of student teachers in their schools is critical for the development of a ‘teaching craft’. This communication takes place through written and spoken language. Vygotsky considers language as an important tool for thought and problem solving: ‘Thought is not merely expressed in words, it comes into existence through them’ (Vygotsky, 1986, p. 128). The thought becomes explicit when it is expressed in language. Through language we are able to examine thought, clarify it, explore contexts and solve problems or discover a lack of connections. Language is not only our most important mode of communication, but also our most important aid in structuring and examining our inner worlds. Both speaking and writing make an idea conscious. They are ways of clarifying and retaining an idea. They are also ways of developing the idea further by restructuring and discovering new associations. Often, they serve as a springboard for new ideas. Retrospective restructuring is very important with regard to the creation and maintenance of longer deliberations and reflections (Hoel, 1995).

Inspired by Vygotsky, contemporary linguistic theory differentiates between two functions of language: language as a mode of thought and language as a mode of communication. It is important to keep in mind these two functions when one is using writing as a tool in developing thought. When we are writing to develop our thoughts the reader is just us. This kind of writing is exploratory by nature as well as fragmentary, spontaneous, and unfinished. When we are writing for someone else the aim is to communicate ideas, beliefs and points of view. In this mode of writing, the text needs to have internal logic, be consistent and grammatically correct. The two different functions of language also represent different relationships to the most important stress factor for writing, namely a critical reader. The student teachers’ written email messages to their tutors will often be explanatory and unfinished, and not always grammatically correct. We feel that it is important to clarify this for all the participants. It is imperative that they should understand that the reader of the emails they write is a friendly reader, not a critical one.

Free writing has a long tradition for writing as a way of opening up to inner resources and as a way of bringing to the surface ideas that have been dormant for some time (Elbow, 1973). Sometimes writing is a tool for introspection, self-discovery and therapy. On self-expressive writing, Pennebaker (1991) claims ‘it strongly encourages the expression of the individual’s very deepest emotions and thoughts about personal and, often, traumatic events and issues’. Free writing is also about conceptualisation. It is all about finding words to express feelings, to describe situations, to tell a story. Writing literal descriptions about a traumatic event can have a therapeutic effect, especially if one tries to put words to the emotions (Pennebaker, 1991). The idea of a hidden articulation process that makes it possible for the unconscious subjectivity to emerge in words has been
suggested by Matthis (1992). Through writing, ‘something’ escapes as if it were someone else’s voice that ‘talks through’ me.

The student teachers should be introduced to the different functions of writing and they should be encouraged to use writing as a tool in sorting out impressions in the reflection process, with only themselves in mind, not another reader. As they gain experience in this way of working, they will in turn eventually be able to encourage their students to use writing as a tool for developing feelings into ideas, and gaining new insights and understanding in relation to themselves and the world.

In writing, the author enters into two kinds of dialogue. One is the dialogue between the author’s inner being and the words that are put down on paper. The other is between the author and an external reader. Writing, as it has been used in the Norwegian University part of the project (one-to-one communication) will lead the student teachers into a continuous dialogue with a reader. It involves ever-changing and expanding perspectives, and can therefore lead to increased insight and understanding. The written dialogue between the student and tutor can be compared to what happens in a conversation. It is a collective process where partners enter into turn-taking roles both as senders and receivers, i.e. the one who speaks and the one who listens, and a dialogue develops through these turn-taking roles. The product of a dialogue is a joint product, albeit put together by individual contributions, but each individual’s contribution is dependent upon others and influences the others, and the result is a wholeness which is more and something else other than the sum of the parts. A dialogue can be considered as a co-construction of ideas. A listserv is the opposite of one-to-one dialogue, being a conversation of one to many.

Progression through the Zone of Proximal Development and Beyond: a model

Tharp & Gallimore (1988) suggest that the progression through the zone of proximal development goes through two stages and beyond that into another two stages to achieve mastery (see Figure 2).
Stage one is called ‘assistance provided by more capable others’. In our situation the cooperating teachers are ‘the more capable others’ that the student teachers observe and with whom they discuss issues. We, the university tutors, with whom they communicate via email are also ‘the more capable others’. Student teachers are only able to attend to and experience a limited amount of classroom life at the beginning of the teaching practice period. It is a sign of mastery to comprehend the complexity of classrooms (Gudmundsdottir & Shulman, 1987; Gudmundsdottir, 1990; Nilssen et al, 1995).

Typically, in an apprenticeship situation, the master gradually fades into the background and the apprentice takes more responsibility for planning the unit and teaching it. During this stage the cooperating teacher and the student teacher may not conceptualise the goals for the teaching unit in the same way, i.e. have the same definition of the situation. Intersubjectivity evolves gradually through discussion with the cooperating teacher and the university tutor via email. Eventually, essential teaching routines become ‘internalised, personalised, adapted and owned’ by the novice (Tharp & Gallimore, 1988, p. 252).

Stage two is when ‘assistance is provided by the self’. The responsibility for the task has shifted from others to the self. Teaching functions are not fully automatic. Tharp & Gallimore (1988) claim that stage two is a stage ‘intermediate between external regulation and full individual competence (automaticity). It may also be seen as a stage in which the ‘voice’ of the regulating other is gradually acquired by the student teacher so that the regulations may be stated by self to self, gradually taken ‘underground’, transmuted into thought, and eventually discarded as the behaviour becomes fully developed and adaptively automatic’ (p. 253).

It is only during stage two that the voice is heard, because stage three starts when the relevant skill is automatic and the ‘voice falls silent’. By then the novice has progressed out of the zone of proximal development. Most of our student teachers will be at stage two where they will still need a regulating voice that is provided by themselves and supported by their university tutor via email communications.
Method

Teacher education at NTNU is a 1-year programme with an 8-week teaching practice. One semester is taken as part of undergraduate studies in the relevant department. It is only after graduation that the student enters the teacher education programme proper, which is one semester of full-time study at the Department of Teacher Education and School Development. The curriculum covers three subject areas: general curriculum theory, pedagogical content knowledge specific to the subject matter and teaching practice. One characteristic feature of all the coursework is a very strong emphasis on student-centred activity in teaching.

The project was introduced both orally and in a written form to the students. They received enough information about the project on which to base their consent to participate. The information focused on what the project was about, what was expected of them, and what the possible advantages were for them should they agree to participate. We described the project as a whole, but focused on the Trondheim part of the project, that is, one-to-one email interaction. The written information specified that they would be expected to use email as a logbook during teaching practice and to reflect upon the following:

- experiences in the classroom, teaching, learning, students, themselves, subject matter;
- episodes, actions, situations, interactions that surprised them, both negative and positive experiences;
- their ideas about giving and receiving advice, conversations with colleagues, or departmental meetings in school;
- their ideas about preparation, reflection and anything else they wanted to discuss.

We also offered the possibility of their using the data (our email interactions) as a source for a mandatory writing assignment in the teacher education programme.

The instruction covered three aspects:

- Using the computer and Eudora (email software). Because our students' computer skills represented such a wide range, we arranged for them to have instruction in pairs.
- Writing as a tool for the development of thought and for communication. It is especially important to emphasise that email communication is strictly an aid in thinking and reflecting and is, therefore, different from writing to communicate.
- The reflection aspect. We approach this task in progression from the past and other teachers, to the present and 'my teaching'. Our findings are encapsulated by case studies of two student teachers, Guri and Hanne.
Results (with Frøydis Hauge & Paul Tormod Brobakken)

In tune with the theoretical framework we are using in this project, we present our findings as ‘reflection chains’ echoing the interactive nature of our research approach. Guri taught first-year history at an upper secondary school during an 8-week teaching practice period. The school was located some distance away from the university. She is a fluent writer and showed remarkable candour in her messages. She wrote about the good experiences and about unsuccessful forays into the classroom. The case study of Guri describes three distinct reflection chains:

- the silent student reflection chain;
- the pedagogical methods reflection chain;
- the transformation of subject matter reflection chain.

The reflection chains are all interrelated and grew out of each other. The silent student reflection chain serves as an example for all of Guri’s reflection chains.

Sigrun (Guri’s university tutor) forges the link between Guri’s favourite teacher from high school and the ‘silent students’ she encounters in her current class. This teacher had inspired her because he treated his students with fairness and respect. To her, fairness and respect meant that everyone had the right to participate and it was her duty as a teacher to make sure that this could be accomplished. She stated: ‘In my class there are a few very active and a sizeable group of passive students’ (email 15 March 1996, from Guri).

She went on to describe an episode to support this statement:

(Step 1 in the reflection model). In that class there is especially one boy (Alex) who loves to take centre stage (probably exciting in the beginning to have a young female teacher). The situation is as follows: the class is discussing the alliance between states before World War One. Alex does not understand why nation states didn’t ally themselves with as many states as possible. This is an ideal discussion theme, and we discussed that perhaps there was nothing to gain from having weaker countries as allies. But Alex would not give in and began fantasising ‘that if he had been a head of state, then he would have ...’. I cut him off by saying it is good that you get so involved, but I think you have to try that situation out by playing Risk. Laughter. (Email 15 March, from Guri)

She went on to the next step in this same message by reflecting upon this episode, as she was asked to do by her tutor:

(Step 2). I am pretty satisfied with this ‘rejection’. We had discussed the theme long enough. I had to stop somewhere. The laughter kind of became the transition to something new. The chemistry between the
class and me is very good, so that Alex didn’t mind the rest of the class laughing. (Email 15 March, from Guri)

Guri advances quickly along the reflection model in this very same message, without any prompting:

(Step 3). One can say that Alex had achieved what he wanted – attention ... Alex usually has some interesting ideas, but he has to learn to be self-critical. He cannot accept the fact that the things that interest him are also of interest to others. (Email 15 March, from Guri)

The ‘passive group’ that Guri wrote about above is larger than the ‘active group’, and is mostly comprised of girls:

(Step 3). My dilemma is how to subdue the active so that the passive can say something ... the point is how to dismiss in a nice way. (Email 15 March, from Guri)

Sigrun, her tutor, responded to this comment in her reply:

You have clearly identified a ‘small’ problem, but also a ‘big’ problem in this class, these silent students. Now, I want to focus on your strategies to get them to speak out. Can you reflect a little bit over that? You say that you have discussed it with your class. This makes two issues clear to your students: 1. You have noticed that there are students in the class who don’t speak out. 2. That you are working on (getting them to speak). Can we now focus on 2. and your development of different strategies to get the silent ones to speak out? (Email 19 March, from Sigrun)

Guri not only used pedagogical methods to encourage the silent ones to speak, she also used content that she knew would interest them. In one message she mentioned in passing that she was planning to read Nazi youth literature to the class when they were reading about World War Two. By using this material she had hoped to shock them into talking, but it did not work:

(Step 1). I didn’t get the response I had hoped for, and it was my own fault. The students were shocked and I did not pursue a discussion because (step 2) I thought they had heard so much about the persecution of the Jews. I did it just to remind them of it. (Step 3) The pedagogical principle in all this is that this was a trial cut short, a trial to use illustrative and narrative curriculum materials in teaching. I didn’t utilise it to its full potential. (Email 23 April, from Guri)

This example shows that by now Guri was using the steps of the reflection model to formulate her reflections about her teaching. She categorised the experience and the text in her mind and called the reflections over how it went ‘the pedagogical principle in all this was ...’.

Guri returned to the topic of ‘discriminating the verbal students’ towards the end of her teaching practice period. She was then more critical of her
own actions. One of the silent students, Per, had spoken out and she described the episode:

(Steps 1 & 2). I smiled and said it was right. But unfortunately what happened next was that Yngve, who sat next to him, said: ‘Wow, you can answer, I would never have believed that’. ... I said: ‘No sarcasm ...’. I think it will be a long time until Per speaks out in class again. (Steps 3 & 4). I should have reacted differently and said that not everybody has a great urge to stand out themselves. In that way I would have been able to take Per’s side in a more supportive way. (Email 23 April, from Guri)

As her teaching practice drew to a close, Guri reaped the fruits of her labours. She noticed that several of the quiet girls had begun to speak out without being called upon. This made her reflect on all the things that she had done to achieve this. She noted that teachers can play a role in encouraging students’ self-confidence by allowing them to get some questions ‘right’. Feeling secure in class and having faith in their teacher helps, as do the small-group discussions she frequently used. Moreover, groupwork gave her the chance to talk with individual students, which she could not do during whole-class discussions. Lecturing, she noted, does not reach everyone’s mind, but most discussions do.

Describing a small victory, Guri reflected in one of her last email messages that she was succeeding:

The biggest ‘victory’ of all came when one of the boys (Per, in above email message from 23 April) who NEVER speaks out, not in my classes or any other classes, suddenly and without any encouragement at all, answered a question (that she had asked and for which nobody had put up their hand). (Email 23 April, from Guri)

Guri had reached out to the quiet students and she had connected with at least some of them, even to the degree that they now trusted her. She had noticed that some of the quiet ones were also the weaker ones. One girl took Guri into her confidence and told her that she took such a long time to formulate her answers that she felt that their regular teacher became impatient, so she kept quiet (Email 27 March).

Once the ‘silent students’ link was secured, Guri hopped around the reflection model, sometimes even skipping steps. She was genuinely concerned with this group of students and she was often ahead of Sigrun, reporting events, reflections and her ideas of the pedagogical elements in her practice in retrospect. Guri was, however, ready to move on to other themes that transformed her understanding of how students learn. Although she was still concerned with the silent students, she had that part of classroom life under control. Besides, any theme can be drained of stimulating thoughts if pursued in isolation too long. She was ready to link that important issue to the teaching methods that get discussions going. In the other reflection chains ‘pedagogical methods’ and ‘transformation of
subject matter’, the silent students themselves retreated into the background and other issues came to the fore.

The reflection model is a kind of scaffold within Guri’s zone of proximal development. If a meaningful dialogue within the reflection model is to take place, there needs to be a minimum number of exchanges to facilitate the step-by-step reflection progress suggested by the model. Guri sent 12 messages and Sigrun responded with 10. This was a critical mass that was frequent enough to enable Sigrun occasionally to push Guri along to take the next step in a systematic way pursuant to the model. We see a modest progression taking place in all of Guri’s reflection chains over the 8-week period.

If we want to understand email interaction structured on the basis of the reflection model and on one-to-one interactions, then Guri’s reflection chains provide some insights. It is clear that while a narrow focus is helpful in the beginning, it needs to be expanded as it develops to include other aspects of classroom life as well. This is in tune with the nature and development of expertise in teaching. Experts, be it teachers or chess players, can attend to larger chunks of data than novices. The fact that the ‘silent students’ reflection chain was exhausted in a relatively short period and needed a new link, shows that Guri was developing professionally at a rapid pace. Reflection initially needs a clear focus that is later broadened to capture a new theme, which in turn initially has a clear focus, but is later broadened into an endless succession of focusing on a critical issue of classroom life, only to widen out to include other complexities of classrooms and contexts. Such an extensive exposure to systematic reflection as is afforded by the reflection, even over a short period of time, has created interactions on the inter-mental plane that Guri is beginning to internalise.

Hanne had her teaching practice in Norwegian language and literature in a first-year upper-secondary-school. The main themes of Hanne’s email correspondence were:

- Teaching literature and using a logbook.
- Writing as a tool for reflection. Hanne has a meta-perspective on writing and its value as a promoter of reflection and conscious thinking. This theme engages her considerably and she frequently returned to it in her emails.
- Her own development from pupil, student and undergraduate to Norwegian teacher. This development may be traced in her emails, where she draws on her experiences from her own period as a student and undergraduate. She utilises these to understand her students, their reactions and her own behaviour better. Previous experiences are tied to the situation here and now. Hanne is very honest and sincere in her
description of herself. She puts down on paper experiences, emotions and thoughts that many people would think twice about letting somebody else see.

We have chosen to base our analysis on the teaching of literature.

**Reflection Chain on Writing and Teaching Literature**

Hanne was going to teach literature and wanted to include short story writing. Her first email cast a quick glance back to her own literature classes when she was a student at an upper-secondary school:

> We were never allowed to write our own short stories. We exclusively analysed literature. We never created anything ourselves as it were, we only produced what we believed was a ‘correct interpretation’ of the text.
> (Email 6 March 1996, from Hanne)

Torlaug (her tutor) responded by dwelling on this point. She wanted her to develop and examine more closely the idea she proposed in her email, partly by considering her own experience as a student in the light of the present situation:

> What did you think/experience concerning how literature was taught, for example when working with short stories, when you were a student? How do you look at these experiences now, when you teach Norwegian?
> (Email 7 March, from Torlaug to Hanne)

Torlaug also asked her questions concerning her situation as a teacher. She was going to teach literature – what did she want to give her students, and how?

In her next email, Hanne presented her thoughts about teaching literature during her own schooling and also what she as a teacher wanted to emphasise:

> Much too little weight was given to the personal experience of reading, I’m sure. The teacher had his interpretation of the short story, and we students were intended to approach this by means of certain criteria .... We were more or less absolved of any obligation to think for ourselves .... I am very concerned that my own interpretation should shine through. Therefore, I consider it important that the students are allowed to offer their own views, and we draw no conclusions on what is correct or incorrect, only on what is probable or less probable. (Email 9 March, from Hanne)

In the quote above Hanne starts at steps two and three in the reflection model. Towards the end she moves up to step four; she discerns an alternative approach to literature teaching which she wants to employ, this being that students must be permitted to offer their own ideas, irrespective of the teacher’s interpretation. She does not offer any explicit explanation.
for choosing this, but her reason is implied in what she has related from her own experiences, i.e. she wants students to learn to think independently, in this case in relation to a literary text. Because of this she as a teacher wants to keep her own interpretation to herself, and she emphasises that interpretations may be probable or less probable.

In Torlaug’s answer, she again attempts to have Hanne dwell on the theme of literature teaching, and in Hanne’s reply she returned to this theme, this time by relating it to her own university experiences. Even though she was accustomed to having the text presented in a ‘complete interpretation by a lecturer’. In this email she elaborates on what she wrote in her previous email about letting students encounter the text based on their premises:

They [the students] encounter the text with totally different expectations than I do. Now everybody reads into a text what they want, to a certain extent at least. Everything depends on age, background, experience, and knowledge. In brief, everything that distinguishes us as humans and makes us different. (Email 15 March, from Hanne)

Behind Hanne’s writing, we perceive reception theory, theory of literature pedagogy and learning theory, even if she does not explicitly refer to these in her email. She did, nevertheless, do so in a previous email. What she said about reading and interpreting texts may also be extended to general theories of learning (constructionism). The specific event which caused the issue of literature teaching to be raised (in the email dated 6 March) was then relegated to the background, and Hanne moved to a stage where she supplied reasons for certain pedagogical principles which she believed were important for literature teaching.

Hanne worked with literature for a major part of her teacher training assignment. The curriculum for her class allows great freedom of choice concerning material, and the teaching supervisor gave Hanne a free hand. Thus Hanne was comparatively free to select the texts she wanted and to use them the way she wanted. This freedom caused one of the first problems she encountered in the transition from being a student to becoming a teacher: which texts were suitable for this class and its aims? She worked extensively to find appropriate texts, asking for advice from the cooperating teacher and also from the pedagogical content knowledge professor. She experimented with methods and tested work methods she had learned about in lectures, and tested her own ideas, as well as ideas supplied by her students.

As we have seen in the case study, the literature teaching Hanne received when she was in school was based on textual analysis according to fixed formulas, resulting in essays written in the exam mode. The teacher’s interpretation was the one and only answer. She also encountered ready-made interpretations while at university. As a student teacher, Hanne reacts against the literature teaching she has been exposed to. She wants to give her students literature teaching which is exciting and engaging,
which also provides room for student interpretations. Her goals are ambitious: I want to teach the subject of Norwegian in such a way that my students enjoy it equally as much as I do. She also wants her students to establish an independent relation to what they are reading. To attain joy and independence, she emphasises that forms and methods of work must be varied and open to imagination and creativity. Moreover, the students should learn about structure, techniques, genres, etc. through their work with texts.

The interaction with the individual student and the whole class is important to Hanne. From day one she noted groups in the class, especially the silent ones and those who were vocal. She told about one class where she concentrated especially on the active ones, the vocal students, explaining her choice by stating that in this particular lesson she felt uncertain and thus especially dependent on student response. She was also afraid to ask the silent ones, because they might be dreading to be called on. Halfway through the teaching assignment she noticed a development in herself; initially, she was most concerned with the active students, but gradually she took the entire class into account, including those who never appeared willing to speak. ‘A long-term goal for me is to have more people speak’, she wrote (22 March).

At the time of Hanne’s first email she had taught two lessons and admits that she was feeling nervous, but she was surprised at how much the students knew, and that allowed much of the lesson ‘... fortunately to be created by the students themselves, as they offered their contributions to the questions I posed’ (6 March). Letting the students be creative within the framework necessary to govern teaching and learning is something she developed during her teacher training assignment in a reflective and professional manner.

Hanne oriented herself in the direction of her new role as a Norwegian teacher. One typical feature of Hanne’s emails is that during this process she continually drew on her experience as a student and as an undergraduate studying Norwegian, using this both for her practical methodological arrangement of teaching and as a source of reflection. Her experiences contributed to shaping the teacher and student roles she wanted to establish. She looked back at herself as a high-school student and the student role she was allocated there, and then at her undergraduate role. She was very aware that she wanted another teacher role and thus also another student role than what she herself had experienced.

One interesting trait of Hanne’s teacher training is that she drew attention to events and episodes she had felt uncomfortable with, where she had fallen short or done something ‘stupid’, as she herself states, and then used these to develop. This is a general trait of problem solving and learning from experience. However, what makes this typical of Hanne is her honesty and the fact that she allows even the more uncomfortable episodes from her
teaching assignment into her emails. Other student teachers may have similar experiences, but they do not choose to make them public. It is obvious that it is not the experience itself which is decisive, but rather the way it is interpreted.

**Discussion**

We have connected all these analyses, interpretations and the more overarching ideas to build on an interactional principle (Hoel, 1995, p. 13). Everything, all phenomena, in one way or another, are interconnected, they interact and affect each other. Some belong in a larger whole, one detail always joins a larger context; one moment in time is part of a timespan, a person always exists in relation to other people, in relation to his/her closest social context, and to the larger historical and social context he/she belongs in. The individual interacts with his/her surroundings within the social and cultural context which he/she is a part of. This also applies to cognition, thinking and reflection. Cole (1988) defines the interplay between the individual and the larger context thus: ‘The zone of proximal development: where culture and cognition create each other’ (p. 146).

Rommetveit (1974) has defined the rule ‘complementarity of premises’, which has as its basic tenet an interactional view on communication, which is a prerequisite for intersubjectivity: ‘We are writing on the premises of the reader, reading on the premises of the writer, speaking on the premises of the listener, and listening on the premises of the speaker’ (p. 63). Interaction and communication build on mutuality; the partners are necessary for each other and complement each other. Through the interaction, content is constructed jointly. The creation of meaning is tied to the process of verbalisation and the result of the collective process is a new whole which is greater than, and different from, the sum of the individual contributions.

An interactional or dialogic view of communication implies that utterance, message, meaning ‘is completely inseparable from intercourse, ... meaning ... is built between them (the partners) as a kind of ideological bridge, is built in the process of their interaction’ (Bakhtin & Medvedev, 1978, quoted from Nystrand et al, 1993, p. 295). Concentrating the analysis exclusively on the student emails would be like analysing a telephone conversation based only on what a person at one end says. An analysis of reflection and thought development should also include the factors that initiate such processes, those that enhance development and promote changes in thinking, and those that inspire new thoughts. In email communication, thought, development and reflection are largely connected to the dialogue between the student and the email partner, to the interaction process itself.

An interactional standpoint also yields consequences for views on thinking and reflection. In reality, reflection is not an abstract, isolated
phenomenon. Reflection is always connected to a ‘something’ or one or more ‘some ones’, and it is always connected to one or more contexts. One of the contexts in this study is the one created through the email communication. Another is the pedagogical knowledge gained in lectures. A third is the individual student teacher in the classroom with her pupils and interacting with her supervisor.

The case studies show how difficult it is to isolate one episode with its subsequent reflection. A single episode always belongs in a context and is part of a further context, linked as it is both to the past and the future. In order to understand Hanne’s and Guri’s development, one should know such things as whether they have already assessed a number of approaches to teaching the specific subject material, and that the alternatives they have chosen are the result of experiences, testing and evaluations made at an earlier stage in their professional teaching careers.

Traditional cognitive problem-solving theory regards problem solving as a linear step-by-step process, where one step must be completed before the next can be entered. We have chosen to consider the model in the context of a dynamic and cyclical view of problem solving. A phenomenon or problem is usually interlinked with others, and the more complex it is, the more complex is the solution. A problem never remains unambiguous and constant, as our perception and interpretation of it change continuously. During this process, new conceptions about the problem are being formed, as well as possible solutions and new perspectives on the correlations between the individual parts and the whole. Problem solving, comprehension and creation of meaning are dynamic processes where the problem, the players and the context continually interact (Hoel, 1995, p. 227). When the boundaries of the immediate development zone have been reached after addressing a problem or phenomenon, attempts to solve the problem from other angles may be made, or the problem might be left on the shelf, as it were – consciously or in the subconscious – until it again can be processed within the range of the immediate development zone. Even if the mind is elastic and unbounded, it has temporary limits.

In this project, the email messages had a double function. First, the writing in itself was intended as a tool for the student teacher’s own thinking. Secondly, email is intended to enable communication between the student teachers and Torlaug and Sigrun (their tutors). The first aspect is rooted in Vygotsky’s view on language as an important tool for thought and problem solving. During their studies in the teacher education program at the Norwegian University of Science and Technology, all student teachers are offered lectures on the role of language in learning and thinking, and on how to apply this when teaching. Student teachers teaching Norwegian are especially well trained in this as a result of the lectures on pedagogical content knowledge. They are also encouraged to write logs or diaries during their supervised teaching assignment.
The case studies show that the bad experiences, or rather, an episode where one has the subjective feeling of not having succeeded, are often necessary in order to dwell on the episode and use it as a stepping stone to further development. One seldom pauses to reflect on the successes. It is also quite common that when student teachers feel they have failed, the failure tends to take on extra dimensions as they are inclined to search for the causes of their problems and failures in themselves on a personal level. Part of what both the supervisor and the email partner want to attempt is to assist the student teacher in sorting and analysing phenomena, thereby putting the causes where they belong.

Nevertheless, problems or cognitive conflicts are means of development. A perceived problem causes a cognitive conflict, which in turn constitutes an intellectual need, which requires satisfaction through finding answers or solutions. Becoming aware of a problem causes intellectual and emotional engagement, as the problem follows its own innate course towards a solution (Hoel, 1995, p. 226). An obvious task for the email partner is to attempt to assist the student teacher in solving problems. Another task is, paradoxically, to make the student teacher see problems she has been unable to see. This method is often used in such areas as cognitive research and research into reading and writing, and so-called thinking aloud records. Such methods do not offer direct access to the mental processes which take place; the written material may only uncover the conscious thought. The underlying layers, the subconscious mind, which comprise the major part of our mental activities, are not captured. Furthermore, the written text can only express those thoughts which can be verbalised, but not all thoughts can be verbalised.

Some thoughts can be uncomfortable and too revealing - you do not want to see them on paper. Hence, even diary and private log writing has been sorted and censored. This obviously applies even more strongly when writing for a reader, even if one feels comfortable and secure with him or her. A stream of consciousness style, which is the closest approximation of the recordable activities of thought, would be unreadable and even uninteresting in our context. In addition to the more irrational and unconscious selection, there is another conscious selection in relation to the writing situation: what is interesting or important? How much should I write explicitly? How much time do I have for writing? The thoughts which are recorded will only be part of those held in the conscious mind at the moment of writing (Gudmundsdottir, 1996). Moreover, a great deal of the process of becoming conscious of something occurs much later and over time and will not be reflected in the letters.
Concluding Remarks

Our theoretical framework emphasises the role of written and spoken language in all development, including professional development. In our study we have been exploring the pedagogical implications of information technology. Our interests are focused on the message, not so much on the medium. We have chosen this medium because we are able to give almost immediate feedback. Previously, student teachers out on teaching practice got feedback on their journal several days later, which was too late to be able to make meaningful learning experiences from critical episodes occurring during practice.

On the basis of our research findings, we believe that structured email communication can make an important contribution in teacher education. Although one-to-one communication requires so much time that it will probably not be feasible to offer this to every student teacher, it may be appropriate for those student teachers who need a supplement to the individual supervision they are given at the school where they are on teaching practice. Within education in general, email communication has a place everywhere where novices are having field experiences, in order to connect theory to practice. Also, we see the place for one-to-one communication in distance teaching and the in-service education of experienced teachers.

Email communications in general are characterised by informality, spontaneity and openness. This has been clearly evident in our communications. We do not think that Norwegian student teachers are that much different from their overseas colleagues, if anything they tend to be less verbal and less forthcoming than their fellow student teachers, say in Italy. What is important here is that they share basically the same tasks: presenting content to students and keeping discipline. They also share the same needs: to talk about their experiences and to get immediate feedback so that they are able to ‘do it better tomorrow’. Communication via email with their tutors goes some way towards meeting that need, regardless of the nationality of the people involved.

Correspondence

Torlaug Hoel, Programme for Teacher Education, Laaven, Norwegian University of Science and Technology, N-7491 Trondheim, Norway (torlaug.hoel@plu.ntnu.no); Sigrun Gudmundsdottir, Institute of Pedagogy, Norwegian University of Science and Technology, N-7491 Trondheim, Norway (sigrun@svt.ntnu.no).
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