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VIA VERITAS VITA

TEACHER EDUCATION
THROUGH PARTNERSHIPS
AND COLLABORATIVE
LEARNING COMMUNITIES

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CONFERENCE PROCEEDINGS
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Contents

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Introduction

The 40ᵗʰ Annual Conference of the Association for Teacher Education in Europe (ATEE) was held in the University of Glasgow from the 24ᵗʰ - 26ᵗʰ August 2015 and welcomed 300 local and international delegates from 53 countries. The theme of the conference was **Teacher Education through Partnerships and Collaborative Learning Communities.** To highlight and model a partnership approach to teacher education in Scotland the conference was organised by the University's School of Education in partnership with Education Scotland, the Educational Institute of Scotland (EIS), the General Teaching Council for Scotland (GTCS), Scottish College of Educational Leadership, Glasgow City Council, Scottish College of Educational Leadership (SCEL), School Leaders Scotland, Association of Headteachers and Deputes in Scotland and British Council Scotland. The conference was sponsored by Routledge Taylor Francis and by British Council Scotland. The sponsorship from British Council Scotland enabled a delegation of teachers and teacher educators from African countries (Kenya, Rwanda and Pakistan) to participate in the conference.

The conference was opened by senior pupils from Hillhead High School, Glasgow and primary pupils from the Gaelic School of Glasgow to emphasis the importance of partnership with young people. Angela Constance, Scottish Government's Cabinet Secretary for Education and Lifelong Learning presented the opening keynote. The other keynote speakers were Professor Graham Donaldson (Scotland), Ellen Moir (USA) and Professor Kari Smith (Norway). The conference included two innovative Roundtable discussion and debate sessions involving all the conference participants in reflection and exchange concerning questions about partnership and the future of teacher education. The Round table sessions included various speakers from the university sector and from the General Teaching Council for Scotland, European Commission (Education and Culture Directorate) and British Council. The conference brought other innovations including the partnership approach in its organisation, the use of twitter before, during and after the conference (with 1000 followers) and the involvement of pupil voice. The delegates indicated in their feedback that these innovations gave a stronger feeling of interaction, partnership and community.

There were 159 research papers presented by delegates from around the world over the 3 days of the conference and each of the 15 ATEE Research and Development Communities had 3 meetings during the conference to discuss ongoing research projects and publications. The conference participants were invited to send full papers for consideration for publication in the Conference Proceedings. The papers received were peer-reviewed and those that are presented in this volume provide a snapshot of the papers presented during the conference parallel sessions.

I would like to thank everyone who was involved in supporting the conference - before, during and after August 2015. Everyone's participation and collaboration made the conference a great success academically and socially.

Professor Kay Livingston
Chair of the ATEE Conference 2015 Academic Committee

Teacher Education through Partnerships and Collaborative Learning Communities

There is growing recognition that the complex, diverse and changing contexts in which teachers work means that they need to revise, add to and enhance their knowledge and skills continually throughout their careers and engage in different forms of professional development according to their own and their pupils' needs. However, for many teachers, their development paths remain disjointed with no sense of teacher education as a progressive journey of professional learning. Realising a vision of a continuum of teacher career-long professional learning that meets teachers' individual learning needs and is balanced with school, local, national and international needs means re-conceptualising teacher education and the role of teacher educator. The complexity of teachers' diverse professional learning needs requires collaborative approaches to teacher education that provide access to blended professional learning, different knowledge, skills and expertise in practice and research and to a rich mix of teacher educators. Stronger partnerships are necessary that help connect teachers with their peers in their own school and in other schools and enable greater interaction and interdependence between different teacher education providers and stakeholders. The Council of the European Union in its conclusions of 20 May 2014 on effective teacher education (2014/C 183/05) recognised the potential of enhanced cooperation, partnership and networking with a broad range of stakeholders. The Council's conclusions acknowledged that teacher education programmes '*should draw on teachers' own experience and seek to foster cross-disciplinary and collaborative approaches, so that education institutions and teachers regard it as part of their task to work in cooperation with relevant stakeholders such as colleagues, parents and employers.'* The development of effective and sustainable collaborative approaches to teacher education requires shifts in systems, cultures and practice and ongoing professional development for teachers and teacher educators.

The conference offered opportunities to exchange knowledge and ideas; stimulate discussion and encourage further joint activities and research in the following issues related to the conference theme:

- Teacher education through collaborative partnerships
- Multiple and interconnected contexts for teacher education
- Collaborative learning communities
- Teachers' diverse professional learning needs and the implications for teacher educators

- Blended approaches to professional learning including digital technologies and school, local, national and international peer learning
- Mentor support and challenge for teachers' professional learning
- Teaching for diversity and creativity
- Leadership for transformational change
- Teacher educator identities
- Teacher evaluation and teaching standards

Keynote presentations

Round Table

http://media.gla.ac.uk/web/schools/education/RoundtableAndDiscussion2.mp4

Professor Graham Donaldson

http://media.gla.ac.uk/web/schools/education/GrahamDonaldson.mp4

Ellen Moir

http://media.gla.ac.uk/web/schools/education/EllenMoir.mp4

Professor Kari Smith

http://media.gla.ac.uk/web/schools/education/KariSmith.mp4

Ken Muir

http://media.gla.ac.uk/web/schools/education/KenMuir.mp4

Preparing student teachers and teachers for the multicultural school and pre-school through international practicum and collaboration

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Abstract:

Norwegian classrooms have become more diverse due to immigration from both European and non-European countries. This implies new challenges for teachers and teacher education. This research paper presents a study aimed at exploring and analysing student teachers' professional development through exposure to international practicum in South Africa and how their cooperating teachers are affected by the student placement. The study draws on discourses within multilingualism and socio-cultural theory (Cushner 2007; Heggen & Raaen 2014; Sãljõ 2002; Wenger 2008). The methodological rationale for the qualitative research approach forms part of a search for meaning (Alvesson & Skjøldberg 2000) within the cultural diversity of the placement schools and pre-schools. Central issues of the findings of this study could feed into and benefit teacher education programmes in terms of preparing teachers for the multicultural and multilingual classroom.

Key words: school and pre-school teacher education; international practicum; multilingualism; intercultural competence

Context of the research

Norwegian kindergartens and classrooms have become more diverse as a result of immigration from both European and non-European countries over the past 20 years. This brings new challenges for teachers and teacher education. However, the majority of teachers and student teachers are ethnic Norwegians with little or no in-depth experience or knowledge of other cultures. They are therefore poorly prepared to work with children and pupils from diverse cultural backgrounds.

In order to reduce the gap between the cultural backgrounds of teachers and learners in Norwegian classrooms, Oslo and Akershus University College of Applied Sciences (HiOA) provides the opportunity for student teachers to complete a placement period of up to three months in primary schools (including pre-schools) in the province of Western Cape, South Africa. Student teachers are given accommodation with host

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families to strengthen their learning experience of a foreign culture. The hosts are recruited from among the placement schools' teachers, thus offering the students an arena outside school to discuss and reflect on their daily experiences.

In South African education, the legacy of apartheid has left many schools under-resourced and unprepared to cope with transformation-related policies regarding, amongst others, new school curriculums, restructuring and reculturing of the whole education system (Olsen, 2008).

The complexity of the educational challenges involved is also linked to South Africa as a traditionally multilingual country with eleven official languages, of which most South Africans can speak more than one. Multilingualism could be described as the norm in South African society. Two of the official languages are the colonial languages, English and Afrikaans (derived from Dutch), and the other nine are indigenous languages. Only two percent of South Africans speak a non-official first language. Until the democratically elected government of 1994 came to power, English and Afrikaans were the only official languages. The post-apartheid government made the nine largest indigenous languages official, and South Africans often take pride in using indigenous languages for many different purposes. The most common language spoken as a first language by South Africans is Zulu (23%), followed by Xhosa (16%) and Afrikaans (14%). English is the fourth most common first language in the country (9.6%), but is understood in most urban areas and is the dominant language in government and the media.

The three dominant languages in the Western Cape are English, Afrikaans and Xhosa and these languages are used as mediums of instruction in schools. During the first four years of primary school, the schools aim to teach the children in their first language (if one of the three). As a result, different mediums of instruction may be used within the same school during this period. Starting at fifth grade, the medium of instruction is changed to the school's main medium of instruction. In the Western Cape area, this will usually be English or Afrikaans, and for many of the children this is their second or third language.

The placement schools are all situated in some of the most deprived areas of Cape Town and the Western Cape in both urban and peri-urban settings. For two of the schools, the surrounding community mainly consists of 'coloured'/Afrikaans-speaking people and 'black'/Xhosa-speaking people. (For the purposes of this paper, we have followed the lead of local South African researchers and distinguish between different population groups on the basis of race/ethnicity, using the terms 'coloured', 'black' and 'white'.) The third school is situated in an area where the majority population is 'black'/Xhosa-speaking. A significant portion of learners also come from informal settlements, commonly called 'squatter' areas, inhabited mainly by 'black' people who have migrated from rural parts of South Africa, primarily the Eastern Cape. All school staff members are 'coloured' or 'black', with the exception of one 'white' teacher in this predominantly coloured school, who live in other and considerably better resourced areas than those of the learners, in what could be classified as lower middle class areas.

The placement schools can hardly be said to represent an enabling teaching and learning environment, in spite of a seemingly high level of commitment by school staff.

Extreme levels of stress among teachers have been recorded over the last few years in South Africa (Hay, Smith & Paulsen, 2001; Xaba, 2003; Theron, 2009 in Collett & Olsen, 2012). All schools in South Africa seem affected by innovation overload as a result of various educational reforms since 1994.

Placement schools' need for support with regard to the many demands foisted on them as a result of the many education reforms since 1994 was clearly forged by inadequate human resources and financial capacity in the school as well as widespread poverty in the school communities. Our study shows that the principals and the teachers are overburdened with poverty-related challenges as well as with administrative tasks – a situation also described by Collett and Olsen (2012).

The selected placement schools were therefore targeted by the Teacher Well-Being (TWB) project during the years 2009–2014 to address the stress recorded among teachers in South Africa. The project was developed by Transforming Institutional Practices (TIP), based at the University of the Western Cape, and implemented in partnership with the South African Democratic Teacher Union (SADTU) and the Centre for Education Policy Development (CEPD). The Western Cape Education department supported the TWB interventions in the schools participating in the pilot project.

Key findings of TWB impact show strengthened capacity at an individual, school and leadership level to address both the structural and cultural conditions that impact effective teaching and learning (Collett & Olsen, 2012).

The Norwegian student teachers are introduced to and trained in the methodology and theory of TWB both prior to and during their stay in South Africa. They are encouraged to identify and reflect on factors supporting or constraining their well-being during their placement.

Research question

This paper explores Norwegian primary and pre-primary student teachers' professional development through international practicum. The paper also examines how the student teachers' presence in schools affects the cooperating teachers during their placement.

The study presented in this paper addresses the following interrelated questions:

- How are the student teachers affected by their placement in poverty-stricken primary/pre-primary schools in a foreign context?
- What are the factors found to facilitate and enhance – and what factors hinder – their learning process?
- How are the South African cooperating teachers affected by their encounter with the Norwegian students?

Theoretical framework

Practicum in a foreign context is one of many learning arenas in a student's course of study to qualify as a teacher. We have chosen to apply sociocultural learning theory in our analysis and discussion of findings from student experiences and learning. Our analysis is

based on studies by theorists including Lave & Wenger (1999); Wenger (2008) and Säljø (2001), chosen in view of their theories and concepts regarding learning in practice (situated learning; legitimate peripheral participation; negotiation of meaning and context). In addition, we apply the concept of coherence, i.e. whether the elements of the programme of study form an integrated whole, to expand the analysis of the complexity between theory and practice in the programme (Heggen & Raaen (2014) and Semby & Heggen (2015)).

Our study draws on discourses in international research related to intercultural competence, which spans a wide spectrum of approaches and schools of thought. Horntvedt (2012), Cushner (2007) and Dahl (2004), among others, emphasise the importance of concepts such as ethnocentrism, cultural relativism, worldview, stereotypes and prejudice. Other important key words are values, norms and verbal and non-verbal communication. Based on these concepts, in line with the researchers mentioned above, we have chosen to apply the understanding that communication skills and attitudes in interactions with persons from a significantly different cultural background are also crucial to intercultural competence.

A significant part of intercultural competence in communication is the ability to shift between languages, translate, explain and in other ways draw on every available linguistic competency in a multilingual context, as did some of the schools in this study. Some newer theories of multilingualism that this study builds on apply the concept "dynamic bilingualism" to refer to this ability to shift between languages. The use of multiple languages in the same situation is also referred to by some researchers as "translanguaging" (Garcia 2008; Chumak-Horbatch 2012).

When interpreting the data on the language situation in the placement schools, we also draw on research on language policy in South Africa (Heugh 2002; Mazrui 2002), and refer to the role of English in the context of globalisation. The use of English as a lingua franca has generated research fields of its own that are relevant to the interpretation of data on the language situation (House 2006; Jenkins 2006).

Research approach and methodology

The issue of the mutual impact of student teachers and cooperating teachers is analysed in this paper within the framework of a qualitative study involving students, cooperating teachers and principals in three selected placement schools. The methodological rationale for the qualitative research approach forms part of a search for meaning (Miles & Hubermann 1994; Morgan 1997) within the cultural diversity of the placement schools and kindergartens situated in poverty-stricken semi-urban and urban communities in South Africa.

The investigation was conducted over a period of three years from 2012 to 2015 and included a total of 61 students (of which 40 are primary school student teachers), 18 cooperating teachers and three principals (of whom one is a deputy principal). The schools selected are the three partner schools to the departments of teacher and kindergarten teacher training at HiOA. The schools have provided placements since 2010. Access to the schools was obtained through a long-term research partnership on school development (since 1998) between researchers based at the faculties of education at the University of the Western Cape and HiOA.

Since examining a cultural phenomenon is a dynamic process, a reflexive qualitative research approach, including a continuous process of reflection and self-reflection as understood by Alvesson and Skjøldberg (2000), was chosen for our study. The aim is to describe and better understand the processes of learning experiences and communication among all participants in the study. Data collection and analysis were therefore interwoven right from the start of this investigation, as strongly recommended by, among others, Miles and Huberman (1994). The students and their cooperating teachers communicated over a considerable period of time (in most cases up to three months), and a number of the cooperating teachers were involved with several groups of students. This provided us with an opportunity to capture not only anticipated outcomes of the student exchange, but also nuances and unanticipated outcomes.

The data collection instruments applied were school observation, focus group interviews with student teachers and cooperating teachers and individual interviews with the principals of the placement schools. All three researchers attended all the interviews, providing data, in terms of both verbal and non-verbal communication, on which to base our analysis.

The group interviews with the students took place about three months after their return to Norway. We wanted the students to have ample time to digest and reflect on their experiences. Our assumption was that the time provided would give the students an opportunity to develop a more thoroughly thought out interpretation of their experiences and a better understanding of how those experiences had affected them. We are aware that we may have lost valuable 'fresh-in-mind' information this way. We did, however, find that the students generally spoke openly and freely around the questions asked. They often became very impassioned about the topics discussed, and at times these discussions developed their own dynamics, sometimes requiring our intervention to bring them 'back on track' Generally, and as described by Morgan (2007), the advantage of group discussions became evident when the discussions began to take shape. The students' opinions and experiences reflected similarities and differences across the group.

The group interviews with the cooperating teachers as well as the individual interviews with the principals took place during the students' placements in the schools. Most groups of teachers seemed to speak openly and freely in spite of – or maybe because of – the researchers being 'outsiders'. We did observe that a few teachers seemed to feel uncomfortable with being asked questions by someone unfamiliar and from another culture. After some time, however, they spoke with just as much enthusiasm as the other teachers. Nevertheless, we question whether some of the enthusiasm and positive comments from both teachers and principals may have been influenced by an eagerness to convince us to continue the partnerships with the placement schools.

Findings

Student teachers

- How are the student teachers affected by their placement in poverty-stricken primary/pre-primary schools in a foreign context?

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The authors have chosen to present the main findings of a study of student teachers' descriptions and interpretations of their experiences while on placement. Quotes have been used to bring life to and illustrate the main points and in some cases to illuminate differences in participants' responses.

Development of leadership and teaching skills

As described in the introductory section, the student teachers encounter a school context involving challenges that differ from those they face in their own country. The students say that working with these new contextual challenges and finding their way has been a key element in their professional and personal development. The students describe the combination of being entrusted with responsibility and given demanding tasks as frightening and challenging, but also as important factors contributing to their personal growth; it has given them a feeling of security and confidence in their role as teacher: "you learn far more when you step outside your comfort zone ... when you push beyond your own boundaries, you learn a lot". Several students mention that the shortage of teaching materials provided an important boost to their own creativity in their work preparing lessons.

The students also reflect on the way the challenges they have faced have increased their awareness of their own attitudes and values and of the discourses that form the basis of their training as teachers.

The students commend the cooperating teachers as helpful conversation partners in the process of understanding, interpreting and contextualising their experiences.

Poverty – sociocultural conditions

As described above, the student teachers live with host families in the local community. By exploring and getting to know the local community outside school hours, they have become more aware of how the children's lives outside school influence their behaviour in school and their ability to learn. One student describes this as follows:

> Never before have I thought about how important outside factors are for good teaching. Another lesson I have learned is how the pupils' living conditions and access to necessities such as food affect them; I've seen this on an even larger scale than in Norway.

Attitudes towards pupils and discipline

The student teachers emphasise that some issues, such as discipline and the dominant, teacher-led style of teaching, are more difficult to raise with cooperating teachers and principals than others. The students on placement in South Africa found it particularly challenging to interpret and understand episodes of relatively brusque forms of reprimand and punishment by teachers, which in some cases must be described as psychological and physical assault (note: corporal punishment is forbidden by law in South Africa). The students generally describe the condescending and angry tone used by many teachers and some teachers' methods of corporal punishment as a 'culture shock' that had a deep emotional impact on them.

The students' reactions to these episodes were handled differently by students and by teachers at the different schools. First, the students discussed it with each other. Some of the students also took the matter up with the school's teachers and principal. The following two quotes show students' differing reactions:

Student 1:

> We went through many situations together and it was very unpleasant there
> and then, but we sort of got over it very quickly and after a while you kind of
> get used to that too, in a way. And your attitude changes a bit. It was really
> unpleasant the first time you saw a child being hit, but when you've seen it
> every single day for a while, you sort of realise that it's kind of normal and
> then you don't react to it as much anymore. And that was an unpleasant
> feeling, that you don't react any more to something that was absolutely
> heart-breaking to watch the first time you saw it.

Student 2:

> I never got used to the fact that some teachers hit the children – tried to
> bring it up with the principal and the teacher in question, but nothing was
> done … nothing changed ….. After a while, I transferred to another
> cooperating teacher.

The students maintain that being faced with this sensitive area of differing attitudes to children and their upbringing and their own reflections and actions has made them even more aware of their own values and of how context can influence their own attitudes. Some of the students express feelings of anger and frustration at a level that could result in less respect and openness towards people from a different cultural background. Could this type of dramatic experience impair these students' potential to develop intercultural competence?

Communication – development of empathy and sensitivity

The interviews revealed that many of the students had no previous experience of being members of a minority group. At their placement schools, they are viewed as 'white' and 'foreigners', not just as teachers. The experience of having characteristics attributed to them based on skin colour and background is challenging for the students. The students state that these experiences have increased their awareness of their own prejudices and attitudes, of how they also ascribe motives to other people based on their own perceptions of them, with a tendency to fall back on prejudices and stereotypes in their descriptions of 'the others'.

The experience of being the only one who does not understand the language spoken in the classroom is emphasised by pre-school student teachers as particularly challenging. Four-five year olds are rarely native English speakers; they use their own native language. The pre-school student teachers also note that they were surprised by their own reactions to the experience of not understanding or being understood. They refer to their reactions and experiences as feelings of inadequacy, frustration and exhaustion.

In the interviews, the student teachers note that these physical experiences of being the outsider who does not have a command of the language or the cultural codes has made them more aware of the power that lies in having a command of both. The students maintain that these experiences, of being an 'outsider' or 'different', are among the most important experiences they have absorbed. They think that this experience could increase their competence as teachers in their encounters with minority children and their parents in Norwegian schools and pre-schools:

Think I appreciate more what it's like when you don't understand anything and how insanely frustrating it is and how tiring. I mean, you sit listening for a whole day without understanding anything at all, so perhaps you'll have a little more understanding when the child who doesn't understand a word of Norwegian is not able to sit still for 10 minutes at the morning meeting, even though we think that that's such a short time, they should really be able to manage that, but it's really difficult when you don't understand anything at all.

The students also reflect on the challenges of communication with cooperating teachers. Limited knowledge of each other's cultural codes has led to misunderstandings between the students and their cooperating teachers, which the students relate to differing patterns of communication, i.e. concepts and words can have different meanings. The students think that these experiences will increase their awareness of the use of words and concepts in various contexts in their own work as teachers.

Cooperating teachers

- How are the South African cooperating teachers affected by their encounter with the Norwegian students?

Previously in this section, we presented the student teachers' experience and learning from their encounters with an unfamiliar school context. But what effect does it have on the teachers who open their classrooms to our students? The teachers receive students who are following a course of study the content of which is unknown to them, and their knowledge of Norwegian schools is also limited. On the other hand, they possess a high level of knowledge and competence as teachers in their own school context. We wanted to hear their voices. Do they have anything to gain, what do they experience and what do they learn, is the experience mutually enriching or is the student an extra burden?

Some of the main findings from the focus group interviews of teachers are presented here. Again, quotes are used to illustrate commonalities and dissimilarities in the findings.

Issues raised by teachers during the interviews included views on learning, choice of teaching method, attitudes towards children and class management (maintaining discipline). The teachers note that these issues took on new relevance because the student teachers brought up these topics in conversations with them, but also because of their own observations of the way the student teachers communicated with pupils and the teaching methods they used.

Class management – Care and discipline

The interviews revealed different reactions and reflections among teachers at the three placement schools related to class management (discipline) and communication with the pupils.

In their interviews, Grade R teachers at one of the schools referred to a change in their own methods after observing how the pre-school student teachers resolved situations involving pupils who did not do as they were asked or were 'naughty', as the teachers put it. As an example, one of the teachers describes how a student teacher would sit the child on their lap, explain and talk to the pupils. She emphasises the difference between the students' approach and the approach she herself would normally have chosen in the same

situation. Teachers at this school say they have given a lot of thought to the students' approach to disruptions in the classroom. This teacher goes on to say that they (Grade R teachers) also tried to apply the same methods after the students had gone home and experienced for themselves that the approach was a useful way of creating a calm and safe environment:

> We have started to hug them more. All they need is to feel secure. We learned this, but when we saw the students, we saw that it really happened. They talked because they feel secure. They express their needs more.

At another placement school, a Grade R teacher reflects on pre-school student teachers' reactions to her conduct in the classroom. She says that she raises her voice, uses "timeout" and reprimands the pupils, which the students said they found questionable:

> A lot of the children come out of homes with no discipline. The parents are absent. I speak loud I have a naturally loud voice. They did not understand this. They reacted and they did not understand the "time out story".

This teacher's methods were questioned in her conversations with the students. The students' questions provided a basis for discussion and reflection.

At both of these schools, the teachers say that observing and experiencing different methods in the classroom and the ensuing conversations with the students has led them to reflect on their own conduct in their interaction with their pupils. At one of the schools, the teachers have changed their methods; at the other, they have not.

The classroom – a meeting place for differing views on learning

Both student teachers and pre-school teachers encounter a school where teacher-centred teaching methods are emphasised and used to a far greater extent than in Norway. The emphasis on formal learning and tests is also more pronounced than experienced by the students in placements in their home country (cf. Introduction). As a result, in their obligatory teaching practice, the students largely use teaching methods that they are familiar with. They try out methods such as group work and active pupil participation. The use of play and teaching through play was also tried out.

In the interviews, the teachers at all three schools discuss the challenges of using more pupil-centred forms of teaching and the use of play as a learning method. They say that these teaching methods are not unfamiliar and were emphasised during their own pre-service training. They also say that they themselves have rarely used these methods in their own work because of structural factors at the school, such as considerable pressure related to the curriculum high academic requirements in their subjects, large classes, equipment shortages and the school's 'traditions', which set limitations on the teaching methods they can use. Nonetheless, several of the teachers say that it has been inspiring to observe and discuss the strengths and weaknesses of different teaching methods with the students. As one teacher put it: "I am inspired to actually practice what we learned in our pre-service training".

The teachers also stress that they have appreciated the experience of having co-teachers in the classroom. This gives them more opportunity to observe their own pupils, which is useful in their own teaching. In addition, they emphasise that the change they have noticed in the pupils' motivation for school work as a result of the extra help and support they have been given by the students has given them food for thought. One teacher says

that he had again been reminded of what he had learnt in his own pre-service training, i.e. how important it is to be patient and give the pupils time to understand and learn.

The length of the students' placement at the schools is also mentioned by several teachers as important to their interaction and discussions with the students: "Enjoy the Norwegian students. They stay the longest and you can build a better relationship" (teacher).

None of the cooperating teachers or students explicitly mentions in their interviews that teacher well-being (TWB), i.e. the school's work on fostering a collegial culture of reflection and good communication, contributes to promoting reflection on their own teaching methods and conduct. Based on the care shown by the schools' teachers towards each other and the students, however, we assume that the culture at the school may be significant in terms of encouraging a focus on teacher well-being. They gain knowledge and skill related to enhancing their own well-being. The students particularly express appreciation for the focus on understanding stress and the opportunities for deep reflection. We expected the issue of the context in which the cooperating teachers and student teachers live and work to have a significant bearing on their experiences and reflections and our findings bore this out. As argued by Young (2000) and Wenger (2008), experience forms the foundation of all knowledge.

"Every child is unique" (teacher) – attitudes towards children

A number of teachers report that they are impressed by the student teachers' motivation and degree of involvement, and their interest for the individual child and their local community. At one of the schools, teachers noted that the student stayed behind with the children during breaks in the classroom and joined them during playtime outside. An observation made by all the Grade R teachers was that the students participated in the children's games and that they initiated games to include all the children in playtime activities; as one teacher put it: "the pupils love the Norwegian students".

The teachers discuss what it is like to work with enthusiastic and motivated colleagues and how seeing more strongly motivated pupils affects and strengthens their own motivation for the work they do.

Teachers at all the schools mention that their pupils are not used to 'white' teachers: "We must remember that our African children are not used to a different skin colour". They also say that getting to know, being cared for and being shown attention by adults of a different skin colour is a new and unfamiliar experience for most of the pupils. They refer in this context to South Africa's recent history.

The teachers also emphasise that their friendship with the students has made them reflect on their own biased perceptions and prejudiced attitudes to other people. They note that conversations with the students about their cultural and educational background and the students' curiosity about the host country's and the school's culture and history have been important to their own reflection and have expanded their perspective.

Language

The language situation in the placement schools

As previously mentioned, in the Western Cape area, three of the official languages, English, Afrikaans and Xhosa, are dominant and used as languages of instruction in the schools. During the first four years of primary school, the schools aim to teach the children

in their home language (if one of the three). As a result, different languages of instruction may be used within the same school during these years.

From grade five, the language of instruction is changed to the main language of instruction of the school. In the Western Cape area, this will most often be English or Afrikaans, and for many of the children this is their second or third language.

Some of the teachers reported that that the hegemony and prestige of the English language was increasing and expressed their criticism of this situation. The lower grade teachers in the predominantly coloured school in particular, who originally intended to and wanted to teach in the children's home language, could see that parents chose to put their children in the English-speaking classes even if this was not the language the child knew best. This made the first years of school more difficult for both the teachers and the children, and they tried to talk the parents out of making that kind of choice: "…But now parents are saying their children should be in English class even if they are Afrikaans-speakers. I discourage that".

The fact that English is gaining ground over Afrikaans in the coloured population was also something we experienced through informal visits and conversations. It was quite common to hear the parents in a family speaking Afrikaans while the children spoke English, often in one and the same conversation. One of the reasons for this situation might be the fact that as the majority of the higher education institutions use English as the language of instruction, it has become the language of opportunity, and its use is encouraged by parents who want their children to succeed. At the same time, younger generations' exposure to popular films and pop songs, which tend to be in English, also contributes to strengthening the position of English and increases its use.

Teachers' comments on how the students managed the language situation

The schools that hosted the Norwegian students in this study used all three dominant languages as instruction languages. This means that the students, who all had a fairly good command of English, but who could not understand Afrikaans or Xhosa, sometimes had to work in classrooms in which they did not understand the language of instruction. Teaching and instruction by the student teachers had to be conducted in English, and in some cases, this was neither the children's home language nor their school language.

When asked about how the students coped with this language situation, the teachers did not seem to think this was a problem. One headmaster in a coloured school had asked and heard about how this was being dealt with in the classrooms: "Students would sometimes be in a classroom where the language of instruction was Afrikaans. The teachers said this was not a problem. The teacher would translate".

Many of the Norwegian students themselves, however, felt the language barriers presented a considerable challenge during their placement period in South African schools. Not being able to communicate with the children in a common language that both parties knew well was difficult for them. Nevertheless, the teachers did not seem to see this as a problem.

One of the explanations for this could be that in South Africa (as in many other African countries) multilingualism is the norm. Even if having eleven official languages is a relatively new situation, these languages have been in use for many generations. Africans are accustomed to handling different languages in the school context, translating when possible so that everybody understands.

In some schools and preschools in Norway, there is a tendency to regard monolingualism not only as the norm, but also as the goal. A multilingual situation is seen as

difficult both for the teachers and for the children. Experiencing a school environment where multilingualism is the norm, and where this is not regarded as much of a problem, may give our students valuable experiences and competence that they can apply in multilingual environments in Norway.

Conclusions and implications for teacher education

Our findings indicate that the student teachers, and to some extent their cooperating teachers in the placement schools, learn from each other in ways that strengthen competence within intercultural communication and classroom management. The experience of finding themselves in a context where they belong to a very visible minority that does not understand the cultural codes and, in some situations, does not understand the language spoken is described by the student teachers as pivotal. They report that this experience has made a significant contribution to their ability to feel empathy and be open-minded towards learners and parents from minority groups in Norway.

We further argue that the student teachers in particular seem to have moved from an ethno-centric worldview towards one of cultural relativism in their efforts to understand the differences between Norwegian and South African schools in their everyday life. We also found that the student teachers, and to some extent their cooperating teachers, acquired a stronger understanding and appreciation of where they come from in terms of their education programmes. This was particularly evident in the approach to discipline management, which for some student teachers was a shocking experience. The harsh and sometimes brutal disciplinary methods exercised by some of the cooperating teachers could have weakened the students' development towards a cultural-relativistic view and thus intercultural competence. However, the student teachers learned how they – through observation, reflection and action focusing on their own well-being as student teacher – could take collective action to support each other and constructively deal with shocking experiences during their placement in South Africa. We therefore do not find any evidence that the assumed weakening of their move towards cultural relativism has taken place. The student teachers themselves are confident that they have experienced profound professional and personal development that has made them better qualified to communicate and teach in multicultural and language-complex classrooms in the future.

We therefore suggest the following implications for teacher education:

- Better use could be made in teacher education of the experience gained by student teachers during their placements abroad for the benefit of other student teachers who have not had this opportunity, particularly with regard to issues concerning cultural and linguistic diversity.
- International practicum as described and analysed in this paper could be adopted and adapted as an optional semester in teacher education programmes and offered as an exchange opportunity between strategic partners across the world.
- The concept and methodology of teacher well-being could be included in pre-and in-service teacher training in order to promote a caring school culture for teachers and learners/pupils.

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An investigation of student teachers' professional development following a teaching placement in Southern Africa

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Norwegian classrooms have become multicultural and this implies new challenges for teachers and teacher education. International practicum is often presented as effective in developing intercultural competence. This paper explores the professional and personal development of student teachers during a three-month international practicum in Namibia. International practicum has the potential to transform the students' meaning perspectives because it puts the student teachers in an unfamiliar cultural and educational context. In analysing how student teachers reflect on their experience, we have primarily drawn on Mezirow's and Taylor's transformation theory. Our main findings are that most students have increased their professional and personal self-efficacy and developed their communication skills with children from cultural minorities. However, only a few have deepened their ability to reflect on specific cultural imprints of schooling and teaching. And many seem to lack critical reflection and openness as to how the local culture influences classroom practice and the teacher-student relationship.

Context of the research

Norwegian classrooms have become more diverse due to immigration from both European and non-European countries. Most teachers and student teachers are majority-culture Norwegians with limited experience or knowledge of other cultures. According to Walters, Garii and Walters (2009), the disparity between teachers' culture and experiences and those of their pupils creates classrooms where teachers are unable to address the needs of pupils from diverse backgrounds. And the consequences might be as Cushner and Mahon (2009, 307) claim, namely "that many teachers continue to graduate from preparatory institutions and settle into careers without the requisite competencies to ensure the educational equity that enables all students to attain their personal and professional goals in this global, postmodern world". This implies that teachers and teacher education are facing new challenges.

Multicultural dimensions are included in all subjects and an international term is typically offered in the course of the 4-year teacher education programme. Most commonly, this is in the form of a study abroad programme. At Hedmark University of Applied Sciences, a multicultural perspective is highlighted as a focal point of teacher education. Students receive training and courses in various social, multicultural and multilingual contexts. Specified learning objectives are knowledge about children's education, development and education in different social, multicultural and multilingual contexts and a good understanding of global issues and sustainable development. However, most students are exposed to these issues at a theoretical level and few students take part in international exchange programmes. Theoretical courses in diversity, multiculturalism and cross-cultural understanding are important, but whether these types of courses are able to change the values and perspectives of the students is open to question. It is also debatable how well

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such courses prepare students for work in the diverse classroom. Merryfield (2000) also questions the ability and commitment of middle-aged white teacher educators from the majority culture to teach for equity and diversity. According to Walters et al. (2009), an international practicum is more effective in developing cultural competence and global awareness than theoretical lectures. Several studies find that the teaching abroad experience seems to make lasting changes in teachers' classroom practice. (Cushner 2007; Mahon and Cushner 2009; Quezada 2004).

Nevertheless, there is a lack of documentation on the effect of these programmes and research is needed (Trilokekar and Kukar 2011). This paper explores the professional and personal development of student teachers during an international practicum in Namibia. The intention of the practicum is to facilitate students' professional development, with a special focus on intercultural competence. In analysing how student teachers reflect on their experience, we will draw on Mezirow's and Taylor's transformation theory as well as previous research on international practicum (Mezirow 1981; Taylor 1997; Cushner 2007).

A plethora of terms exists referring to what we can broadly label as "intercultural competence". Common concepts are ''transcultural communication", "intercultural interaction", "ethnorelativism", and "intercultural sensitivity" (Cushner 2007; Sinicrope, Norris and Watanabe 2007). In this paper, we will use the concept intercultural competence to describe the ability to discriminate and experience relevant cultural differences and the ability to communicate and collaborate with people whose attitudes, values, skills and knowledge are significantly different from one's own (Cushner and Mahon 2002).

Research aim and research question

Our focus in this study is to examine whether the aims of the international practicum are met. More specifically, we focus on the development of the students' professional role as teachers. The research question is: what do Norwegian student teachers gain in terms of professional development during a twelve-week international practicum in Namibia? Professional development is defined as activities that develop an individual's skills, knowledge, expertise and other characteristics of a teacher (OECD 2009)

Theoretical framework

According to Mezirow (1981, 1997), adult learning differs from childhood learning. Within his theory, adult learning is about a change in meaning perspectives, which are defined as "broad sets of predispositions resulting from psychocultural assumptions" (Mezirow 1994) that form an individual's worldview. Meaning perspectives develop from former experiences and are culturally specific. Mezirow defines transformative learning as a "process of using a prior interpretation to construe a new or revised interpretation of the meaning of one's experience in order to guide future action" (Mezirow 1996, 1997). This is in essence what Mezirow (1981) calls perspective transformation. "The new frame of reference would be considered more functional when it is more inclusive, differentiating, critically reflective, open to other points of view, and integrative of experience" (1998:3). Transformative learning is the process of change in frames of reference.

Taylor (1994, 1997) questions the catalytic role of critical reflection and claims that dramatic changes in culture, affective learning, relationships, as well as collaborating with others might also induce transformative learning. To learn to be mindful of other people and open to diversity implies recognition and experience of otherness (Abdallah-Pretceille 2006). Transformative learning theory provides a useful framework for understanding how

"experience" and "experience of otherness" provides a context for perspective transformation.

An international practicum is potentially effective in transforming learners' perspectives and preparing them for work in a diverse classroom (Cushner 2007; Quezada 2004; Walters et al. 2009; Wiggins, Follo and Eberly 2007). The students might gain new perspectives on their professional role and pedagogical practices through their international experience (Driscoll and Rowe 2012; Hamel, Chikamri, Ono and Williams 2010; Usher 1985). Teaching in a new context will challenge them as teachers and might help them to question their *a priori* understanding of teaching and their role as teachers and construct a new understanding (Pence and Macgillivray 2008). Furthermore, they must learn to live and communicate in a foreign culture. This might be frustrating since former meaning perspectives and frames of reference will not always help them to understand and act adequately. The cultural shock that many will experience may catalyse a change in frames of reference, which again might lead to increased cultural sensitivity. However, this will depend on the ability of the student to reflect and elaborate on an existing point of view and habit of mind, and transform them into a new frame of reference. Another outcome might be that the student sticks to his or her initial biases regarding groups and cultures and the conceived superiority of his or her own cultural values and habits. To transform one's perspective is less common than it is to make the "new" fit into existing frames of reference (Mezirow 1998). Thus, international experience alone does not necessarily make the participating students interculturally competent or give them new perspectives on their professional role and pedagogical practices.

At Hedmark University of Applied Sciences, the international practicum programme consists of three phases, of which the stay abroad is one phase. The three interlinked phases are: pre-departure, in-country and re-entry. The programme is meant to help the students enhance their learning outcome by providing relevant knowledge as well as stimulating reflection on their student experiences. Vande Berg and Paige (2009) recommend this design from their analyses of several intercultural training programmes. The traditional non-interventionist programmes are waning and most new programmes are based on "a new paradigm, based in the understanding that students learn more effectively abroad when we intervene in their learning" (Vande Berg and Paige 2009, p. 433). The students need some form of education, mentoring, challenges and support to change their previous perspectives (Bennett and Bennet 2004). The programme spans 10 months of the third year of a 4-year general teacher education programme.

The *pre-departure* phase consists of region- and context-specific knowledge and understanding. It is important that the students know as much as possible about the geography, history, economy, ethnicity, culture and school system of Namibia. Furthermore, we give lectures on global issues, development theory and issues of poverty and inequality. A meeting with students who have finished their international practicum is also a part of the pre-departure phase. In addition to this, the students develop a problem statement for their BA thesis that they will conduct fieldwork on during their stay in Namibia. The *in-country* phase*,* which lasts three months*,* starts with a week in the Namibian capital where the students receive briefings and lectures by local professors and NGOs. Moreover, in this phase they are exposed to the local culture, schools and university. The lectures focus on the challenges of the education system and of being a teacher in Namibia. After this week, they travel to their final destination, Tsumeb, and start their practicum placement in local schools. Students are placed in pairs to allow them to share their experiences more easily. Halfway through their stay, arrangements are made for

group discussions and individual tutoring. Topics raised include culture shock, the students' feelings and behaviour, their frustrations, and the role of being a teacher in a very different context. We furthermore raise questions about Norwegian values, habits and points of view. We specifically ask the students to reflect upon how they can apply what they learned at the pre-departure course in the new setting. As part of their teacher education, they must write a BA thesis on a subject related to their practicum in Namibia; student theses often focus on the challenges facing local schools. Our aim is to strengthen the students' process of reflection on how local factors affect the learning process both on the individual and structural level. The *re-entry* phase starts when they are back in Norway. The students' experiences on a professional and personal level are discussed in groups and on an individual basis.

Research methodology

In order to gain insight into the research question, we conducted a qualitative study. Within a qualitative methodology, the focus is on the meanings, values, intentions and emotions of the informants and the main goal is to obtain an understanding of their perspectives (Kitchin and Tate 2000). The choice of this methodology is mainly to do with the explorative nature of the research question. Drawing on the methodology of Willard-Holt (2001) developed for pre-service teachers in international programmes, we have developed two open-response questionnaires to be answered pre- and post-practicum. The semi-structured questionnaires were designed to provide insight into the characteristics and outcomes of a perspective transformation. The pre-practicum questionnaire (Q1) and the post-practicum questionnaire (Q2) are very similar in order to allow for a direct comparison to show how the 3-month practicum has affected the student in terms of issues related to global perspectives and self-development. The questionnaires are numbered in such a way as to ensure that the pre-practicum and post-practicum answers from the same student can be compared as well as securing the anonymity of the students. The questionnaires consist of a mix of fixed questions where the respondents mark their perceived level of, for instance, tolerance or knowledge on a scale, and open-ended questions where the respondents explain and elaborate in their own words. In addition, we conducted one focus group interview halfway thought the students' practicum and one after their return. The same themes were raised in these interviews as in the questionnaires. Individual tutoring, a reflection note and informal conversations with the students also contributed valuable knowledge to the study. The group interviews and reflection texts were analysed using inductive open coding. The data was collected from two cohorts of students, 16 students in 2014 and 20 students in 2015.

In addition, we have conducted follow-up interviews with 8 former students who attended the programme during the period 2007 – 2013 to see if their practicum experiences have had any long-lasting effect on their role as teachers.

Findings

Most students expressed that they had benefitted on both a personal and a professional level from their international practicum experience. The positive benefits included increased confidence in themselves and their teaching, appreciation of the diversity in the Namibian classroom and increased intercultural competence. However, not every aspect of their stay was positive. Some students were negative toward the classroom practice they observed.

Most students believed that their stay in Namibia had made them better prepared for teaching. The following quotation is typical:

> *I have become much better at explaining. In addition, I have learned that I must explain from different angles and be very patient in order to make sure that they all understand. I have also learned to manage without all kinds of teaching resources and technologies*.

The students found the lack of resources, ethnic diversity and poverty challenging. They had never experienced classrooms with more than 30 pupils; in Namibia, classes of 40 and 50 are common. There were not enough chairs and desks, and a shortage of learning materials and books was common. There was no functioning ICT. The student teachers felt that teaching in an unfamiliar setting, in big classes, with language challenges and small resources had made them more innovative as teachers. They initially found it problematic to do without all the kinds of teaching materials that were available to them in Norwegian schools, but discovered that they managed to find alternative methods of teaching. In addition, they experienced that they could do without textbooks. This increased their confidence as teachers. They still had to teach and they experienced that the pupils learned, even though no advanced learning materials were available – sometimes, just pencils and a blackboard. Managing big classes was new to the students but also useful, as one student summed up: *"I have become better at giving clear messages to pupils than I was before".* This may seems a small thing, but all teachers know how important this is.

Furthermore, they felt better prepared to teach global subjects, such as poverty, inequality and cultural differences. A three-month stay in a developing country gave them many stories of daily life, which they can use in their own teaching in Norway. They saw poverty and wealth side by side in a poor country. Teaching from one's own experience is seen as a valuable outcome of the international practicum.

We also find that the students felt that their experience of otherness and of living in Namibia had enhanced their competence at teaching global and multicultural subjects:

> *I believe it makes me a better teacher having experienced being included in another culture, which has given me greater insight that may have made me a better human being and teacher,*.

In general, the students expressed that they had become more confident as both teachers and people during their practicum in Namibia. Moreover, they had increased their professional and personal self-efficacy. The following quotations from five different students are illustrative:

> *I have learned a lot about myself, more so than academic things.*
> *I have experienced what it's like to be a minority*
> *Feel confident when I teach more than before*
> *I have experienced being put off* because I had not broken the cultural code in Namibia*
> *The stay in Namibia has tested me both as a person and teacher.*

The students experienced poverty in the classrooms and streets and expressed empathy. They expressed that they felt helpless when they became aware of the poverty many of their pupils lived in. As one student said: "It was so hard to watch pupils who wanted to learn but were held back by poverty; for example, a girl of 15 who can only go to school every now and then because she has to work and look after younger siblings because both parents are dead and the children live alone in the slums". They felt frustrated and sad about not being able to help their pupils to fulfil their learning potential. Some said that they admired the people they saw who were struggling to fulfil basic needs but were still smiling and helpful.

Observing Namibian teachers, the Norwegian students were placed in a situation that challenged them to reflect upon the idea that teaching is embedded in ideologies (Kabilan 2013.) However, few students did so. Most students criticised the teacher's classroom praxis without looking for reasons. According to the students, the typical Namibian teacher conducted teacher-led, top-down teaching with little dialogue, little differentiation and little focus on motivation or concern about learning outcome. The teaching style was mostly authoritarian and teacher-centred. They observed a great deal of one-way communication where the teacher talked and the pupils' role was to listen and answer. The lack of dialogue made the Norwegian student teachers question the learning outcome as they had learned in their own education that dialogue is a necessity for learning. Differentiation and motivation are key aspects of teaching ideology in Norwegian schools. In Namibian schools, the students reported that there was little differentiation in teaching methods. It seemed that, for most teachers, discipline was paramount. The following two quotations illustrate what many students felt:

> *The students respect the teacher. More than I am used to from Norwegian classrooms. Teacher-pupil relations do not exist; I even doubt if the teacher knows the names of her students. I have not observed differentiation and motivation efforts by the teacher. If the students do not follow, it seems not to concern the teacher. Another factor is expectations; the teacher has high expectations for all her students. That is not so in Norwegian classrooms.*
> *Teachers down there are very concerned with formalities and less concerned with the pupils learning outcome. If the pupils are quiet, the teacher is doing a good job.*

Most students expressed frustration at the classroom discipline they observed. Pupils were punished for not performing well enough and the punishment could include sweeping the floor in the classroom or being beaten. Namibian law prohibits corporal punishment, but it is still common. The teachers' use of psychological bullying and public humiliation towards their pupils upset and bothered the Norwegian students. The asymmetric relationship between teacher and pupils surprised the students: *"When you are a teacher you have the power ...you have power over the pupils and you can do whatever you like. For instance, you can sit on the phone as long as you like during class and you can leave the classroom during class".*

Few students questioned the reasons behind Namibian classroom praxis and the teachers' behaviour. More typically, many students developed a negative perception of the local school culture and it strengthened their belief in the superiority of Norwegian school culture. There was little reflection on how the local culture, values and customs influence classroom practice and teacher-student relationships. Instead, most student teachers felt

that Norwegian teaching methods were superior to what they observed in Namibia, as the following quotation illustrates:

> I *think they are lagging behind and teaching as we did during the 70s. No, I think we must go back to the 50s in Norway to find teachers and teaching that can be compared to what we have seen in Namibia*

However, a few argued that it is the Norwegian school that is atypical. These students see that there is a relationship between context and teaching. For instance, the authoritarian teaching style can be a reflection of a hierarchic society and the role of children in Namibia. Some students appreciated the difficult working situation for many Namibian teachers, which could make it difficult for them to adopt a different teacher role.

> A teacher is contact teacher for one class, in addition, he is subject teacher for 6-7 classes, and there are 35-40 pupils in each class.

The students have not changed their views on what it is to be a good teacher. Their praxis in Namibian classrooms strengthened their belief in the learner-centred teaching style and their own educational system. This finding is accordance with some other studies on international practicum (Mahan and Stachowski 1990).

International practicum seems to have helped many of the student teachers to feel more at ease living and working in a multi-ethnic, multicultural society. They used words like "*feel relaxed in a multicultural environment … gained confidence to relate to people from different cultures" … become more tolerant of differences and challenges"* to explain how the stay had made them feel more at ease in culturally diverse situations.

Some were surprised at how different cultures can be. One said for instance: "*Experienced that we are more different than I thought; before I left, I thought people were equal".* Some of the students focused on the value of experience in order to understand another culture. The following quotation illustrates this*: "I have a greater understanding of the lives of others and other cultures because I have experienced it myself".* Many students furthermore reported that they have become more open and tolerant towards other cultures and ways of living than before they left for Namibia and appreciate that there are many ways of living. A typical statement is this: "…*Have less xenophobia than before I left. Before, I was probably more sceptical about other cultures and ways of life, but now after having lived in another country with a different culture and way of life my view has changed".*

Many of the students have become more open and tolerant and developed their communication skills with people from different cultural backgrounds due to their experiences in Namibia. They have learned to appreciate, tolerate and be more open to cultural differences. This is useful in their future jobs as teachers in multi-ethnic Norwegian classrooms since many have come home with a positive attitude and maybe curiosity about unknown people and unfamiliar cultures.

Former students support this finding. We asked teachers who took their international practicum in Namibia some years back what it has meant for their work as teachers. They all said that it has made them better teachers in a multicultural classroom because they have experienced other cultures and another educational system. Many said that they learned from their own experience how important communication is. Moreover, they learned how difficult communication can be in a multicultural and multilingual setting.

The stay in Namibia made them feel more competent at relating to diverse pupils and their parents. For instance, some claimed that they feel more aware than their colleagues about how the parents' backgrounds have a bearing on their ability to relate to the demands of Norwegian schools. Many parents find it strange that they are expected to play a role in their children's education. The teachers also said that it had been an important experience not to be understood and not to understand while living in Namibia. Some mentioned that they had gained a better understanding of how difficult it must be for minority pupils to learn in an unfamiliar language. Moreover, they think that this insight makes them better teachers for these pupils.

All the teachers said that they use much of what they learned in Namibia in their own teaching about Africa and global and cultural issues. Their stay in Namibia has had lasting effects on most of them. For instance, assert that they are more interested in learning from other cultures about their way of living and their attitudes than before they went to Namibia. Many, furthermore, maintain that they are open to other cultures and think we Norwegians have a lot to learn from others. We have to add that this is based on the teachers' own statements.

Conclusions and implications for teacher education

Mezirow defines transformative learning as a process of using an *a priori* interpretation to construct a revised interpretation of the meaning of one's experience to guide future actions (Mezirow 1998). To what extent can we conclude that taking part in our international practicum in Tsumeb, Namibia has led to a transformation in the students' meaning perspectives?

We do not find that most students have deepened their reflection on specific cultural imprints of schooling and teaching. We find that many seem to lack critical reflection and openness about how the local culture, values and customs influence classroom practice and teacher-student relationships. Moreover, their experience have strengthened their pre-departure understanding of what good teaching is. Still, by observing a different school system and by teaching in another context it seems most students have gained a new perspective on their professional role and of pedagogical practices. Interviews with former students strengthened this finding. All claim that their stay in Namibia was useful because it made them feel competent in dealing with minority pupils and their parents. In addition, they value concrete knowledge and experience of otherness as useful in their work as teachers.

International practicum seems to have increased most students' professional and personal self-efficacy. For many, the experience has improved their communication skills in their encounters with children from cultural minorities. As regards whether or not the students *became more empathetic and began questioning cultural stereotypes*, the data is inconclusive. It is therefore difficult to say if the determined goals of international practicum were reached for all students.

International practicum has the potential to transform students' meaning perspectives because it puts student teachers in an unfamiliar cultural and educational context. We see that most have become more at ease in diverse cultural contexts, although few question cultural stereotypes. We have seen that many retain their initial bias regarding other groups and cultures and the supposed superiority of their own cultural values and habits. This may not be surprising since to transform one's perspective is less common than it is to make the "new" fit into our existing frames of reference (Mezirow 1998).

Another reflection is that international experience alone does not change a person. The effect of the experience will vary according to the student's personality and to what extent the student is able to reflect upon his or her experience. It is, furthermore, important how the sending institution works to help the students to reflect upon their experiences. We think that we at Hedmark college must take these findings seriously and partly redesign the current programme. The programme needs to focus more on how to help the students reflect upon and expand their existing points of view and habits of mind in order to facilitate a possible transformation into a new frame of reference.

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Thinking together? Teacher autonomy, collaboration and professional development in Turkish lower secondary schools

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This paper reports on a PhD research which investigates the concept of teacher autonomy in the context of Turkish lower secondary schools. The study uses the English language teaching profession as a focus. There are two primary aims of this study: to explore the extent to which teachers of English exercise autonomy in relation to teaching and assessment, professional development, school management and curriculum development; and to ascertain the factors influencing their exercise of autonomy in these areas. This paper discusses the professional development aspect of this study and, whilst drawing on the literature, argues that teacher autonomy can support meaningful professional development. The following four data collection methods were used: document analysis; classroom and school-wide observations; surveys, and interviews with teachers of English, head teachers, and educational administrators. The participants have reported a strong desire to exercise autonomy in relation to their own professional development. However, there are personal and structural influences; each reproducing the other.

Key words: teacher autonomy, professional development, English language teaching profession.

Context of the research

There is a tendency in the literature to define teacher autonomy using very general terms such as decision-making power (Ingersoll, 1996), or independence and control (Moomaw, 2005). These terms convey the impression that autonomy could be achieved by someone who is able to make decisions independent from others, or is in control of his/her own life. However, these terms are too broad and fall short in thoroughly encapsulating the meaning of autonomy (Mackenzie and Stoljar, 2000). This paper sees autonomy as a multi-dimensional concept, defining it as a workplace construct in which teachers can both work together and individually to create spaces to take initiatives and responsibility, to exercise discretion and to participate in decision-making processes in relation to four teacher task areas. These task areas are teaching and assessment, professional development, school management and curriculum development (Freidman, 1999). This paper focuses only on the task area of professional development, when reporting findings obtained from the research undertaken in the context of Turkish lower secondary schools using the English language teaching profession as a focus. Autonomy, in the sense of a collaborative social concept which also involves individual dimensions, is a construct which this paper argues can support meaningful professional development for teachers.

Before discussing the research aims, it is necessary to give some contextual information about the education system in Turkey. The Turkish education system has four main aims. These are: to raise individuals who are committed to Ataturk, the founder of Turkey's reforms and principles; to promote the welfare and happiness of Turkish society; to

support and accelerate economic, cultural and social development and, finally, to make the Turkish Nation a constructive, creative and distinguished contributor to contemporary civilization (MoNE, 1973). The education system espouses democratic principles such as equality, the right to education, the needs of individuals and society, school and family cooperation as its base (MoNE, 1973). In addition to these general aims and principles, specific goals are determined for educational institutions of different types and levels. The country has a highly centralised education system. All educational activities for each school in the system function within a framework of regulations set up by the Ministry of National Education (MoNE) (OECD, 2013). The Turkish education system consists of two main divisions; Formal and Informal Education (MoNE, 1973). As the latter is beyond the scope of this paper, I will provide brief information about the former. Formal Education in Turkey is divided into five levels. These are kindergarten/nursery class, primary school (compulsory education), lower secondary school (compulsory education), high school (compulsory education) and university. Among these, lower secondary school institutions cover years 5, 6, 7 and 8 (from age 9 to 12). The performance of students in a number of centralized exams during year 8 determines the type of high school they can gain admission to. Students taking these exams are also assessed on their English language.

Turkish pupils begin to learn English in year 2 in primary schools. The recent English curriculum programme for lower secondary schools highlights the significance of English learning by stating that "there is no question that the key to economic, political and social progress in today's society depends on the ability of Turkey's citizens to communicate effectively on an international level" and "competence in English is a key factor" in this process (MoNE, 2013, p.2). Therefore, there have been continual efforts to improve the effectiveness of English language education, such as the implementation of learner-centred education including the concept of learner autonomy, new curriculum programmes and the introduction of new text books. However, despite these concerted efforts, a significant percentage of students leave school without the ability to interact successfully in an English-language medium (MoNE, 2013)

Research aim

Literature on teacher autonomy largely suggests that it is important to enhance professional autonomy because encouraging and strengthening the power of teachers in the personal and professional sense can improve teaching quality and help them to cope with changes within the educational system (e.g. Marks and Louis,1997; Friedman, 1999). An investigation into teacher autonomy in the context of Turkey may open up new discussions regarding low levels of achievement in English language learning. This study expands the efforts of research around the concept of teacher autonomy and contributes to enriching our understanding of it in different contexts. The aim of this research is to explore the current environment and existing opportunities as well as constraints for teachers for the exercise of teacher autonomy. I am, for example, interested in the extent to which teachers of English in Turkish lower secondary schools exercise autonomy in relation to their own professional development and what factors influence them in this area. The study is likely to guide us in finding ways to enhance opportunities for more autonomous action.

Theoretical framework

The theoretical framework I use builds on elements of philosophical theories of autonomy, teacher professionalism and teachers' roles and the theory of structuration. In order to understand teacher autonomy more in-depth, it is crucial to gain a good understanding of the concept of autonomy itself. With this purpose I traced two specific theoretical strands within thinking and writing about autonomy. The first strand is the individualist approach which sees autonomy as resting completely within the individual and is followed mostly by liberal theorists (e.g. Dworkin, 1976; Christman, 2004). The second strand is a more recent approach by feminist theorists (e.g. Friedman, 1997; Mackenzie and Stoljar, 2014) who reconceive autonomy in a more relational or social way. Drawing on these models, this study looks at autonomy as a construct which involves individual and social dimensions. Individual dimensions include dispositions, beliefs, attitudes; the social aspect on the other hand pinpoints the significance of social relations, power struggles, collaboration and interaction.

Individualistic and relational dimensions of autonomy are germane to teachers and their working lives. When conceptualizing the place of the individual within workplace learning, Hodkinson and Hodkinson (2003) comment that seeing only the social and disregarding the individual is a risk. An alternative is to see the individual as separate from the social, but interacting with it. That is, the mind of the individual and the social world are separate but interrelated. When reviewing a number of opinions dominating writings on teachers, Biddle et al (1997) refer to the scholarly vision, which has focussed on role expectations for teachers. They go on to say that according to this vision, teachers are influenced not only by the rights and responsibilities imposed on them because they are employed in school, but also by the expectations that they and important others have for teachers and teaching. In other words, as well as rules and expectations, the principle of the school, curriculum specialists, parents, school board members and teachers' own opinions influence what they do at school. When discussing what determines teachers' practical reasoning, Lindblad (1997) gives the following example;

> When we want to understand why teachers give students homework, we might refer to the fact that they are teachers who are expected to do so as that kind of actor in our schools. It is part of school as an institution governed by norms and rules to do so-to act according to such common institutional determinants connected to mutually recognized roles. However, teachers' practical reasons are not only determined by the fact that they participate in the practices of schools based on institutional determinants. If we have a closer look at teachers' practical reasoning and external determinants at work, in particular, we will find professional as well as personal determinants (p. 397).

What we can understand from this example is that teachers are actors with private wants, beliefs that influence their intentions and epistemic attitudes. In addition to these personal determinants; instructional norms, rules and acting in conformity with others can be considered to be of vital importance in the teaching profession. An individual teacher whose mind is creative, generative, proactive and reflective shares the world of school with

students, parents, schools heads, colleagues and other stakeholders. Teachers' relationships with others, for example are an important dynamic of school settings and interactions are an important part of school life (Blasé and Anderson, 1995).

In identifying these influencing factors, I use Giddens's theory of structuration (Giddens, 1984), which allows me to look at not only the teachers but also structures when trying to understand the concept of teacher autonomy in the Turkish context. Giddens sees human actors as capable of autonomy and possessing agency. However, he argues that this can be constrained by existing social structures which, conversely, can also be enabling.

According to Giddens, the relationship between these two is an inseparable bidirectional cycle.

Within their professional lives, teachers take a number of roles inside and outside the classroom and fulfil a variety of tasks. Friedman (1999) divides these into two activities that teachers perform in their workplace; the pedagogical and the organisational. Friedman also criticizes the fact that pedagogical aspects of teacher activities are emphasised more than the organisational aspect. However, teachers are generally interested in taking part in decisions affecting the whole school, contributing to advancing their professional knowledge (Friedman, 1999). Friedman's study of teacher autonomy identifies four areas of teacher functioning:

- Student Teaching and Assessment: Classroom practice of student attainment evaluation, norms for student behaviour, physical environment, different teaching emphases on components of mandatory curriculum.
- School Mode of Operating: establishing school goals and vision, budget allocations, school pedagogic idiosyncrasy and school policy pertaining to class composition and student admission.
- Staff Development: determining the subjects, time schedule, and procedures of in-service training of teachers as part of general school practice.
- Curriculum development: introducing new 'homemade' or 'imported' curricula by the teachers and introducing major changes in existing formal and informal curricula (p.70) [original emphasis].

Among these, professional development of teachers is a central goal of all the education systems in the world including Turkey. Teachers in Turkey, for example, are encouraged to take more responsibility for their own learning and work with their colleagues collaboratively. Teacher autonomy is a prerequisite for teachers' own professional growth (Kohonen, 2002) and this is heavily emphasised in the literature on teacher professionalism (e.g. Goodson and Hargreaves, 1996).

Methodology

I use a mixed methods design in this study. Mixed methods can be defined as "the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study" (Johnson and Onwuegbuzie, 2004, p. 17). There are a number of typologies of mixed method designs in the literature (e.g. sequential explanatory, sequential exploratory, sequential transformative, concurrent triangulation, concurrent nested, concurrent transformative). In this research, I use a sequential triangulation method. Morse (1991) brought the typology of

sequential triangulation into the mixed methods field. According to Morse, these projects are conducted one after another to further inquiry, with the first project informing the nature of the second project. What Morse suggests may seem as if the main research design involves only the first phase of the study and depending on the results, the nature of second can vary accordingly. However, each PhD research begins with a well-outlined research design. In the case of my own research, the design was not retrofitted to the study, however I was flexible in reshaping it. When needed, I re-evaluated the next research phases and modified the kinds of questions that could be asked of the research participants in the light of the data collected from them in the previous stages.

Advantages of using a mixed methods approach to research have been well documented. Leiber and Weisner (2010) for example explain that qualitative and quantitative methods employed simultaneously or sequentially, are of great value in bringing a wider range of evidence to strengthen and expand our understanding of a phenomenon. This research shares the view that combining quantitative and qualitative research can reveal contrasting dimensions of the phenomena under investigation, and as a result increases the depth of understanding of it. Thus the sequential triangulation method provided me with the flexibility of employing as much direction as needed depending on the results of the first phase. The following diagram shows my sequential triangulation research design.
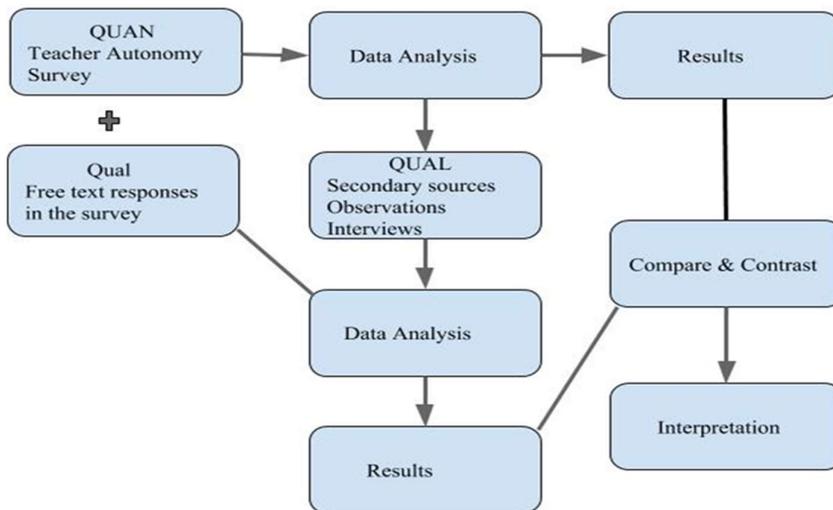
Diagram 1. Research design

I use four data collection methods in my research. These are; documents, a questionnaire survey, observations within schools, and interviews. A number of documents including policy papers, the English language teaching curriculum and newspaper articles were collected and prepared for data analysis. This phase continued until the data analysis process for the other phases was completed. I then surveyed 88 teachers of English using Survey Monkey. In recruiting the respondents for the main study, I used the email list of the English Language Teachers' Association in Turkey that has 300 active members. The survey included 28 Likert type questions and, of these, six were pertaining to professional development. The participants were given the option to make free text comments under each survey section. The final part of the survey invited participants for observation and

interview phases of the study. 16 hours of classroom and school-wide observations were undertaken with three different teachers of English. In the final phase of this study, interviews with five teachers of English, three head teachers and two educational administrators were carried out. All the interviews were undertaken in Turkish.

Quantitative and qualitative data were analysed separately. However interaction between two kinds of data was established as the process continued. Observation data for example were used in order to further analyse and understand questionnaire responses. The first stage of data analysis dealt with quantitative survey responses. In analysing the quantitative data obtained from the questionnaire survey, I used the following steps suggested by Creswell and Clark (2010): preparing the data for analysis, exploring and then analysing the data. For the purposes of preparing the data for analysis, I exported the data from Survey Monkey to Excel. I then imported the data into SPSS, the statistical analysis software. The phase of exploring data required a visual inspection of the data followed by a descriptive statistical analysis to determine general trends in the data. This included calculating minimum and maximum values, means and standard deviations. Screening the data through descriptive analysis helped build an honest data analysis (Tabachnick and Fidell, 2007).The final phase involved analysing demographic data by using descriptive and frequency analysis. Later the frequency values of each question in the four main sections of the questionnaire (teaching and assessment, school management, professional development and curriculum development) were calculated.

In analysing qualitative data, I adapted Braun and Clarke's (2006) thematic analysis guide where data analysis process is divided into six phases. These are: familiarising yourself with your data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, producing the report. As the authors state, these are not rules for doing thematic analysis and these six phases can be applied flexibly according to the needs of a particular research project. I followed a retroductive thinking strategy throughout the whole process. Retroduction refers advancing from one thing (empirical observation of events) and arriving at something different (a conceptualization of deeper structures) (Danermark et al, 2002). The following diagram presents the thematic analysis procedures I followed in this study illustrating the process using a spiral image. This suggests that the process of data collection, data analysis and report writing are interrelated, took place simultaneously and required movement in analytic circles throughout the process rather than using a fixed linear approach (Creswell, 2007). The first loop in the spiral shows the beginning of the analysis.
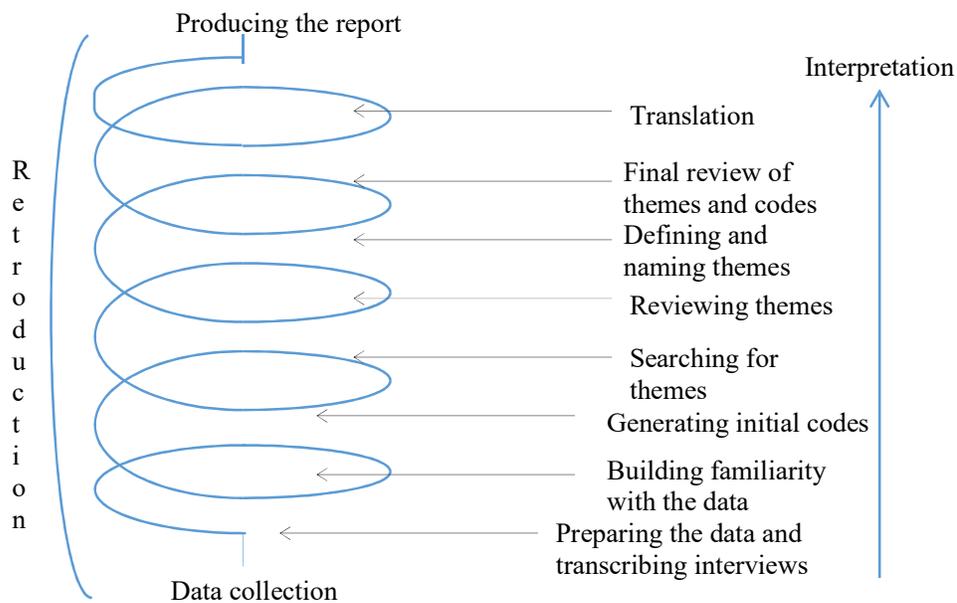
Diagram 2. The phases of qualitative data analysis

The initial data analysis began during data collection. This involved gathering documents and looking at them with a critical eye. Preparing and exploring the data for analysis included transcribing the interviews and reading through the transcripts several times in order to build familiarity. This process continued by reading through field notes several times and organising free-text responses. In analysing qualitative data, I used a software package called NVivo 10. For that reason, preparing data for analysis involved importing data into NVivo and organizing NVivo folders according to the sources uploaded. The next stage involved data categorisation and coding by constantly interacting with the literature. I used a multi stage process of categorisation and coding (Kuckartz, 2014). At stage one, I read (a) teacher interviews, (b) head teacher interviews and (c) interviews with educational administrators respectively. The data was then coded roughly using categories derived from the literature, research questions and survey questionnaire for a, b and c separately. However, I was open to any other code emerging from the data. During the coding process, I worked through the text line-by-line from beginning to end and assigned text passages to categories. Some of the text passages included multiple topics, hence they were assigned to multiple categories. The second stage was more systematic and I grew more confident in developing codes. Finally, I ran a third analysis and the categories and sub-categories were further developed, revised and prepared for reporting. The same process was employed for the analysis of free-text responses obtained from the survey questionnaire, documents and field notes. After I finished creating codes and themes, I began translating the interview extracts and free-text responses.

Findings

In the professional development section of the survey, respondents were asked to consider six statements and evaluate the extent to which each one corresponded with their own experience, behaviour and attitudes. These six statements can be seen in the diagram below
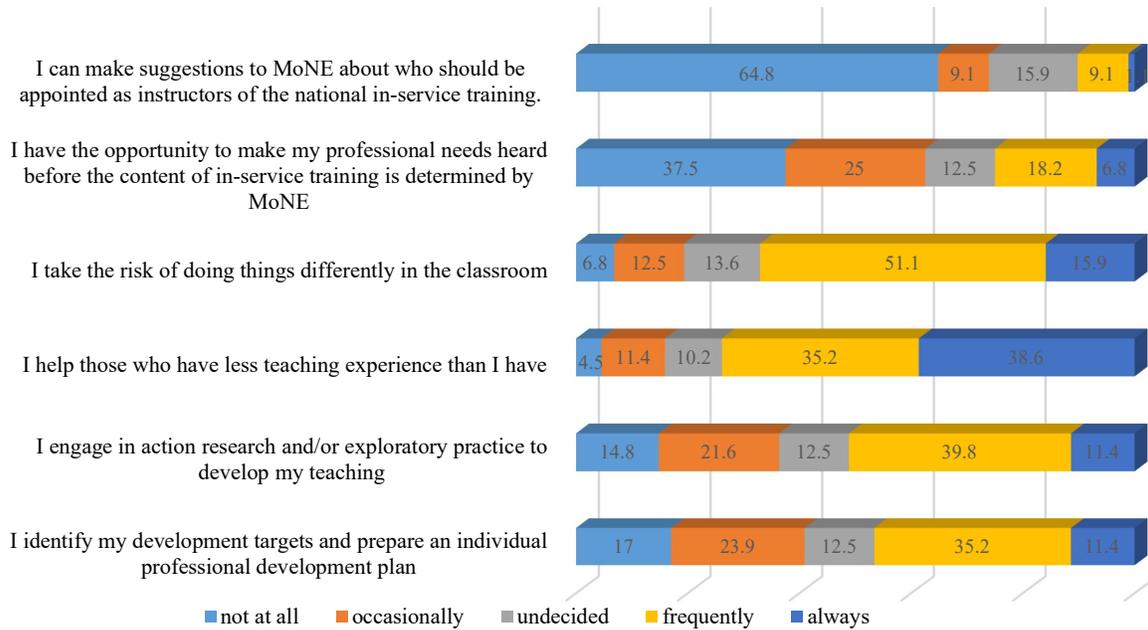
Diagram 3. Survey results in relation to professional development

Respondents were asked to indicate their views using a five-point Likert-type scale ranging from 'not at all' to 'occasionally', 'undecided', 'frequently' and 'always.' The majority of participant teachers indicated that they frequently (51.1%) or always (15.9%) take the risk of doing things differently in the classroom. 73.8% of respondents said they frequently or always help those who have less teaching experience than themselves, which indicates a sense of collaboration among colleagues.

Of the participants, 39.8% said that they frequently engage in action research and/or exploratory practice to develop their teaching, while 11.4% of them indicated that they always did. 35.2% said they frequently identify their development targets and prepare an individual development plan and 23% do this occasionally. The responses so far indicate positive results to some extent in relation to the exercise of autonomy. However, when we look at the first two questions, the picture changes greatly. 64.8% of respondents said they had no opportunity at all to suggest who might act as instructors for their national in-service training. 37.5% of respondents do not have any opportunity at all to make their professional needs heard before the content of in-service training is determined by MoNE. These results suggest that teachers are able to exercise autonomy both at the individual and social level within their working contexts, but possess very limited agency when it comes to wider structures influencing their professional development which is understandable in the light of the centralised nature of the whole education system. The qualitative data however, reveals a different story.

MoNE is responsible for the professional development of teachers in Turkey and offers a number of training opportunities. The main principle of training is to create uniformity of

instruction; rather than promote professional development. MoNE conducts a survey of teachers every year in order to determine their professional needs, in which teachers are asked to choose among a number of predetermined professional development areas. Teachers are given the freedom to suggest any other training areas if they need to; but in order to do so they are limited to only 20 characters! The following image is a screenshot from MoNE's survey illustrating the space restriction.
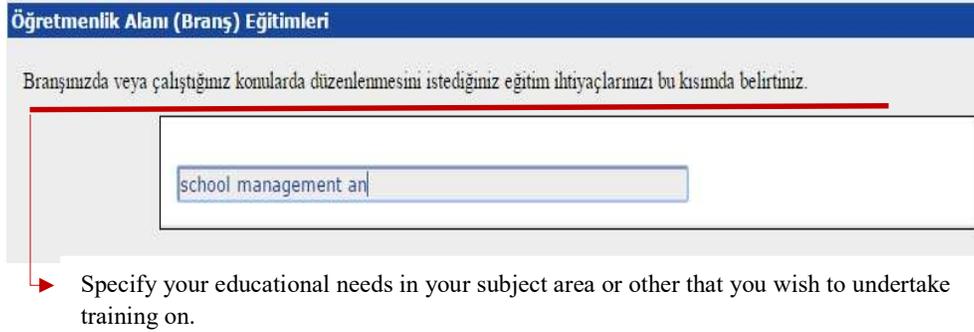
Öğretmenlik Alanı (Branş) Eğitimleri

Branşınızda veya çalıştığınız konularda düzenlenmesini istediğiniz eğitim ihtiyaçlarınızı bu kısımda belirtiniz.

school management an

► Specify your educational needs in your subject area or other that you wish to undertake training on.

None of the five participants I interviewed used this space to insert an additional development area. One of the survey respondents commented that "Teacher opinions and experiences aren't cared [=taken into account]." Another one commented, "Even if I had the chance to give my opinion, this wouldn't make any difference."

The educational administrators and head teachers who participated in the study understandably see professional development as crucial to improving the quality of English teaching. When asked to describe a good teacher of English, all of them pinpointed the significance of professional development. Among teachers of English on the other hand there seemed to be concerns about the quality and scarcity of professional development programs organized by MoNE. One of the teacher interviewees for example made the following comment: "The number of in-service training sessions for teachers of English are really limited and they lack quality. Lack quality because the instructors who run these sessions for teachers of English are themselves teachers of English who work under same conditions at similar type of schools as we do. For that reason I find them futile." Most of the teacher participants argued that there are not enough training opportunities for teachers of English. An interesting response to this claim came from an educational administrator responsible for training teachers, who said "If a group of teachers of English request a particular kind of training, we are ready to make all the arrangements, but this has never happened before." This prompts the question of whether the problem is the scarcity of professional development opportunities or limited teacher agency. However, the following quote drawn from a teacher interview illustrates a different angle; "If we knew that we will receive an answer, I think we would request or suggest new professional training topics [experience tells us that], we wouldn't get any response, we wish we would. Positive or negative any sort of reply." These comments are very important not only in relation to my first research question which investigates the current environment; but it also gives us significant hints about the factors that influence teachers' exercise of autonomy. There seem to be structural influences, but teacher agency can also be an enabling factor as well as a constraint factor in the exercise of teacher autonomy.

In addition to in-service teacher seminars, the school-based development model emerged as an important topic during the analysis of documents. MoNE introduced this model in 2007 with the aim to promote both individual and collective professional development; and encourage teachers to take more responsibility for their own professional development. None of the teachers I interviewed or school head teachers were aware of such a development model. This indicates a communication gap between MoNE and teachers. Furthermore, teachers also have the opportunity to come together in teacher meetings in their working contexts. However, even though collaboration is valued by all the participants, some of the teachers do not seem to fully take advantage of working, thinking and developing together; "I meet once or twice a year with teachers of English from different schools within this district. These are more like social gatherings. We talk about past days, ex-boyfriends." Such an attitude towards teacher meetings has important implications for how teacher see themselves as professionals in their work. There is insufficient space here to explore teachers' professional identity. However, it is important to note that teachers are in continuous interaction with their social context and this is likely to have influence on how they see themselves as professionals, too (Kelchtermans, 2013).

Conclusion and implications for teacher education

To summarise, the purpose of this paper has been to report my PhD research, which set out to investigate the concept of teacher autonomy in the context of Turkish lower secondary schools, using the English language teaching profession as a focus. The study looked at teachers' exercise of autonomy in four teacher task areas which are; teaching and assessment, professional development, school management and curriculum development. The aims of this study were to assess the extent to which teachers of English exercise autonomy in these teacher task areas and to identify the factors that influence their exercise of autonomy. This paper presented the result on the professional development aspect of the study only. The study found that most of the participant teachers exercise autonomy both at the individual and social level within their working contexts. However, a different picture emerged when it came to wider structures influencing their professional development. It was found that the participants possessed very limited agency. Limited teacher agency can be taken as one of the consequences of centralised education systems. However, it was observed that the existing opportunities allowing teachers to create spaces for autonomy were dismissed by the participants. The exercise of autonomy can be influenced by personal factors and by environmental factors both in school and at national level (Ball, 1987). There seems to be a link between these two. Each is reproducing the other. The established ways of doing things can be changed and people can reproduce the environment. This is particularly the case in relation to data presented on professional teacher development in this paper. This study suggests that teachers should be given the opportunity to identify their developmental needs collectively at local levels so that their sense of collaboration can be developed. Additionally, more professional development courses need to be organised in line with local teacher needs and more importantly teachers need to be active participants in constructing and tailoring courses to their needs. Communication between MoNE and teachers is very poor, but should be strengthened because thinking together can be the key to success. Finally, it is important to encourage teachers to collaborate both in school and at district level.

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Getting to the Crux of a Creative Collaborative Academic Colloquium

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This is a study of the dynamics of a Turkish Teacher Educator Professional Learning Community (TEPLC) **ELTER**, (English Language Teacher Education Research), a body created by educators from a variety of institutions in Turkey with the aim of "providing a forum for English language teacher educators and researchers to discuss and share their practices, experiences, and research." The focus of the study is to establish what features and characteristics of this TEPLC aid or hinder the dynamic, and in turn the achievement of its goals. The study incorporated an interpretive case based qualitative approach to find out perceptions of the dynamic within the community. The concept of an inter-institutional TEPLC has the potential to create meaningful partnerships within institutions to further the overall goal of student learning. The findings and reflections gleaned by the researchers on the dynamic could be transferable for teacher educators in other contexts.

Introduction

It has been suggested that teachers engaging in collaborative learning through doing research together can enhance the process of achieving greater research outcomes than individual projects would (Lassonde and Israel 2009; Wuchty, Jones, and Uzzi 2007). The collaborative trend is evident in many fields as more and more research is being published by multiple author teams (Whitfield 2008). However, negotiating the dynamic of the collaborative group can be a considerable challenge. The researchers (members of a collaborative research group themselves) decided to explore further the elements of this challenge.

Collaborative Learning

Collaborative learning in some form of community can be seen within a variety of frameworks. Clausen, Aquino, and Wideman (2009, 445) track related concepts going back to Dewey's 1938 "communities of inquirers" through Schaefer's "centres of inquiry" in 1967. Many writers mention Senge's workplace-based learning organisations in the 1990s and Wenger's communities of practice. With slight variations, the two most widely used terms appear to be professional learning communities (PLCs) and communities of practice (CoPs).

Blankenship and Ruona (2007) explore perceived differences between these, comparing and contrasting different models of each, and concluding that all the models using both terms seem to present an organisational culture of shared vision, collaboration, and trust. They also explore the lack of clarity about concrete structures for knowledge development and sharing, which are common to both models. Differences are manifested in the sense of a PLC as a learning organisation, as opposed to CoPs, which centre the community more on a sense of common practice than on the sense of an organisation; this is further underlined by

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the perspective of the shared PLC goal of changing outcomes for learners rather than the CoP focus on the practice of members, even though both focuses are inextricably linked. A final point is that the PLC models they focus on are based on learning organisation theory, whereas the CoP models draw on situated cognition, social learning, and knowledge management theory. For the purposes of this study, the concept of the PLC fitted the context more closely, so this is the framework explored more fully.

Stoll et al. (2006) claim that there is no universal definition of the term "professional learning community" and DuFour (2004) suggests it has become so ubiquitous as to be in danger of losing all meaning. Others (Toole and Louis 2002; Hord 2003, 2008) choose to emphasise the need for all three elements of the term to be present; that "professional" implies knowledge and expertise, that "learning" implies the need for some change in and/or application of knowledge and experience, and "community" brings the notion that the learning should be beyond what the individual would be capable of achieving on his or her own.

There are commonly agreed upon characteristics of PLCs, though different writers add to this in different ways. Stoll et al. suggest five core characteristics in their review of the literature, but feel there is insight to be gained from three more. There are frequent minor variations; for example, Hord (2009) lists six dimensions and Clausen et al. (2009) (who were also comparing a specific learning community to the general characteristics of PLCs) say ten. Clausen suggests that the characteristics might not all be present at the start (especially as some take time to develop), and that some bodies can remain as effective operating PLCs in the absence of one or two of the five features.

In Stoll's review of the literature, the five core features common to most definitions are:

- **shared values and vision**–in descriptions of working PLCs, what is shared is educational values rather than a full consensus on how to achieve learning goals;
- **collective responsibility** is important because many of the PLCs are schools, so this is often talked about in terms of a responsibility for pupils' learning;
- for PLC projects to come to fruition, a deep level of **collaboration** is required;
- there is **group as well as individual learning**, in that not only do all of the members see themselves as learners, but the collective knowledge of the community as a whole is also enhanced; and
- there is **reflective professional inquiry**, in that people are interrogating their own practice.

The three further characteristics specific to Stoll's paradigm are:

- there should be **mutual trust**, respect, and support among group members;
- there should also be **inclusive membership**, and in the case of a school, this means not only teaching staff, but also school leaders and support staff; and
- finally, there should be **openness**, both in the sense of the knowledge and expertise of different people, departments feeding into each other, and in looking beyond the school for sources of learning.

In her keynote speech at the 1st Global Teacher Education Summit in Beijing, Stoll (2011) extended the concept of PLCs and their productive nature to collaboration and

partnerships in teacher education, which helps to validate it as a choice of framework here. The term can be and has been used for a wide range of different bodies and it originated in higher education, but of late it has more often been used to describe schools taking an internally driven approach to developing a capacity for change. Stoll highlights the likelihood of the isolation of teacher educators working within schools, the need for the same principle of personal learning and development in the pursuit of external outcomes to be part of their on-going practice (as it is for any educator) and the fact that these two elements result in a need for cross institutional PLCs which she calls Teacher Educator Professional Learning Communities (TEPLCs). She also highlights the synergy that can be found in partnerships that involve both schools (which bring the immediacy of the knowledge of practitioners) and higher educational institutions (which bring the greater immersion in the theoretical underpinnings of knowledge), though tempers this with the fact that diversity in institutions and roles brings with it disparity in backgrounds and perspectives. As the need for professional support and the potential for cross-fertilisation of ideas increases with variety, so do the difficulties of communicating effectively across distinct discourse communities.

Context of Research

With the more fully explored concept of a PLC (though in actuality one that manifests as a TEPLC) in mind, the researchers conducted a comparison of their own collaborative research group, ELTER (English Language Teacher Education Research), and the framework of a PLC. ELTER is a group comprised of pre-service and in-service English language teacher educators and academics, in both government and private universities, and trainers involved in courses leading to externally validated teaching awards. The main aim of the group is to generate research into teacher training and education in English Language Teaching (ELT) in Turkey and thereby improve practice nationally. ELTER was established to bring people together across institutions in order to allow them to build on the research of others or to work with others in cross-institutional projects. It was founded in 2011 and meets annually as a whole body; while membership has been fluid, the governing committee and a wider circle of about 25 participants has provided a stable core, along with two external consultants. The members participate voluntarily and, as a result, are not in exactly the context of the English setting Stoll (2011) describes, where organisations would enter into partnerships, taking members with them as a matter of course. The membership of ELTER includes much knowledge and expertise with regard to doing academic research, experience of teacher education and training, or various combinations of these.

To return to the notion of the three elements (as implied by the name) that should be present in terms of ELTER, a PLC is professional in the sense of having knowledge and expertise (in the case of schools, there is some debate as to whether support staff should be included or not, but in the case of ELTER, the knowledge and expertise is that of teacher education and training and that of doing academic research, and some members are considerably more experienced in one of those elements than the others.

Learning implies the need for some change in and/or application of knowledge and experience. Schools usually have the direct goal of increasing outcomes for learners through research into practice, and changes in practice in a PLC would address that. ELTER also has dual research and practice goals. One of the mission statements is the intention to promote

collaborative research into teacher education and training, but there is also a commitment to shaping practice through influencing policy in teacher education and training as a result of that research, and while application might be less immediate at this more national level, this seems to parallel the idea of change in and application of knowledge and experience in school-based PLCs.

Finally, community brings the notion that the learning should be beyond what the individual would be capable of achieving on his or her own, and the mention in the ELTER mission of shaping future directions for research might be seen as outcomes potentially greater than would be the case if individual researchers and practitioners continued to work alone or solely within their respective institutions.

Sigurðardóttir (2010) combines three different sources to say, "A professional learning community consists of a group of professionals sharing common goals and purposes, constantly gaining new knowledge through interaction with one another, and aiming to improve practices." Schools usually have the direct goal of increasing outcomes for learners through research into practice, and changes in practice in a PLC would address that. As stated above, ELTER has dual research and practice goals, and again, the application might be less immediate at this more national level; however, there are still commonalties with school-based PLCs.

As stated before, the dynamic in a group can affect how well it works. In the face of difficulties the researchers found themselves facing in collaborating, their project group became interested in the different views of what collaboration could mean, what other groups were doing, how they had succeeded and what the community of ELTER was achieving through that collaboration, resulting in a research focus that would attempt to uncover the dynamic. As a result of hearing varied reactions and responses to what was, for many, a new way of working, the researchers became interested in whether the goal of collaboration and the cross-institutional nature of ELTER project groups were in fact resulting in synergistic outcomes.

Research Paradigm and Question
To carry out their research, the researchers chose an interpretive paradigm through the lens of a case study of a PLC of teacher educators, of which all the researchers are members. Cohen and Manion (1994, 36, as cited by Mackenzie and Knipe 2006) suggest that "reality is socially constructed," and this would therefore seem an apt research design when researching collaborative researchers who are coming together in this manner. The researchers started with no hypothesis; rather, they set out to understand and find meaning from the perceptions of the dynamic of the group held by the members/participants of the group, acknowledging these were perceptions and not facts coming from each individual at that point in time. Therefore, taking into consideration the research problem within this paradigm, the researchers came up with the following research question: "What characteristics of a learning community affect members' ability to collaborate in research?"

Research Methodology

To address the research question, the researchers carried out a case study on ELTER, a TEPLC of teacher educators of which they are all members and which is described earlier. Therefore, this could be described as a qualitative case study using naturalistic methods, as will be explained below.

Research Methods

The data collection was carried out by the researchers in three phases as follows: The initial phase was conducted at the annual ELTER meeting, when the researchers were given a time slot in the two-day event to present their study and ask each research group to reflect on their collaborative experiences at ELTER. One of the researchers, in presentation form, reminded the participants of the timeline of ELTER, and then the next participant presented a very brief description of the aims of the research, and consent forms were handed out. The participants were organised into their research groups and recorded discussing the roles they felt they had within the groups and how they had felt at each stage. There were a total of 27 participants comprising a combination of 20 academics (pre-service teacher educators) in different Turkish university schools of education, and seven practitioner teacher trainers (in-service teacher educators).

The second phase was carried out three days after the collaborative focus groups, when participants were asked to complete an online questionnaire (with open-ended questions) about their perceptions of their collaborative endeavours at ELTER. This was done anonymously in order for the participants to feel more comfortable about sharing challenges than they would in front of their peers. Sixteen participants completed this phase of the study.

The final phase of the study was carried out three weeks after the initial phase. Three participants were interviewed (in recorded, semi-structured interviews) to generate greater insight into issues that had been brought up in the initial and second phases. One interviewee was an academic pre-service educator, one was an in-service teacher educator, and the final interviewee had experience of both.

The three methods were chosen to be a triangulation of perspectives, which would enable the researchers to bring a greater depth of understanding to bear on the data when addressing the question.

Analytical Framework

Initially, Stoll's criteria for a PLC's shared values, that is, collective responsibility, collaboration, group and individual work, reflective professional inquiry, mutual trust, inclusive membership, and openness were used as a framework through which characteristics of PLCs in general could be compared with those of ELTER, the research group being used for the case study. Afterwards, all three phases of the collected data were analysed by looking within each phase for four specific indicators, namely, creativity (CR), conflict management (CM), teambuilding (TB), and collaboration (C). The data were then collated as per the table below.

Figure 1.

	PLCs	ELTER (PALC)	CR	CM	TB	C
Shared values						
Collective Responsibility						
Collaboration						
Group & Individual						
Reflective Professional Inquiry						
Mutual trust						
Inclusive Membership						
Openness						

Findings of Factors That Can Affect Collaborative Research

As stated in the Analytical Framework, Stoll et al.'s criteria for a successful and therefore productive PLC were compared with those exhibited by the research group from the case study to address the research question ("What characteristics of a learning community affect members' ability to collaborate in research?"). The most significant data, that is, the topics brought up most frequently by the participants will be mentioned.

The first factor for a PLC as previously mentioned is "**shared values and vision** of an institution and objectives." In the case of the TEPLC, the members/participants of the study do not have institutionally-bound shared values and vision because many members are from different institutions and are a mixture of pre-service and in-service teacher education bodies. They do, however, share a larger vision; that of improving ELT teaching in Turkey, which is why members join. There is also a shared goal in terms of generating research to establish how this improvement could be brought about in practical terms. The significant factors that were mentioned by the participants were that they were exposed to different views, contexts, and issues that were apparent in alternative contexts. They had the opportunity to connect with different voices, which enhanced their creativity as they felt it broadened their thinking and attitude to research. However, the lack of a shared concrete vision and diversity of contexts meant that the subgroup members found it challenging to find a common goal for research in terms of the specifics of a concrete research question, as

often the pre-service academics look for a goal of academic interest whereas the in-service practitioners look for research goals that could glean practical solutions.

The next factor mentioned is **collective responsibility**. A TEPLC, unlike an institutionally-bound PLC, does not have the common responsibility for student learning or the consequences of peer pressure from collaborating in the workplace, where they regularly meet face-to-face and have to explain what they have and have not done. Because participation in the case study TEPLC is voluntary and members come from institutions throughout Turkey, ELTER has less collective responsibility than in a PLC, as they do not have any responsibility for students that they directly deal with or for students' learning outcomes. This created issues for the two indicators of creativity and conflict management. The former, creativity, was challenging because they had different work schedules and geographic locations and, as such, they found it difficult to meet online and work together, brainstorm, and share ideas. However, in relation to conflict management, it was also mentioned that they had different roles in the group and they felt that because they did not know each other well, they were unable to make excuses about not keeping to deadlines and were more polite to each other.

The next factor is **collaboration**, which should be deep collaboration. Without significant outcomes, an interdependence and joint review cannot be attained. In the case study TEPLC, deep collaboration is challenging as there is often a lack of interdependence and a responsibility for an outcome because there are no explicit consequences if tasks are not completed. While collaborating in the TEPLC, it was felt that patience, tolerance, and trust were needed, and that it was especially challenging to collaborate virtually because people had familiarity with different communication platforms and widely varying degrees of experience with regard to working in this way; many felt it offered more potential simply not to reply. This also applies to teambuilding, which can be challenging in a face-to-face context, so when participants are also less accustomed to operating in a virtual environment, initial steps towards formation of an effective working team become even more hesitant and intermittent. Additionally, for collaboration, they found shared responsibilities, giving feedback and support, and organising data difficult to negotiate. Deep collaboration in this forum is key to effective research, and because this group only meets face-to-face once a year, it was often felt that this goal was not met. However, many of the members/participants were presenting at the ATEE conference, and it was mentioned several times that this external goal was a great impetus to connect with others and facilitate the collaboration process.

The next factor for a PLC is "**group and individual** needs must be promoted," that is, collective learning through the creation of collective knowledge for all the members of the group. The significant indicator of conflict management arose from the data because when there was more than one person from the same institution, the work hierarchy would often carry over into the voluntary research subgroups. It was perceived that not all of the members saw themselves as learners, which led to frustration, as some members felt their ideas were not listened to. There was a feeling that more structure (not hierarchical) was needed in the TEPLC to ensure this would not happen.

The next factor is "**reflective professional inquiry**," which in PLCs is primarily in the form of action research. However, in the case study TEPLC, there was also reflective professional inquiry about the bigger picture (Turkey). Members were very positive about

the fact that they were working with others from other institutions and that they had access to a much greater range of data than they would have had otherwise, feeling this added to their creativity and, as such, increased the possible depth of their studies. However, they felt that there were not enough opportunities to meet face-to-face (meeting as a group only once a year), which meant there were challenges with being able to reflect collaboratively.

The final three factors were those mentioned specifically by Stoll et al. The first is **mutual trust**, which is an absolute requirement for both a PLC and ELTER. It was felt that mutual trust, respect, and support had either developed or not, depending on the combination of personalities in the sub-research groups. The combination of who works with whom should be thought out more carefully, or possibly left to participants to make choices about. As mentioned above, work hierarchies can come into play, which can mean there is trust and respect, but not on a level of equality. However, the opportunity for networking and making new professional contacts was seen as a benefit.

The second last factor, **inclusive membership**, means that in a PLC, members from outside the department and from all levels of the institution would be welcome. Since ELTER is not institutionally bound, it could potentially try to involve representatives from a cross section of all the institutions with English language programmes in Turkey, and possibly government bodies, NGOs, and publishers. However, this is not currently the case, and at the time of the study, membership in the TEPLC was by invitation only. The significant indicator for inclusive membership of the TEPLC was that of creativity, because participants found that finding a common, meaningful research topic was challenging in terms of uniting the different ideas of the practitioners and the academics, which challenged participants to think in new ways and also to consider impact as a way of evaluating the usefulness of a focus. However, due to time constraints, outcomes did not always match up to hopes and intentions.

The final factor is **openness**, in that PLC participants are open to feedback and negotiation from other departments or external experts are drawn upon. In ELTER, there are no other departments involved, but external experts are drawn upon in the form of two consultant academics. There was much positive feedback for them, but there were also contradictory views of their roles.

A summation of the findings can be found in the table below.

Figure 2.

	PLCs	ELTER (PALC)	CR	CM	TB	C
Shared values	Shared values and vision of institution and objectives	Shared values and vision of ELT teaching in Turkey	*	*		
Collective responsibility	One institution	Not work-bound	*	*		
Collaboration	Deep collaboration necessary or no significant outcomes	Deep collaboration necessary or no new outcomes		*	*	*
Group & individual	Promoted	Promoted		*		
Reflective professional inquiry	Teachers doing action research	Variety of research methods	*	*	*	*
Mutual trust	Absolute requirement	Absolute requirement			*	
Inclusive membership	All school members	Variety of institutions	*			
Openness	Other departments or outside experts	Outside experts drawn upon	*			

Recommendations

The make-up of ELTER, the lens through which the researchers conducted their study, is different from a school-based PLC in that it is not institutionally bound, but is more in line with the cross-institutional concept of a TEPLC. However, the underlying concepts used to frame the comparison of ELTER with PLCs here are common to both PLCs and TEPLCs. A TEPLC with a broader mixture of motivated volunteer members such as ELTER, if managed well, has the potential to fulfil the dual goals suggested by Stoll (2011) of leading to members' understanding more about their own practice (be that academic or more practical) while also contributing to the overall state of understanding of how to best enhance English language teacher education in Turkey.

Several of the points Stoll (2011) raises as being essential if a TEPLC is to be meaningful and sustainable as a community also arose in this analysis. The idea that both groups (the more academic and the more practical) needed to reorient their thinking to see the other side as being equally essential was an on-going theme. This is a difficulty almost certainly compounded by concepts and contexts "not easily translated" across the two groups, something that will also hamper the communal construction of new knowledge. The disparate geographical locations and asynchronous nature of most communications also make greater collegiality a significant challenge and the extent to which "intentional learning conversations" can be achieved with so little face-to-face contact and with so many time and location constraints is a further concern.

The researchers found that there were many areas where the members were very positive about how ELTER was being run. However, more carefully scaffolded structure and support would be in line with Stoll, Harris, and Handscombe's (2012) assertion that "great" professional learning requires "leadership to create the necessary conditions." For example, ensuring those who work in the same department or institution are not in the same sub-research groups would ensure that any work hierarchy does not carry through into the group's dynamics. This is supported by Stoll (2011) when she states, "Despite teacher education programmes including both theoretical inputs and practicum experiences, a tension exists in teacher education and in relationships between school based practitioners and university researchers more generally." Although she refers to the relationship between school teachers and academics and the researchers are referring to in-service and pre-service educators, they found similar tensions. For a TEPLC to work, it needs a structure in place while at the same time not creating another hierarchy. Therefore, a structure should be created with mutually agreed upon rules and consequences being discussed and accepted by the group as whole. If carried out like this, members would be more involved and more invested in achieving the goals they set. Creating a structure in such a manner should encourage the feeling of equality and democracy.

Stoll (2011) mentions an "insufficient value of each other's knowledge;" again, this was brought up by the members in that both factions believe the others do not appreciate their work. Some mentioned that more input should be given on how to do research while others felt that this was a waste of time. To address this lack and at the same time create a greater appreciation of the other participants' perspectives, the researchers suggest that interactive seminars, not their usual medium of presentations, should be given by the in-service academics on how to carry out research and that presentations, not seminars (their usual medium), should be given by the in-service teacher trainers, thus getting both groups

out of their comfort zones in a medium the others are used to while at the same time gaining an appreciation of what challenges the others face in the workplace. Additionally, implementing a job-shadowing scheme would be a worthwhile activity because it would enhance collaboration by fostering a greater understanding of what others do and, as such, their value to the group.

TEPLCs, with this variety of membership, should use more teambuilding activities when they meet, which would better enable the more challenging task of collaborating virtually when they are not meeting face-to-face. This does not automatically mean focusing directly on activities on the topic of teacher education; it could be activities where members find out more about their personal lives and interests to enhance trust and collaboration. It could be simulations where both practitioners' and academics' skills are needed to find a solution to a problem, and then afterwards, a reflection on why they needed each other to be successful.

Time is limited and precious when you meet once a year and work for different institutions, therefore time has to be carefully planned for this annual meeting. As brought up in the research, time needs to be factored in to create goals, plan research and allocate various roles, so that when the members return to their respective environments they would have goals set out to work towards and not be reliant on doing that remotely.

Additionally, some training in the use of a common communication platform should be part of these meetings.

Perceived work status should not be in evidence, though experience along with an openness to learning and sharing should. To create this atmosphere is extremely challenging, as is borne out of this study. We all need acknowledgement and understanding of what we have achieved. The question is how to marry the need for equality while focusing on specific problems with people's need for status, without which a productive TEPLC cannot be maintained. The answer to improving a dynamic could be to utilise the practitioners' experience and to set up seminars in the face-to-face annual meetings, but have them working on these seminars with the pre-service academics who have the content knowledge of research. The organising committee should allocate these tasks to the members, which will enhance teambuilding, create a greater understanding of each other's work, and encourage investment and responsibility in the projects at hand.

Limitations of the study
There were a number of limitations to this study, which had to fit in with the short time frame of the TEPLC schedule. Much had to be done online and the same challenges that the participants faced in engaging with their peers posed equal challenges for the researchers. Additionally, the sincerity of answers may be put to question because of the hierarchy and power distance at play in the main group and subgroups, especially in the initial phase of the study. This is counterbalanced to some degree by the second stage being anonymous; however, it is a small group and people may still have been concerned that their views would be identified.

The TEPLC in question has only been in existence for five years and is still finding its way towards how to attain its vision, so it would be interesting to revisit the group in 2018 to do a follow up comparative study.

Conclusions

A group of teacher educators from different work backgrounds coming together to conduct research has enormous potential for the professional learning and development of the educators involved and the bigger picture of the education of the field they are inquiring about. However, that said, if not approached in the right way, frustration, tension and dropout can occur.

All the individuals of the community need to feel understood and appreciated, and this requires direct action in such limited time frames as those presented in this case study. This direct action or intervention must be initiated through a combined top-down and bottom-up method for it to be inclusive and for it to work, and for all to be on board and be truly invested in what is a very worthwhile common goal.

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Recognition and Validation of Knowledge in Collaborative Learning Communities of Educators and Training Providers

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The focus of this paper is the recognition and validation of competence. It addresses the perspectives of using a toolkit in collaborative learning communities of educators and training providers. The recognition and validation of learning that takes place in all settings, formal or non-formal, is highly considered in all forms of lifelong learning. The high mobility of workers and students today makes the accreditation of any form of prior learning very important for planning further education programs in all kinds of professions, which include teachers and teacher educators.

One of the difficulties of recognizing, validating and accrediting prior knowledge is the need of criteria that make such learning explicit. The "learning outcomes" approach represents a conceptual shift that is becoming common and used in all forms of education and training because it reflects the combination of knowledge, skills and competences, also including an attitudinal dimension. National qualification frameworks of European countries are increasingly using learning outcomes as a tool for qualification descriptions and the application of this approach is rapidly spreading. The learning outcomes approach was originally developed within vocational education and training and closely associated with European Credit system for Vocational Education and Training (ECVET) and the European Qualifications Framework (EQF). More recently, its application is recommended for lifelong learning programs and for teacher professional development programs. (European Commission, 2013).

There is today a growing need for means and measures to register knowledge, skills and competences (KSC) described by Learning Outcomes. Experiences and recommendations from projects and initiatives indicate that a structured aggregation of educational attainments is profitable for the individual, the education and training providers, and for all stakeholders related to the employment market.

This paper first describes the Skillsbank, a web based toolkit targeting career guidance, recognition of prior learning and individual training support. It uses principles based on ECVET, the European Credit System for Vocational Education and Training. The paper presents examples of how to use the possibilities of the Skillsbank toolkit, and its extension SkillsTube, to facilitate career guidance through the mapping of the users' competencies and assessments of their knowledge and skills. One important purpose of these toolkits is to facilitate the recognition and validation of non-formal learning of individuals when applying for jobs or seeking further education.

The paper will discuss the value of these first results to teaching, learning and assessment in vocational education and training and the toolkit's applicability to other types of education.

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Introduction

The recognition and validation of learning that takes place in all settings, formal or non-formal, is highly considered in all forms of lifelong learning. The high mobility of workers and students today makes the accreditation of any form of prior learning very important for planning further education programs in all kinds of professions, which include teachers and teacher educators.

The recognition, validation and accreditation of prior learning, especially knowledge acquired in non-formal settings, is not an easy task due to the lack of criteria that make such learning explicit. Such knowledge differs from formal learning regarding the accreditation form, which in the case of formal learning takes place by means of exams and the issuing of certificates. However, there is no guarantee that certificates or diplomas truly reflect somebody's knowledge acquisition. Changes occurring more recently in the assessments of knowledge acquisition suggest that the Learning Outcomes (LOs) approach represents a conceptual shift that seems to have greater validity. LO is becoming common and used in all forms of education and training because it reflects the combination of knowledge, skills and competences. National qualification frameworks of European countries are increasingly using LOs and their application as a tool is spreading and becoming more common as an acceptable form to define learning. The LOs approach was originally developed within vocational education and training and closely associated with European Credit system in Vocational Education and Training (ECVET). The concept has actually existed for a long time, but under the inputs/outputs concept systems. It evolved more recently to a concept named learning outcomes. While outputs focused mainly in the description of attained activities, the outcomes focus on the "difference made" by the activities when it comes to documentation of practical performance.

In the literature, learning outcomes are statements about what students, or learners in general, can do when they finish a course program. Actually, the outcomes are narrower descriptions of competencies, which imply (the) knowledge and skills acquired by the individual.

According to Horn and Mackey (2011) the focus on *outcomes* is a form to encourage the attainment of goals, and, furthermore, the establishment of a high-quality student centred education system.

The need of means and measures to register knowledge, skills and competences (KSC) described by LOs is steadily increasing. Experiences and recommendations from projects and initiatives indicate that a structured aggregation of educational attainments is profitable for the individual, the education and training providers, and for all stakeholders related to the employment market. In 2013, the European Commission recommended its application to lifelong learning programs and for teacher professional development programs (European Commission 2013).

The Skillsbank Project

The Skillsbank Project was a European project funded through the Norwegian Centre for International Cooperation in Education (SIU) under the EU Lifelong Learning Programme. Its design aimed at improving career guidance and recognition of prior learning of individuals that need advice for further development in their careers. The Skillsbank toolkit makes it possible for individuals to match their aggregated skills and competences against defined matrixes of qualifications and occupational profiles. One of its intentions is to meet the needs of people on the brink of exclusion from working life – or those trying to enter new jobs in a changing employment market. Another purpose is to identify gaps in knowledge and skills that can be reduced by attending educational programs.

The Skillsbank project focused on the definition and description of knowledge, skills and competences in different professions. It developed a web-based toolkit targeting career guidance, recognition of prior learning and individual training support. It uses principles based on ECVET, the European Credit Transfer in Vocational Education and Training and the European Qualifications Framework (EQF), and it uses descriptions of Learning Outcomes for aggregating competences into qualifications. Descriptors for each level of EQF are presented in Appendix 1.

The Skillsbank system has created a tool to help in the definition and storage of qualifications that are transferable into structured, and optionally multilingual, matrixes. This means that the qualification matrixes use LOs as a basis. A LO can be described in a holistic way, or it can be divided into specified descriptions of the competences, knowledge and skills. Skillsbank has also developed a module for assessment and Recognition of Prior Learning (RPL) where each LO can be self-assessed by the individual using Skillsbank. External assessors validate and conclude with a consolidated assessment, which is included in the individual competence portfolios. Other important features of Skillsbank are the compatibility with ESCO, the European Classification of Skills/Competences, Qualifications and Occupations and the matching with the European Qualifications Framework (EQF) for lifelong learning.

(http://www.hioa.no/Forskning-og-utvikling/Hva-forsker-HiOA-paa/FoU-ved-LUI/FoU-institutt-for-yrkesfaglaererutdanning/The-Skillsbank-project)
(http://www.skillstools.eu/skillsbank-top)

Qualifications and Learning Outcomes

A few words about European Qualification Framework (EQF)[*] are necessary here because of a significant paradigm shift that took place in technical and vocational education and training after the EQF developments. The shift was from input based curricula and training plans defined through specified volumes, such as number of pages or allotted time, to intended, specified and realised LOs. The principles governing EQF, and ECVET, require the

obtained LO to be at the core of a qualification definition - and be assessed, validated and recognised. Thus, Skillsbank is compatible with the paradigm shift towards Learning Outcomes orientation. Using LO is an alternative way to define and design education, training and qualifications. The shift from learning inputs, such as duration, type of education, location, programme, institution etc. to documented performance of LOs (learner centred approach), opens up for new possibilities to cover work based learning, including formally and non-and informally acquired knowledge, skills and competences.

Skillsbank takes as a starting point the idea of defining qualifications according to the EQF and ECVET principles, meaning that Learning Outcomes (LOs) are at the core of the system.

LOs specified in competence, skills and knowledge are usually organised in units representing a functionally coherent group of LOs. In the Skillsbank system, LOs are structured in units and build up to complete qualification matrixes. LOs can be depicted through a simple description or by dividing them into competence, knowledge and skills, where relevant. For more information on defining qualifications and LOs, take a look at www.ecvet-team.eu and www.skillstools.eu.

Pre-structured matrixes can be entered into Skillsbank by the institution that has access to Skillsbank as a Competent Body, i.e., the organisation that is responsible for the quality Assurance of the qualification. Skillsbank has introduction videos that show how to enter qualifications (www.skillstools.eu). Organisations interested in uploading matrixes in an ECVET format can have a direct contact with NTI-Multilateral Monitoring and Management (www.ntim.eu)

How are Qualifications and LOs related?
Qualifications and LOs are entered separately in Skillsbank as they represent different steps in the matrix development. LOs are organised in logically coherent units through which the full qualification is defined. When entering LOs, some principles must be kept in mind. LOs can be registered at different levels where the level indicates how detailed the LO is. The LOs registered at the top level are the least detailed. They can still be depicted individually either in more general descriptions, or divided into separate specifications of competence, knowledge and skills. Further LOs that are to be entered can then be positioned in a hierarchy under the top level LO. The content of the sub-Learning Outcome will therefore be strongly related to the first LO, however the latter is more specific in its content. In Skillsbank, numbering is used to indicate which level the LO is entered on. An example would be: the first entered LO would be numbered with 3.1 and the next LO that is entered under the first LO, would be indicated with the number3.1.1. The first number (3) indicates which Unit of Learning Outcomes it is, in this case Unit number three. Table 1 presents an example of learning and sub-learning outcomes under a specific qualification.

CODE	EURTM-ENM Unit 4					
QUALIFICATION TITLE	EURTM-EN: European Road Transport Manager					
UNIT TITLE	EURTM-ENM Unit 4: Customer services and support					
ACRONYM	EURTM-ENM Unit 4: Customer services and support					
POINTS CREDITS	ECVET POINTS	ECTS CREDITS	EQF LEVEL	REVISION DATE	REVISION NUMBER	
	0	0	5	07/07/2013	1	

ECVET POINTS/RELATIVE WEIGHT											
AT	BE	BG	CZ	DE	ES	FR	IT	NO	PL	PT	UK
0				0		0		0	0		0

LEARNING OUTCOMES	DESCRIPTION		
	COMPETENCE	KNOWLEDGE	SKILLS
EURTM: 4 Customer services and support			
EURTM 4.1 Customer and market mapping	Info-Kit: 2.1, 2.2, 3.1, 3.4, 4.7, 5.3 http://know-in.eu/Info%20Kit%20/Info%20Toolkit%20%20UK.pdf		
	S/he is able to obtain and analyse market research	To know the basic methods and instruments for market research	Is able to analyse market research
EURTM 4.1.1 Customer needs			
	S/he is able to understand customer needs and requirements	To know how to interact with customers to establish their needs	Is able to establish customers needs
EURTM 4.1.1.1 Customer requirements			
	S/he is able to assess customers' requirements	To know how to assess customers' requirements	Is able to assess customers' requirements
EURTM 4.1.1.2 Customer relations			
	S/he is able to communicate with the customer to modify project/plan/proposal to assure a common understanding of the recommendation and the expected outcome (trust)	To know how to communicate effectively	Is able to communicate effectively

Table 1: Example for placing Learning Outcomes under a specific qualification

Who can use Skillsbank?

Skillsbank provides access for several actors into the system. For example, an organisation can have several access roles simultaneously, such as Competent Body, Institution and Course Provider. Thus, it is possible for an organisation to play all three roles in the context of Skillsbank. (See Figure 1).
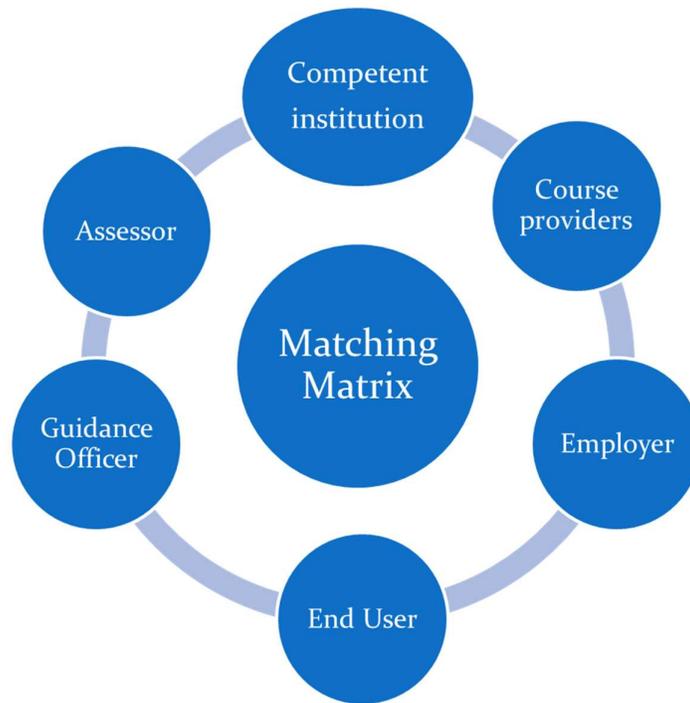
Figure 1: Actors that have access to Skillsbank.

The Competent Body (CB) is the owner of the qualification. The CBs have access in Skillsbank as the organisations or institutions responsible for qualification definitions and their quality assurance. Therefore, a CB will have access where it can add Qualifications and the corresponding LOs into Skillsbank. This organisation could be as high up as the Ministry of Education, a sectorial organisation, an institution or school working within the realm of just a few qualifications. The latter ones will most likely have not only the role as a CB, but also as an Institution and Course Provider. The CB is responsible to add corresponding assessment items and questions to the qualification. These questions will serve as assessment base for the User and the Assessor. Due to the CB's responsibility of qualification definitions, it is also in charge of adding Assessors to Skillsbank. Assessors are individuals that the CB views as qualified to perform adequate, reliable and valid assessments of individuals. When qualifications exist in several languages, then the CB has the responsibility to add the translations into Skillsbank.

The organisations that have access to Skillsbank in the category of Institution are those that offer education and training. They can therefore add their courses and modules to Skillsbank. These courses and modules can be linked to an existing Qualification and the respective LO. This organisation/institution is at the implementation level and defines users, mentors and guidance officers in Skillsbank. Therefore, at the institution level one is responsible for adding mentors and users to the system. At the institution level one can see

the outcome of the Recognition of Prior Learning (RPL) assessments core of a particular user and the assessor of that user, together with the consolidated scores.

The organisations and institutions that have access as a Course Provider offer only education and training. They can therefore add their courses and modules into Skillsbank. These courses and modules must also be linked to a relevant qualification and LOs. When accessing as course provider, the only option is to add courses, however in most cases organisations have access as both, institution and course provider, and have thus the combined rights of these two possibilities into Skillsbank. In some cases, it is possible that organisations have access as a competent body as well.

Learner participants, trainees, students, apprentices or other persons that search for career guidance in a lifelong learning perspective, will have access as End Users. They are given access details by the institution they belong to. They have the option to add all attended courses and training and work experience, as well as to upload supporting documents. When an individual has a social media profile on LinkedIn, the information specified there can be directly uploaded to Skillsbank. As a part of competence mapping of users, they will also have the option to assess their own competences through the Recognition of Prior Learning (RPL) assessments module. In practice, this means that both an assessor and a user are assigned to Skillsbank. The users assess their own competences according to assessment questions that relate directly to a qualification matrix that is already added into the system. This is the first phase of self-reflection on own competences, which is part of the validation and recognition of prior learning regardless of the learning and training context.

As Assessor, a person is certified and authorized as a qualified assessor by the Competent Body he/she is assigned to. One becomes assessor of people's competences only within the framework of qualifications for which one's CB is responsible. One will assess the learner according to the assessment questions registered in every qualification unit. The assessor uses the set of questions and control items to evaluate the level of competence of the learner, combined with additional documentation of performance available.

To access as a Mentor, one is possibly a teacher, a guidance officer or has a role in some specific setting as learners' mentor. He/she is given access by the institution that has qualified him/her as a mentor. The access as mentor gives the right to examine the information a learner has added about him/herself into Skillsbank. With access as a mentor, one plays a guiding and supporting role towards the students and their career development.

Recognition of Prior Learning Assessment

The Skillsbank system opens up for Recognition of Prior Learning (RPL) by means of assessments. Thus, RPL assessments' aim is the validation of all LOs acquired previously through either formal, non-formal or informal learning. The validation process of prior learning includes the following steps: a) identification of prior learning, b) documentation of learning, and a formal assessment prior to certifying the LO into either partial or full qualification. The possibility to get informal and non-formal learning validated complies with

the Council Recommendation of 20 December 2012 on the validation of non-formal and informal learning (20l2/C 398/01). RPL assessments aim to identify and certify all forms of learning, which are, then, partly or fully validated. The process of RPL assessments in Skillsbank is a two-step procedure and starts with self-assessment of own competences by the user. This is followed by the independent assessment of the user done by the assessor. The individual applicant in Skillsbank may also upload supporting documents for the assessment. The assessor consolidates this step as an input to the formal recognition and accreditation of the users' competence.

During the time that Skillsbank is being implemented it was translated into several languages to facilitate transparency between language versions of qualification descriptions. In addition to the already available interfaces BG, DE, EN, ES, FR, IT, NO, PL and PT, EE, CZ, LT, FI, HU, SI and SK new interfaces are in the pipeline. The reason for these efforts is the fact that Skillsbank has as one of its purposes to facilitate employment across the European countries. Beyond this purpose, lies its possibility to facilitate the recognition and validation of knowledge and skills of the large number of refugees coming to Europe now. Therefore, a translation into theArabic language is being done.

The Challenge of Tacit Knowledge

The implementation of Skillsbank has opened its use to different areas and pointed to emerging needs. One of them is how to make knowledge and skills visible regardless of having every aspect of a qualification described in writing. Is it possible? And if so, how can they be shown? These questions challenged the researchers working with Skillsbank to examine the concept of tacit knowledge more closely, especially as tacit knowledge constitutes a central element in crafts and professions where mastery and expertise is concerned.

In knowledge philosophy, in anthropology and in work related social science the distinction between a positivistic understanding of knowledge (what is implicitly used in the EQF descriptions), and a phenomenological approach is frequently discussed. Renowned philosophers as Wittgenstein, Heidegger, Bourdieu and Polyani are often cited in discussions around tacit knowledge (Ziegler/Müller-Riedlhuber/ Kristiansen 2015). A well known citation from Polyani is that "We know more than we can tell".   Others exemplify from practical situations in working life:

> Tacit knowledge is highly personal and hard to formalise, making it difficult to communicate or share with others. Subjective insights, intuitions, and hunches fall into this category of knowledge. Furthermore, tacit knowledge is deeply rooted in an individual's action and experience, as well as in the ideals, values, or emotions he or she embraces. (Nonaka/Takeuchi 1995, p. 8).

In the strongest sense tacit knowledge means that even a third person is unable to describe intelligent action in terms of rules. This does not mean that skilful acting is intuitive; it may

be highly conscious, but it does not follow strict and formalised rules, it is creative (Neuweg 2004, 133ff.).

The descriptions of LOs may be highly precise through the differentiation into specified Competences, Knowledge and Skills. However, this form of competence documentation fails to capture tacit knowledge – which is difficult to correctly describe and document through verbal articulation or written descriptions.

Being aware of the limitations of making tacit knowledge visible in descriptions about knowledge and skills in written texts, it became gradually clear that to capture tacit knowledge was a challenge for Skillsbank. It was necessary then to further develop descriptions of LOs in order to encompass their full meaning. To create a form for capturing the fluidity of tacit knowledge became thus a challenge for Skillsbank and the seed for extending it into a form that would capture tacit knowledge. A better alternative to document such competences and skills would therefore be through practical performance. With a distinction between competences that are fully describable by verbal means, and competences that can only be fully documented through illustration, video recordings of practical performances can serve as a valuable tool to document tacit knowledge. These were the reasons for the proposition of a new project, the SkillsTube project as an extension to Skillsbank.

The SkillsTube and Tacit Knowledge

Skillstube (Erasmus+ 2014-1-NO01-KA200-000439) is a multiplier of the Skillsbank project (Oslo and Akershus University College of Applied Science: Leonardo da Vinci Transfer of Innovation 2011-1-1-NO1-LEO05-03275 The context of the SkillsTube project was the application of ECVET principles for precise descriptions of LOs structured into units also covering tacit knowledge.

The first objective of the Skillstube project was to collect and store an individual learner's performance through video clips that are directly related to clearly identified qualifications and LOs. These video performances can serve as electronic attachments to certificates as further documentation of skills attached to their European CV. This is an added value to teaching, learning, certification and individual career development in professional fields where practical performance is impossible or difficult to document.

The second project objective was to develop a system where video clips can be stored and can serve as examples of best practices. This can be of high value to teaching, learning and assessment. Therefore, the SkillsTube project aimed to systematise the video performances of the chosen vocations: examples from welding and from selected crafts. Implications for career guidance will be further studied as an add-on to Skillsbank.

What have we learned so far?

The SkillsTube project (2014-2016) is being carried out by several partners. Preliminary results point out that with SkillsTube and Skillsbank a range of services and options are available for an early identification of an individual's skills and competences, including tacit knowledge, by means of:

- Effective procedures and principles for video documentation of vocationally oriented performance;
- A system where skills related practical performance recorded as video clips are linked to matrixes of LOs in an ECVET format;
- Documentation of an individual's tacit knowledge through the video recordings;
- A growing library of recordings of best practice examples;
- Procedures and tools for the recognition of prior learning, including non- and informally acquired skills and competences;
- Options for multilingual access to qualifications, facilitating the RPL for migrants and refugees;
- A system where individualised recordings can be linked to certificates and CVs;

There are several indications that the video clips give excellent insights not only about best practices, but also about best teaching, especially when elements of tacit knowledge are concerned. By examining the video clips, it is possible to raise several questions. One of them is about the effectiveness of teaching and learning under different forms of partnerships or collaborative learning communities. One important aspect refers to tacit knowledge. How does one express knowledge that has been incorporated through many years of practice? How does/can a learner learn from an expert? The videos are intended to have practical value to teachers and teacher educators as a means for reflections about their practices.

The long term benefit is to contribute to build bridges between the world of schooling and the working world, in addition to underlining the value of workplace learning. This covers formal, non-formal and informal learning regardless of where it is acquired. Strengthening of the ECVET and EQF principles will in the long run benefit students, trainees, apprentices, migrants or any other individual changing their career path. The recording of best practices of competences will impact teaching greatly as this will narrow the gap between the expectations of the employers and the skills and competences of the employee. The option for recognition of prior learning (RPL) with video documentation secures learning seen in a lifelong perspective.

Conclusion
This paper started with a presentation of Skillsbank, a project that created a toolkit for registering the knowledge, skills and competences of individuals in all sorts of professions. It continued with an overview of SkillsTube, an extension of Skillsbank for registration of competences and, if possible, the tacit knowledge of experts in professions. The main intention is to contribute with examples that can be of high value to teaching, learning and assessment in all forms of educational partnerships and collaborative learning communities.

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Appendix 1: Descriptors defining levels European Qualifications Framework

Each of the eight levels is defined by a set of descriptors indicating the learning outcomes relevant to qualifications at that level in any system of qualifications

EQF Level	Knowledge	Skills	Competence
	In the context of EQF, knowledge is described as *theoretical and/or factual*.	In the context of EQF, skills are described as *cognitive* (involving the use of logical, intuitive and creative thinking), and *practical* (involving manual dexterity and the use of methods, materials, tools and instruments)	In the context of EQF, competence is described in terms of *responsibility and autonomy*.
Level 1	Basic general knowledge	Basic skills required to carry out simple tasks	Work or study under direct supervision in a structured context
Level 2	Basic factual knowledge of a field of work or study	Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools	Work or study under supervision with some autonomy
Level 3	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	Take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems
Level 4	Factual and theoretical knowledge in broad contexts within a field of work or study	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities

EQF Level	Knowledge	Skills	Competence
Level 5[1]	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge	A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others
Level 6[2]	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	Advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study	Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups
Level 7[3]	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research Critical awareness of knowledge issues in a field and at the interface between different fields	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields	Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams
Level 8[4]	Knowledge at the most advanced frontier of a field of work or study and at the interface between fields	The most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice	Demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research

Source: https://ec.europa.eu/ploteus/content/descriptors-page

i The European Qualifications Framework (**EQF**) is a translation tool that helps communication and comparison between qualifications systems in Europe. Its eight common European reference levels are described in terms of learning outcomes: knowledge, skills and competences. For more details: https://ec.europa.eu/ploteus/content/descriptors-page

ii Units based on learning outcomes are components of a qualification. They consist of a coherent set of knowledge, skills and competence, which can be assessed and validated independently.

iii Introduction videos at www.ntim.eu present examples of how to enter LOs at the correct level.
Enter LO as a competent body: https://www.youtube.com/watch?v=g3DR9SHlXAk
Enter LO as end user: https://www.youtube.com/watch?v=BpwHDCk6dx4
Enter LO as institution: https://www.youtube.com/watch?v=3VtHmZ6ytR8

[iv] Formal learning is defined as learning that takes place in structured learning environments and is usually is certified with a qualification or diploma. Non-formal learning is the learning that takes place trough planned activities, such as in-company training, however may not result in a diploma. Informal learning takes place in daily activities such as work, leisure and family activities. This form of learning is not planned and structured and takes place through the experiences in informal situations.

From campus to Online Learning – Experience from the first year of online training in Technical and Vocational Teacher Education (TVTE)

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Abstract: The purpose of this research was to identify factors that have been important in connection with the construction of an online Technical and Vocational Teacher Education (TVTE) in a Technological Programme (TP). The research builds on the experience gained through the first year. The research is conducted at TVTE in TP (TVTE_TP) at Oslo and Akershus University College of Applied Sciences (HIOA). Where we in autumn 2014 started with three parallel classes: campus, decentralized and Online Class. The research will take a closer look at (1) the students' experience of being online students, (2) how the fundamental principles are safeguarded, (3) pedagogical and didactic considerations, (4) technical challenges and (5) the opportunities and limitations that have emerged so far. The empirical data are obtained through reflection logs, feedback, dialogue and participation in the programme. The analysis is based on a phenomenological approach (Postholm and Moen, 2009) and the use of Atlas.ti as an analytical tool.

Keywords: Online, TVTE, profession, identity, transfer.

Introduction

The experiences from the first year of online training in Technical and Vocational Teacher Education (TVTE) programmes at Oslo and Akershus University College of Applied Sciences (HIOA) is presented in this article. It is a three-year programme leading to a bachelor degree. It started in autumn 2014 with three parallel classes: (1) campus, (2) decentralized and (3) Online Class. The students apply themselves to the class they attend. The classes are separate independent classes while they also will have something in common as the students should all follow the same curriculum. The idea is that they occasionally will have some shared resources within some topics by having joint classes.

There are several reasons HIOA chose to start an online class. There were study places available within TVTE_TP while at the same time there are teachers around Norway that do not have sufficient education (Grande et al. 2014). There is also a greater focus on flexible programmes, both internal and from the authorities (Foss et al. 2011a). An online programme will have a larger impact area and those who are unable to attend classes on campus, which is located in eastern Norway, can have an offer online.

In the education experience there are seven basic principles that underlie its organization and implementation: (1) Practice-oriented (2) Problem-oriented (3) Adventure-oriented (4) Experience Learning (5) Exemplary learning (6) Value-oriented (7) Student Influence and management by objectives (HIOA, 2014). These are also the targets for the online class. An important premise for the

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online course is that it follows the seven principles outlined above, and has the same qualities that are in the mainstream, campus-based study programme.

With this as a starting point the idea is that the programme delivered on campus, can be delivered online. And that online has the advantage that the students are spread around in different locations, such as schools, workplaces etc. while the campus is limited to the facilities on campus (e.g. classrooms without any facilities for vocational subjects).

Six areas that the online offer should seek to develop and achieve are: (1) Dialogue and interaction online (2) Digital documentation (3) Digital learning resources production and use (4) ICT competence in teacher training for teachers of vocational subjects (5) Digital competence in the teaching team at HIOA (6) Quality assessment. The first three are areas of development are the focus of the first year, although the others are touched on. Four and five are areas that should be the outcome of the programme, while point six, quality assessment, is ongoing throughout the study.

Context

Norway has quite well established programmes in technical and vocational education and training (TVET) at the upper secondary school level. Altogether there are nine basic TVET programmes covering the areas of (1) Building & Construction, (2) Electricity & Electronics, (3) Technical & Industrial production, (4) Service & Communication, (5) Media & Communication, (6) Restaurant & Food processing, (7) Healthcare, Childhood & Youth Development, (8) Design, Arts & Crafts, (9) Agriculture, Fishing and Forestry. The basic vocational programmes are related to 172 trades among which one can choose a journeyman certificate. This certificate can be earned after studying technical and vocational education for two years at the upper secondary level and having two years of practice as an apprentice in the work life (LK06 2006).

The students in this is study will become a teacher for the education programme (1) Building & Construction(BA), (2) Electricity & Electronics(EF), (3) Technical & Industrial production(TIP), (4) Service & Communication(SS). TVTE_TP is a generic term for the four programmes. The programme consists of professional subjects, vocational subjects and practice. To get into the TVTE_TP programme it is mandatory to have a journeyman certificate and at least 4 years experience in the profession.

The students are hard-working craftsmen who have not been in school in the past 20 to 25 years. They say they would like to have a simple and practical approach. They have forgotten the complexities inherent in the work they have done on a daily basis. The average age is 40. (Karstensen 2015)

Programme	Campus	Online	Decentralized	Total

(1)BA	10	8	12	30
(2)EF	11	2	7	20
(3)TIP	8	10	7	25
(4)SS	5	4	0	9
Total	34	24	26	84

Table 1 Student at TVTE_TP 2014

Table 1 shows the distribution of students between the different models and programmes. By offering these three models, we now have 84 students in total, an increase from previous years, when it has been around 45. As mentioned in the introduction, the idea is that the students in these three classes should have classes separately, but also together to exploit synergies and create greater communities in the respective programme areas.

The training is divided into sessions and group work. This means there are consultations criss-crossing in Table 1. There are sessions for the respective models but also for the individual programme and for all students. Group work in a class may be for one of the programmes but also for two or more programmes. The students of the online class have base groups and programme groups with sessions which enables them to work in groups and altogether.

The Online class begins with a five-day physical gathering to become acquainted with each other and with the study. After this there are two physical meetings of two days per semester for the remainder of the study. They take all other activities online. Five groups were established at the first physical gathering across the programmes and they meet in different ways. It depends largely on the geographic residence of the individual. The intention is that they should remain together as a group for the rest of the study. Group A - always meet online, Group B - meet physically at team meetings, but online in other settings, Group C - always meet online, Group D - meet at a centre for career development with equipment for sending online and Group E - meet generally in a school.
As a learning management system (LMS) Fronter is used, and as an online communication platform Adobe Connect is used.

Research aim and research questions

As mentioned in the introduction this is the first year that we are moving from Campus to Online Learning. The purpose of the research is to systematize and gather experience gained and to provide a foundation to build on. The research questions that will be addressed are (1) what is the students' experience of being online students? (2) How are the fundamental principles safeguarded? (3) What are the pedagogical and didactic

considerations? (4) What are the technical challenges? and (5) What are the opportunities and limitations that have emerged so far?

Theoretical background

Several strategic documents have analysed the potential of technology in teaching and learning online in higher education both in Norway, Europe and worldwide (Foss et al. 2011b, Karstensen 2013). The Nordic Institute for Studies in Innovation, Research and Education (NIFU) report (20/2013) highlights how teacher education contributes to student teachers developing what could be called profession professional digital literacy (PPDL). By this they mean the didactic use of ICT in teaching and assessment. In practice this means the ability to use ICT to prepare teaching programmes, educational use of ICT in their teaching, in their own administrative work and evaluation and research. They emphasize that the future teachers must be prepared to teach with and through digital tools. Not least, they must be prepared to safeguard digital literacy as one of the five basic skills to future students (Tømte, Kårstein, and Olsen 2013).

Basic skills were introduced by the Ministry of Education and Research in autumn 2006 through the Knowledge Promotion Reform (KPR), which was a comprehensive curriculum reform. The reform places increased focus on basic skills and knowledge promotion through outcome-based learning. Under the Subject Curricula, the five basic skills are adapted to each subject and integrated. These skills are: (1) the ability to express oneself orally, (2) the ability in literacy and (3) numeracy, (4) the ability to express oneself in writing, and (5) the ability to use digital tools. These skills are basic in the sense that they are fundamental to learning in all subjects as well as a prerequisite for the pupil to show his/her competence and qualifications(LK06 2006) (Udir 2013). The NIFU report (20/2013) stresses that PPDL consistently is weakly anchored in the management of teacher education, and most programmes lack a holistic approach to the development of such expertise. PPDL among students in many of teacher education depends on the enthusiasts among teachers (Tømte, Kårstein, and Olsen 2013).

Although this paper is based on surveys in relation to elementary school teacher education the assumption is that the same applies for TVTE. Corresponding results also came forward in a survey done among TVET teachers in 2013. Based on the responses in the survey, it seems that TVET teachers are, in a limited extent, using digital technologies (Karstensen 2013).

Professional identity

The study programme is built around seven challenges and tasks of the teaching profession - (1) Practice oriented: This means that student experiences from the practice field and reflections related to this have a central place in the study. (2) Problem Orientation: Students will learn through working with realistic problems and situations. Problem orientation can be accomplished by, for example, through observation / field studies, problem-based learning and problem solving, project and development work. (3) Adventure orientation: Students should be aware and be able to express their feelings and thoughts in different situations. They should also be able to facilitate the same learning among their pupils. (4) Learning from experience: This means to make themselves aware of past experiences and make new experiences with various forms of educational work. Through planning, try out and reflect on the new practice, students will increase awareness and action in varied training situations. (5) Exemplary learning: Students learn by good examples being analysed

and processed for generalization and use in their own practice. (6) Value Orientation: Students will be conscious and aware of their own norms and attitudes in relation to ethical standards and the consequences of their own choices.   (7) Student Influence and management by objectives: Students must develop goals and plans for their own learning. They should participate in the planning of the programme of study within the framework of the work programme and be part of a continuous evaluation of curricula, teaching and learning processes.

Didactic categories

Figure 2 shows a model called relational model of didactic and it is a model for planning and evaluating pedagogical activity. The model is commonly used in TVET teacher education in Norway. The Model consists of six categories or phenomena, and emphasises the relations between them. The idea behind the model is that it can be used as a planning tool in a teaching situation. It helps in the identification of the factors that will be important for a good preparation.

The model can also be applied as a tool for analysis of activities. The categories are: (1) Learning experiences, which consist of the pupil´s physical, psychological and social conditions for learning. (2) Resources refer to room, time, books, teaching equipment, and curriculum etc. (3) Objectives are what the pupils should achieve after the lessons. (4) Content is often the subject matter. It can be from a book, a film or experiences from an activity. (5) Learning processes is the main part of the plan and include the pupils' action, teachers' action, learning methods and the atmosphere in the classroom, in short the processes that lead to learning. (6) Evaluation is about controlling or measuring the learning and the teaching. It may include evaluating the pupils' learning and the teaching methods (Bjørndal and Lieberg 1978, Hiim and Hippe 2001, Inglar, Bjerknes, and Tobiassen 2002, Nilsen and Haaland 2008, Sylte 2013).
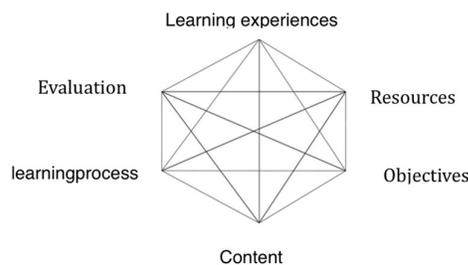
Figure 2: Didactic categories

Methodology

From the beginning, the students have been aware that this is the first time there is an opportunity to study online at HIOA and that the programme is in ongoing development. It is therefore important that they constantly give feedback on what works and what can be done differently. From this perspective it can be said that the implementation has been characterized by action-oriented thinking. At the same time it bears the stamp of phenomenological approach as there has been frequent review of the participant's material

to find something that stands out. But most of all it can be said that the method approaches are heuristic, as it is I who have led, developed and highlighted the elements that are perceived as significant.

Action research was introduced by Kurt Lewin in the 1940s to study social psychology and social changes at the University of Michigan's Research Center for Group Dynamics (Lewin 1947). Lewin's work established the reputation of action research as a "science of practice" that is best suited for studying complex social systems by introducing changes into practice and observing the effects of these changes (Argyris, Putnam, and Smith 1985). In the spirit of action research, this study adopts an iterative process involving five phases to gain understanding of how to enhance online learning: diagnosing, action-planning, action-taking, evaluating, and learning (Susman and Evered 1978).

The diagnosing phase identifies impediments to online learning initiatives so that measures to overcome these impediments can be developed in the action-planning phase. The action-taking phase then carries out the measures developed. The evaluating phase examines resulting changes from the actions taken to assess their impact on the success of online learning. The learning phase assimilates lessons learned and experiences gained towards a better understanding of online learning success. It is these five phases that was used to develop the study.

According to Hiim (2009) there is a basic requirement for the research work that it contributes to knowledge development. By researching our own practice as educators of TVTE students, we will increase our own knowledge by gaining broader knowledge about student learning needs and development of their learning strategies (Hiim, Keeping, and Hippe 2009). The empirical data are obtained through reflection logs, feedback, dialogue and participation in the programme. Students signed consent forms and the research project is approved by the Norwegian Social Science Data Services (NSD). The analysis is based on a phenomenological approach, which has the purpose of illuminating the specific issues and identifing phenomena through how they are perceived by the actors in a situation (Lester 1999, Postholm and Moen 2009). In Phenomenology, the researchers are concerned with the study of experience from the perspective of the individual, 'bracketing' taken-for-granted assumptions and usual ways of perceiving. So that it becomes a tool for understanding the subjective experience, gaining insight into people's motivations and actions, and moving away from assumptions and conventional wisdom. At the same time it is important to see that epistemological, phenomenological approaches are based on a paradigm of personal knowledge and subjectivity, and emphasize the importance of personal perspective and interpretation (Lester 1999).

According to Moustakas (1990), heuristic research begins with the question that needs to be illuminated or answered and it represents a scientific search that involves seven concepts: identifying with the focus of inquiry, self-dialogue, tacit knowing,

intuition, indwelling, focusing, and the internal frame of reference. These concepts assist the researcher to reflect on his/her hunches, thoughts, images, and deeper knowledge and connect to the greater meaning of the phenomena being researched. Heuristic inquiry does not exclude the researcher from the study; rather, it incorporates the researcher's experiences with the experiences of co-researchers. The researcher is required to have a direct experience of the phenomenon in question (Douglass and Moustakas 1985, Moustakas 1990).

Findings

As a research tool it is the six categories from the didactic model, described in the

theoretical section above, which are used. The findings are analysed using the tool to address the research questions.

Content

Sessions with different content and settings are presented throughout the year, as described in Context section above some are for online students while others are connected with the campus and decentralized class. In addition, to those described below, there have been sessions in smaller groups. Content includes:

1. Wiring and become familiar with Adobe connect (fast, groups)
2. Presentation transmission from Lisbon (Backup)
3. Together with Campus class (audio, repeat)
4. Field work in groups (video production)
5. Local gathering on campus
6. Student Presentation online task 1
7. With Campus and public presentation (audio, image)
8. With decentralized class online (first time for decentralized class)
9. The last meeting with the evaluation of courses for the autumn
10. Physical gathering on campus
12 Entrepreneurship together with campus
13 Online review project task
14 Online presentation project
15. Physical gathering on campus presentation of bachelor from third grade
16. Last gathering before summer

Learning experiences

In the first meeting, I was surprised that during five minutes the students were up and running on Adobe Connect. They only had a brief introduction to the programme at the physical gathering. From this beginning we gradually become more and more professional in the use of the platform. When we were at the eighth gathering we had visits by the decentralized class and they felt outside the learning, so it is was obvious that we had become even more advanced users and developed our own practice. This finding also suggests that one should be trained and prepared to be online.

> This day had decent content, but it was a bit difficult to get the context of what was presented. Background for this was that it was a bit problematic with the power point as the sound went back and forth. I found it very disturbing that there is a class while an online. All sounds as coughing and pushing of chairs will be added much noise on the line. Much more transparent when we only have online. (N4)

Resources

The minimum requirement for equipment was a PC or MAC and a set of headphones with a microphone. The reason for this is that any built-in audio system in the device tends to create feedback on the platform. Use of headphones and the built-in microphone device causes the sound to come and go as you move your head. This equipment was sent out to the students anticipating the building of a separate studio (which is now in place). This has in addition to audio and video equipment, a Smartboard and monitor to see what is happening online. Moreover, a classroom on campus is set up with camera and microphone. There have been several attempts to develop online with a campus presence. However, the equipment

was not good enough, but even with good equipment it is a demanding task to communicate via analogue and digital at once. Regarding the students, its works best when they sit alone or are in a place where they have facilitated transmission with several others present. The simplest is often the best, and a single PC/MAC and headset with microphone works every time, but they are limited to one person.

Objectives
In addition to master Adobe Connect as a communication platform, they have been working with producing film and creating multimodal content. In this process they have created their own page and a group page to show who they are and what they working with.

Learning process
Throughout the first year many different activities have been tried. What surprised me most was on the first gathering when I was going to divide them into small groups for discussion. Rooms for this were arranged and everything was ready, when I discovered that some of the students were already sitting together and thus felt I could not split them into my groups. It has also been envisaged filming from the workshops to the students with subsequent presentation for the others. In addition, it was planned to have joint broadcast with campus both with presentation from teachers and with the presentation from the students.

Evaluation
There has been continuous evaluation after each gathering where the course has been amended. This becomes part of the action-oriented approach that has been adopted in the project. On the final course evaluation students reported what they thought could be done differently. For example, *"it happens continuously so there is nothing to improve" (N14)*. This is also essential point one of the basic principles for education - to enable students to participate in their own learning and shape the study.

Experience of being online students
The feedback is good and it seems to work in an excellent manner. The students expressed that they like online and my experiences as a teacher is that I am not able to see that the outcomes are any worse than the campus classes I have had in previous years. On the contrary, I feel that I am even closer and in dialogue with the students. I am not sure if this is because it is something new, it has greater focus, that efforts are being proven with dialogue, or that all are easily visible or that this form of online study simply leads to better outcomes.
It was nice to meet the group physically, a little strange considering that we almost have only met on the net, but I felt that I knew most of them (N17).

How the fundamental principles are safeguarded
The seven basic principles for learning do not seem to be any challenge to achieve through Online study. This is because many of the principles are activities carried out by the students when they are active through activities, in groups or through individual practice. It becomes their thoughts, reflections and discussions through presentations that appear. The network has no impact in this context. The activity that could not be done on-line such as a teaching exercise was completed when they were gathered physically. This led to some displacement of the task since it could not have been conducted online. This means that some of the activities have to be adapted slightly. When it comes to student participation, it added up to

frequent feedback after each joint session and issues were corrected continuously. Final evaluation of the study took place at the physical gatherings; it could also be completed online as it seems that students do not have any challenges in presenting good dialogue there.

Pedagogical and didactic considerations

There are many different views on learning and how teaching should be organized. The basic principles led to some guidelines for what should be contained in the programme as described above. In an online setting, it will be possible to transfer audio and video. Depending on the quality you will be able to see the faces and hear the voices, talking heads with the rest of the body hidden in most cases, although there are exception for those who sit gathered with an overview camera.

In a classroom, it is possible to see all body movements with a single glance. A question is whether this is good enough - can I as a teacher see any difference between net students and campus student so far? The same will also apply to the other senses we have. What is the impact for learning in an online setting?

Neighbour sharing and work in small groups is a method often used on campus to build up experiences around the seven basic principles. This is not easy online when they sit in different settings. It requires a more organization and planning. Random mix and neighbour sharing must therefore be solved in other ways. Moving from campus to online are also matters to be considered in training teachers. It is a strange feeling to begin with sitting or standing alone and speaking out in the air, but the students are actually there and hear everything you say or do.

Today has been a good day. I got new ideas / approaches in relation to task 7 through hearing the others' presentations and feedback. At the same time I became more aware of the details of my own task and how it is structured. I had some questions concerning task 7 today, for example, around this, defining the organization of work, but feel I got some answers through presentations and discussions afterwards.(N10)

Technical challenges

Adobe Connect has been used as communication platforms and has worked well. The only criticism of the programme so far is the transmission of sound from for example YouTube. The video needs to be loaded into the platform first which has been rather cumbersome. It has been solved by posting the links to the videos and the students are given time to watch it on their own. The challenge now is material, which is not on the internet. It must be loaded.

Fronter is used as an LMS. There are limitations on the videos that can be loaded into the platform. Working with multimodal texts means in practice that the some items, like video, must be posted on the open channels. These can be the regulated, but students may perceive it is safer to have more enclosed areas. When it comes to sound and image transfers no problems have arisen with Adobe Connect. Consideration should be given to loans of conference equipment to those who sit in groups because problems with feedback have occurred when they use the microphone. This is because they have the sound on the speakers so everyone can hear.

After several attempts we did not manage to combine sessions where someone sits on campus and other on-line. This requires more technical equipment and possibly a technician present. Providing training for both students and teachers to master communication on multiple platforms simultaneously would be a solution. The fundamental principles of student participation and not unidirectional communications from a lecturer highlight that both teachers and students

should be trained and master the skills together. It is also essential to have multiple screens. If you share your screen with the students to show them something you cannot see them and working blind is difficult.

Opportunities and limitations

The possibilities that one can be at the workshop and try out, filming etc. provides great opportunities. On one hand, the option you have on campus to talk together or share an opinion with the person sitting next to you encouraged by the teacher are gone. On the other hand, online students can use the Chat actively during sessions and unresolved questions and small conversations are occurring. There are also informal meeting places Online where they meet. This has not been evaluated any further.

Conclusions

Based on the results and feedback that is given after the first year everything seems to be going smoothly. It has been an exciting challenge to start. Students and teachers have worked well together with an open mind and been involved in the development and found solutions. The intention of connecting the different classes did not work out. Now we are doing it only online and it works. As mentioned, the first year focused on Dialogue and interaction online although they also touched on the other developmental areas. At start of the second year, the focus is more on production and use of Digital documentation and Digital learning resources. We have begun to use Wikispaces as a platform, simply for the opportunity to share and develop multimodal texts.

As described in the theoretical section of this paper it is important for teacher education to increase digital literacy both among TVTE students and teachers. Working or studying online means that you work in a digital environment, hopefully this leads to a mastery of technology that can also be used in other settings. I find among my colleagues that they do not find it so scary online now, as they may have expressed in the beginning. When it comes to student they have been comfortable from day one and have stated that they have a fast learning track. For us as a TVTE institution, it is important to provide education to all. Although it is not yet so well known around the country, we have a good spread of students geographically, all the way from south to north. We will also from 2016 be offering other studies online.

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Learning logs and self-assessment: **How to use students learning logs and self-assessment towards learning outcomes as a tool in Technical and Vocational Education and Training (TVET) to provide insight and support the students' different learning needs and development of student`s learning strategy?**

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This article is the first of a series of articles about a development project conducted over three years looking at how learning logs and self-assessment are used as a tool in technical and vocational teacher education (TVET) for vocational teaching students on technological programs (TP) at the Høgskolen i Oslo og Akershus (HiOA). The purpose of the learning logs is to give students an insight into their own learning process, to improve their understanding of it. Self-assessment will evolve and develop around the students' learning needs. Both documents are written by the students themselves on the basis of their own reflections in the course of their three-year bachelor degree program. The purpose of our work is to provide technical and vocational teacher education courses with a sound basis in research and theory, while at the same time using students' experiences as a starting point for the development of new skills.

Keywords: self-directed learning; reflection; learning strategy; technical and   vocational teacher education (TVET)

Context of the research

Høgskolen i Oslo og Akershus (HiOA) offers training for technical and vocational teachers in eight out of nine educational programs. This article concerns technological programs (TP) which is a generic term covering four educational programs: Programme for Building and Construction (BA), Programme for Electricity and Electronics (EF), Programme for Service and Transport (SS) and Programme for Technical and Industrial Production (TIP), grouped together under the collective term technological programs (TVTE-TP). The training is intended to help meet the requirement for a combination of teaching and vocational skills. The research is being conducted in respect of the 2014 intake for the technological programs (TP). The research data is being obtained from three classes, the Campus, District and Net classes and in autumn 2014 the classes were made up of 75 students in all. The educational programs will enable students to obtain the qualifications required to work in a number of individual trades within the overall category, for example the EF program is made up of electricians, electronics engineers, telecommunications technicians, etc. Together the four educational programs represent 109 different trades, divided between BA with 23, EF 19, SS 8 and TIP 58.

TVET_TP students typically have an average age of 40, they hold trade certificates or *skilled craftsman's/journeyman's* certificates and most of them have several years' practical experience in their professions (Karstensen 2014). In adult education the learners and teachers should have a common responsibility and be more equal in order to achieve a good outcome (Holt and Stokke 2015). As opposed to teaching "…*and in keeping with the way*

adults regard themselves as self-directing individuals, it is the practice within adult education, as separate from the education of children, to treat the transaction between learning and teaching as the mutual responsibility of the learners and the teachers. The role of the teacher is actually redefined as that of a process consultant, resource manager and co-investigator" (Knowles 2012 p.564)

The course is a three-year bachelor degree course which enables practitioners of a profession to qualify as technical and vocational teachers. It is made up of an overall total of 180 credits, with 60 credits representing professional theory and 120 for vocational subjects. The credits are described as descriptors of learning outcomes. They are divided into knowledge, skills and general competence in the same way that the Norwegian National Qualifications Framework (NKR) (Kunnskapsdepartementet 2011)for lifelong learning is based on the European Qualification Framework (EQF 2012).

NKR provides guidance to enable students to develop a holistic practical approach, which centres on focussing on several learning outcomes at the same time (Dalland 2013). An example of holistic thinking may be provided by this learning objective *"…the candidate can reflect on his or her own professional performance and adjust it under guidance…"* (Kunnskapsdepartementet 2011 p. 22). The objective is illustrative of a holistic approach and the performance as a vocational teacher, together with practice theory (Wenger 2004, Hiim 2013, Haaland and Nilsen 2013) can be developed cognitively by reflecting about actions (Schön 2012).

Research approach, learning logs and self assessment

In this article we intend to examine learning logs and self-assessments in accordance with the national guidelines provided in the Framework Plan for vocational teacher education (Kunnskapsdepartementet, 2013) and the local steering documents which are theme and program plans (HiOA, 2014).

Norwegian Parliamentary *Report/White Paper* Concentration for Quality (St.mld.18), is seeking among other things to enhance knowledge of educational quality, students' learning outcomes and how the institutions prepare for students' learning (Kunnskapsdepartementet 2014-2015).

Learning logs

By learning logs we mean the systematic record that students keep to record their own reflections about their own learning. By using the learning log tool students should be able to keep track of – and develop their own learning strategy at all times (Dale and Wærness 2003), with the ultimate goal of developing their own understanding, both in relation to their own learning and the documentation of this process. Already over a hundred years ago Lida Earhart (1909) emphasised that teaching is a job to be performed by people who have to learn, something that implies that the learning process also has to be learned.

In the 1990's Norwegian schools introduced the concept of Responsibility for Own Learning (Ansvar For Egen Læring - AFEL) in upper secondary education. This is a concept that can easily be misunderstood and gradually came to be used more as a moral instruction to students than as a model for learning, says (Bjørgen 2008). We have nevertheless chosen to use Bjørgen's 10 points as a basis for students' awareness of their own learning process in their learning logs on TVET_TP. For Bjørgen the concept of AFEL came from learning research. He thinks that schools and education sometimes lack a foundation in learning research and that attention is focussed too much on teachers and teaching – not on those who are learning – the pupils – and learning itself.

Bjørgen operates on the basis of 10 points which he thinks are universally important for taking responsibility for and working on one's own learning process. (1) Understanding of the learning process and one's own learning processes. (2) Knowing where sources are to be found and how they should be used. (3) Knowledge about learning in collaboration with others. (4) Control over one's own working time and one's own working output. (5) Knowing the purpose of learning and criteria for what is good and bad. (6) Ability to understand the facts behind the syllabus: about the path from the books to what they are about. (7) Understanding how one should interpret / present the results of their learning. (8) Motivation for learning and perseverance in accomplishing it. (9) Self-confidence and personal assurance to be able to engage in learning. (10) Ability to use one's own creativity.

Self-assessment
The framework plan for TVET_TP sets out a total of 21 learning outcomes (Kunnskapsdepartementet 2013). Compiling a written self-assessment obliges students to record what they are working on and document their working method with reference to the individual learning outcome. This may for example, include the process of linking formal working requirements to learning outcomes and the students keeping a record of their work as described in the program plan. This documentation may be extensive and contain text, sound, images, videos and other digital learning resources (HIOA 2014).
The Regulations on the Framework Plan for vocational teacher education 8-13 describe the learning outcomes the students should be working to achieve (Kunnskapsdepartementet 2013). The Framework Plan also provides certain guidelines for the structure and content of vocational teacher education. An effort should be made to achieve greater integration as outlined in the Framework Plan *"… with comprehensiveness and coherence between professional educational theory, vocational didactic, vocational specialisation and practical experience…"* (Kunnskapsdepartementet 2013 § 1).

Research question
In order to achieve a holistic approach and to develop self-directed learning, we want students to reflect on and document their own study progression to the greatest possible extent. So our research question is: ***How does the use of learning logs and self-assessment help to provide insight and support the students' different learning needs and development of students' learning strategy?***

Theoretical framework (approach)
The Norwegian Ministry of Education and Research's strategy for Schools of the Future (Ludvigsen 2015) highlights the fact that schools of today make significant demands on the teachers' teaching skills and subject knowledge and the ability to analyse and reflect on their own practice in the light of new knowledge and experience. The *strategy for improving teachers* emphasises that teaching must be more research-based, which means using scientific methods and inclining towards new ways of thinking and expansion of the field of practice. Students must develop an independent, analytical and enquiring attitude to their own and others' work in school so that they will be in a position to make their own contribution to the evolution of schools and the teaching profession. NOU 2014:7 Pupils' learning in the school of the future – stresses the following: *"...Deep learning, meta-cognition and self-regulated learning are important requirements for establishing continuous learning and form the basis for learning throughout one's life..."* (Ludvigsen and Norge 2014).

When establishing its different levels the NKR indicates that practitioners of trades at trade certificate level often reflect on the performance of the professional tasks themselves and *"...can consider their own professional skills as a basis for further choices…"* NKR gives professional practitioners an opportunity to reflect more about what they do from a meta-perspective (REF Scön) than trade practitioners necessarily do in the performance of their professional tasks. In order to develop their own practice and give reasons for their own choices as vocational teachers the students must develop their own practice theory (Wenger 2004, Haaland 2013, Hiim 2013).

Developments in teaching and learning approaches require an equivalent adjustment and development of assessment strategies. The distinction between deep and surface learning is well established (Lynch, McNamara, and Seery 2012). With more in-depth approaches to learning being associated with higher quality learning outcomes (Ludvigsen 2015). That deep learning is allied to more in-depth approaches to teaching, focussing on teaching for understanding and even more importantly personal understanding (Lynch, McNamara, and Seery 2012).

It appears that assessment strategies that encourage students to think for themselves and to become critical and creative thinkers shift their focus towards a more in-depth approach to learning. Conversely, an assessment format and an approach that encourages recollection (memorising) and reproduction could lead to the adoption of a more superficial approach, especially when this is also perceived as an increase to the workload. (Mena-Marcos, Garcia-Rodriguez, and Tillema 2013) Therefore promoting the role of assessment for students can lead to significant improvements in learning, especially assessment that goes beyond a summative focus to a more formative one (Lynch, McNamara, and Seery 2012)

High quality formative assessments provide feedback to students about the quality of their work which helps them to improve the quality of their reflective writing. Marcos, Garcia, and Tillema (2013) write that feedback on the standard and content of the students' reflective writing is the most effective strategy in order to move students to a higher standard of reflective writing. This requires a structured and systematic analysis of the content of the student's reflection. In the majority of cases, research on the assessment of reflective writing is based on a holistic approach to determine the level of reflection. In fact reflection requires a disposition to theorise, that is to say that it already presupposes specialist knowledge in order to interpret and make practical experience meaningful, but also advocates construction of new knowledge about practice. Supporters of reflection in teacher education will argue that bringing out the "tacit knowledge" (Schön 2012) from daily practice and making it explicit leads to the construction of (of a corpus close to teaching action) a corpus *closely associated with* teaching action. Therefore teacher education programmes will be called upon to educate critically reflective thinkers for increasingly complex scenarios (Mena-Marcos, Garcia-Rodriguez, and Tillema 2013)

As a theoretical framework for categorising the content of the logs we have elected to use the models of for the Levels and content of reflection (Eric Poldner 2014). We have not as the authors, set sub-categories and conducted statistical calculations, but we think that the model provides an interesting angle for understanding the level of reflection. The levels are described as: (1) Description (2) Description and Evaluation (3) Description, Evaluation and Justification (4) Description, Evaluation, Justification and Dialogue (5) Description, Evaluation, Justification, Dialogue and Transfer.

Methods

As mentioned previously in the article the selection of students was made from those starting in autumn 2014. In all, seventy-five students took part, divided over our three different study options. Out of the seventy-five, seven were women and sixty-eight were men. Their ages ranged from 25 to 55, with an average age of 41.5. Over 60 percent of the students were employed in schools, some were re-training, while others were hoping for a future career as vocational teachers in schools. The empirical data is derived from de-personalised and codified learning logs and self-assessments.

We have a dual role, firstly as educators of vocational teachers and secondly as researchers into own practice (Hiim 2010, Tiller 2006). As researchers our role is to develop theoretical knowledge through researching own practices. The students have signed a consent form and the research has been approved by the Norwegian Social Science Data Services (NSD).

According to Hiim (2010) the basic requirement of research work is that it should contribute to development of knowledge. By researching our own practices as educators of vocational teachers we shall enhance our own knowledge development by obtaining broader knowledge of the students' learning requirements and development of their learning strategies.

The Atlas^{TI} (ref) tool has been used to systematically organise and analyse the learning logs and self-assessments from TVET students. Based on the principles of open coding (Postholm 2010) the data material was categorised and encoded with classification and comparison of data material from different random respondents in the selection (Postholm 2010, Thagaard and Lindegård Henriksen 2010).

A word for word analysis was not conducted in the first round but whole sentences and/or significant texts were codified to provide a basis for further analysis. The first round has led to the emergence of concepts which will facilitate later analyses. The procedure is described in more detail by Postholm (2010). Coding in Atlas ti assisted the process by grouping comments in a way that might limit the number of units for further analysis work. Axial coding was conducted in the second round to make the findings more accurate and complete, which makes it easier to identify the connection between the categories. The levels of reflection in the data material were also graded and sub-divisions were made on the basis of the written material submitted by the students.

Tiller (2006) has highlighted what may be a critical point: "*People who participate in an action research scenario have made up their minds*". Although our research project does not have the typical elements of action research, Tiller may have pinpointed a key issue. We may be in danger of selectively picking out and attaching importance to findings that point in the desired direction, that is to say confirm our existing practice. Dalland (2012) is making the same point through what he calls acknowledgement of subjectivity and we must be open about the implications of our subjectivity. An important factor in our opinion has been quality assurance provided by the joint reading and discussion of the article's content. We feel that the fact that we are three researchers has reduced this risk to an acceptable level. Consequently it is our view that our data findings are both valid and reliable (Dalland 2012). Thagaard (2010) supports this view: "*when the researchers are already within the environment which is being studied from the outset the researchers obtain a particularly good basis for understanding the phenomena that are being studied*". Our role as year directors for the students means we are well acquainted with them and therefore have a good insight into the environment the students are studying in.

Findings

Our findings show that the students' written reflections in the learning logs indicate relatively significant differences in relation to the reflection levels described in theoretical frameworks. The students' writings also generally indicate little use of theoretical vocational documentation/establishment of skills in the self-assessment. Few make use of references to legislation with provisions, various instructions from suppliers/producers and teaching material for vocational subjects. The variations in reflection and documentation are highlighted by our categorisation of quotations from student assignments in the tables: 1 Selected extracts from students' learning logs and 2 Extracts from the students' self-assessments. As an illustration we have chosen to categorise five quotations from different levels of reflection. The quotations in table 1 show a selection of students' writings in the learning logs on the subject of: knowledge of the learning process and their own learning.

Level	Learning log on *"Knowledge of the learning process and one's own learning"*
5	My view of the learning process is as follows: The first contact with the subject stimulates curiosity. In this phase you are working on understanding the subject. This process is conducted externally. Feelings and wishes are not involved. This is therefore a mental process. The next stage consists of appreciating the subject; you see the deeper relationships in the subject and can begin to "grasp" it and "knead" it into something that can become part of you. This part of the process is impelled by wishes and intentions and forms the bridge between the outer and inner parts of the human understanding. What now remains is to make the new knowledge a part of you and this is an internal process. The feeling of authenticity is essential to this process. The last part of the learning process is that which leads to a fusion of the three aspects of the human character: our world of thought, feelings and will. We have recognised knowledge as a real part of ourselves and the permanent changes to the concept of knowledge are in place (C14A1100).
4	The learning process is a continuous process that develops over time. I can see that I have benefitted considerably from changes taking place in my mind. I am a more reflective person now that when I started the study. Reflection is a matter of training and through the tasks that are presented in the study I have gained considerable insight into how I learn best. By studying what other people have written and considering the content with a critical eye, so as to form one's own experience and opinion. Learning is a complex matter, I am in the process of learning - but have not finished learning (C2A1100).
3	I can now see more connection between my learning process and what I can use for teaching, I notice that I learn best when I can practice and see things again in teaching at school, so appreciate more content and context (C5A1100).
2	Writing assignments and using the various methods I have learned about this semester has enabled me to develop my knowledge of learning processes. I have achieved a good learning outcome this semester (C3A1100).
1	Made teaching plan in assignment 7 and have had teaching supervisor with me and have learned that I must work on the planning aspects (N18A1100).

Table 1. Selected extracts from student's learning logs

Table 2 shows examples of variations as far as written documentation of relevant legislation and steering documents for both professional and vocational practice are concerned. The table shows examples of responses in self assessments after one year's study.

Level	Extract from self-assessment: *"have knowledge of applicable legislation and steering documents that are relevant to professional and vocational practice"*
5/4	In subject 1100 I have worked on and acquired knowledge of the following legislation and steering documents both in the form of working on assignments and in teaching and vocational practice. I have elected to use EndNote to gain an overview of my literature and have made separate groups for each theme, professional and vocational subject and for each assignment. This is helping to give me a good overview of all literature used. Professional practice: Læreplanverket for Kunnskapsløftet (National Curriculum for Knowledge Promotion), Core curriculum, Curriculum for common program subjects Upper Secondary Level 1(Vg1) service and transport, Regulations concerning in-depth study project for Vg1 and Vg2 vocational education program, Programme area for sales, service and security – Curriculum in common program subjects Vg2, Curriculum in ICT service subjects Vg3 / business studies, curriculum in business and administration Vg3 / business studies. Vocational practice: Right of Withdrawal Act, Procurement Act, Working Environment Act, Accounting Act, Consumer Purchase Act, Consumer Disputes Act, Craftsmanship Services Act, Marketing Practices Act, the Principles of Privacy Protection, Regulation for universal design of ICT, Personal Data Protection Act, Copyright Act (C16M1100)
4/5	In the course of term 2 I spent a lot of time trying to understand the competence aims and how pupils should be assessed in relation to them. One thing is what the competence aim actually is, another thing is what we should include in it in practice and how we should assess the pupils. We have established a joint system in the department I work in where we assess across classes and mark each others' tests in order to ensure the assessments are as similar as possible in terms of the competence aims. I have also gained more insight into what is to be expected in Vg1 in relation to Vg2 etc. We have spent some time on gaining a similar understanding of what pupils have to go through and what we should focus on in teaching, so that the pupils get the most equal foundation possible. Through the tasks in subject 1100 I have been "forced" to understand curriculums and competence aims more thoroughly. I notice that this has made me more confident in relation to my job as a teacher. N10M1100
3	Now I have concentrated more closely on the laws that are relevant for security guards. And that means the Security Services Act, Personal Data Protection Act, Personal Data Regulations, Archives Act, Fire and Explosives Prevention Act, Planning and Building Act, Working Environment Act, Internal Control Regulations, Electrical Supervision Act, Insurance Contracts Act, Discrimination Act, and not least the Criminal Code. I also have some experience of the Education Act, I came across it when I was on placement. It was about how many days you can be away from school before being discharged from the school. (C4M1100)
2	By working on assignments 6 and 7, I have worked a lot on curriculum targets, and it has been a good learning process. The same applies to my practical period both in the upper secondary school and in the business studies program. In the upper secondary school I really saw how you work on a curriculum target and the basic skills. And there was a considerable level of difference between different pupils as far as basic skills were concerned (N5M1100).
1	I use the Curriculum for motor vehicle mechanic, light duty vehicles, actively in teaching. I have also been involved with curriculums in other subjects this semester. Have used the core section of the curriculum and the learning declaration in connection with assignment writing (C3M1100).

Table 2. Extracts from students' self-assessments

Discussion

As described in the method section an inductive approach was applied to the research material in the analyses. We interpret the conditions on the basis of our own experience and our practice theory and then our understanding of qualitative studies is used as a basis for analysis of the data material that is collected. Choosing qualitative methods means therefore that the research will not necessarily be free of own values (Postholm 2010). Nevertheless we consider the fact that we are three researchers having worked in parallel on the same data material and having at the same time arrived at virtually the same assessment/results for the quality of the students' level documentation to be a strength. Our analyses using Atlas TI described in the methods chapter form the basis for findings and discussion.

Learning logs

The selected extracts from learning logs in table 1 show the various levels of how TVET_TP students reflect on – or about – what they do (Schön 2012). The learning logs were submitted at the end of the first year of study, two years of the three-year bachelor course remain.

The level 1 response shows a log entry with a statement. Quote: *"... Made teaching plan in assignment 7 and have had teaching supervisor with me and have learned that I must work on the planning aspects …"* (N18A1100). The learning log is not clearly expressed and contains no explanation of how learning processes are proceeding or what might be improved in the teaching plan. For this group our feedback on content and standards in the students' learning logs and self-assessment is particularly important. It is important for moving students' reflections to a higher level (Lynch, McNamara, and Seery 2012). At the same time this practice requires a structured and systematic analysis of the content of the student's reflection (Marcos, Garcia, and Tillema (2013).

The response we have chosen to classify as level 3 evaluates the person's own learning process in the teaching of the learners and content in relation to context. Quote: *"...I can now see more connection between my learning process and what I can use for teaching, I notice that I learn best when I can practice and see things again in teaching at school, so appreciate more content and context …"* (C5A1100). In this case a connection is made between learning and practice and practice theory is developed (Wenger 2004, Haaland 2013, Hiim 2013). One objective in the learning process of training specialist workers to be vocational teachers is to develop the practitioners' reflections during action – into reflection about actions (Schön 2012). We can infer from the quotation here that the student is on the point of developing reflections about actions.

The learning log we selected for level 5 describes the student's understanding of the learning process. It is specific, transparent and contains levels for when and how knowledge is developed to become lasting learning by dialogue from a meta-perspective (Poldner 2014).

> My view of the learning process is as follows: The first contact with the subject stimulates curiosity. In this phase you are working on understanding the subject. This process is conducted externally. Feelings and wishes are not involved. This is therefore a mental process. The next stage consists of appreciating the subject; you see the deeper relationships in the subject and can begin to "grasp" it and "knead" it into something that can become part of you. This part of the process is impelled by wishes and intention and forms the bridge between the outer and inner parts of the

human understanding. What now remains is to make the new knowledge a part of you and this is an internal process.   (Læringslogg C14A1100)

In order to achieve level 4 and 5 students must reflect over different levels of reflection and learning. The aim is to develop general competence at bachelor level by connecting the learning log to teaching, the students' work with work demands, experience from educational practice and experience gained in the vocational subject (EQF 2012). The level is determined by distinctions between students' deep and surface learning, and the objective is a more in-depth approach to learning which can be associated with higher quality learning outcomes (Poldner et al. 2014). Students have the scope to develop a holistic practice in the learning log (Dalland 2013). Because the learning log is submitted every six months, so that we as teachers can give formative reports, the students can reflect on their own professional performance and adjust it on the basis of guidance, as intended by the Ministry of Education (2011). Reflective writing can be improved by formative assessment given to the students about the quality of their work. The learning logs can contribute to the reflection work and according to (Schön 2012) reflection can take place after the learning activities have been performed, or in the course of the action itself. It is therefore assumed that learning logs and self-assessments will be written in the course of study and handed in at set times for example after every subject/every six months.

Self-assessment
Self-assessment is intended to record learning outcomes and reveal the students' learning needs. This has established a practice whereby we as teachers and the TVET_TP students have a joint responsibility. The students deliver and we as teachers must give guidance and new self-insight together with understanding of the transaction between learning and teaching will promote responsibility and motivation (Holt and Stokke, 2015). Our role as teachers and the principles of TVET_TP can therefore be defined as being more that of resource managers and process supervisors - than lecturers (Knowles 2012)(HIOA, 2014). As opposed to having the main focus on teaching we must provide the basis for learning. Systematic use of self-assessment as a form of record can increase the motivation for taking responsibility for one's own learning (Bjørgen, 2008). The practice of developing self knowledge through active participation of students is supported by Knowles (2012). The results will therefore be presented to the students to provide a basis for improving the documentation of the next topic in the study.

The extracts selected from the self-assessments in table 2 have been classified on the basis of the standard of documentation. As examples of written documentation we have picked out some texts by students from the following learning outcome description: ***Have knowledge of applicable legislation and steering documents that are relevant for professional and vocational practice.*** This provides opportunities for looking at an overall unit where vocational and professional subjects are included in the documentation. Levels 1 and 2 show students as describers and appraisers of their own actions with reference to use of documents for the exercise of their profession.

"… By working on assignments 6 and 7, I have worked a lot on curriculum targets, and it has been a good learning process. The same applies to my practical period both in the upper secondary school and in the business studies program. In the upper secondary school I really saw how you work on a curriculum target and the basic skills. And there

was a considerable level of difference between different pupils as far as basic skills were concerned …" (N5M1100). And "… I use the Curriculum for motor vehicle mechanic, light duty vehicles, actively in teaching. I have also been involved with curriculums in other subjects this semester. Have used the core section of the curriculum and the learning declaration in connection with assignment writing (C3M1100).

The texts do not present the type of documentation as intended *"…with comprehensiveness and coherence between professional educational theory, vocational didactic, vocational specialisation and practical experience …"* (Kunnskapsdepartementet 2013, § 1) The students describe and assess the curriculums for the vocational subject, but we cannot see where they have referred to the relevant laws and steering documents for the practice of the trade.

For level 3 the student focussed on the practice of the trade and less on the professional subject. The student wrote the following about the teaching role *"… I also have some experience of the Education Act, I came across it when I was on placement. It was about how many days you can be away from school before being discharged from the school …"* (C4M1100). As the students' teachers, we know which documents are used in subjects. It can seem as if some of the knowledge is only implied in the students' documentation. We know that the students are aware of several legislative and steering documents because they have worked on them and written about legislative and steering documents in other work assignments. More thorough documentation might provide the basis for developing one's own practice and justify one's own choices as a vocational teacher. In this way self assessment can help to develop the students' practice theory (Wenger 2004, Haaland 2013, Hiim 2013).

If we group the students classified as 4/5 and 5/4 (N10M1100, C16M1100) together a high standard of documentation is recorded in terms of dialogue and generalisation. The text which is classified as level 5/4 divides the documentation into vocational and professional sources *"… to gain an overview of my literature and have made separate groups for each theme, professional and vocational subject and for each assignment. This is helping to give me a good overview of all literature used…"* (C16M1100). This provides a good schematic overview. If we establish an assessment strategy that encourages students to discuss and generalise transversally among the students at this point and become critical and creative thinkers, the students' focus can be directed towards a more in-depth approach to learning (Eric Poldner 2014). Without the same oversight, category 4/5 features a different style of documentation that includes a reflective approach where legislative and steering documents are developed into practice theory through action (Schön, 2012)

Conclusion and implications for teacher education
Writing learning logs and self-assessments can promote development and understanding of personal learning strategies. For TVET_TP students this will be an important skill when they come to practice as teachers. The practice can also assist the policy promoted by the Education Acts that the function of teachers (TVET_TP students) is to encourage a basis for lifelong learning in pupils and development of the pupils' learning and learning strategies.
We as educators of teachers must work on methods in order to help students acquire transversal competences such as digital literacy, learning to learn, entrepreneurship and creative and critical thinking and reinforce language skills. According to Dale and Wærness (2003) the researchers see learning strategies as a basis for self-directed learning.

This means that learners set themselves targets and that thoughts, feelings and actions form the basis for planning and taking action to achieve these targets. This is parallel to the practice we are trialling through the students' work on learning logs and self-assessments and learning strategy as an element of the professional skills. Therefore TVET_TP students will solve problems through planning, implementing, reflecting and acquiring new knowledge through their own documentation, and learning strategies are the essential element of the work of preparing for lifelong learning.

Reflection requires the skill of being able to theorise, that is to say it already presupposes the skill of being able to interpret and make experiences meaningful. Supporters of reflection in teacher education maintain that revealing "tacit knowledge" (Schön 2012) from daily practice and making it explicit leads to better teaching. Therefore we as educators of l TVET_TP students need to educate critically reflective thinkers for increasingly complex scenarios (Mena-Marcos, Garcia-Rodriguez, and Tillema 2013)

Since our research project will continue over three years, these are only the findings from the first year. In continuing the work we would like to bring the students' voices into the research. What benefit do they get from working with learning logs and self-assessment? How the students' use of/ enthusiasm for tools increases or wanes later on in the study is also something we are interested in.

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Think, code, succeed: The Programming Studio as a games-based collaboration

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This paper investigates the profile of teachers in the island of Ireland who declared themselves willing to undertake professional development activities in programming, in particular to master programming by taking on-line courses involving the design of computer games. Using the Technology Acceptance Model (TAM), it compares scores for teachers "willing" to undertake the courses with scores for those who declined, and examines other differences between the groups of respondents. Findings reflect the perceived difficulties of programming and the current low status accorded to the subject in Ireland. The paper also reviews the use of games-based learning as a "hook" to engage learners in programming and discusses the role of gamification as a tool for motivating learners in an on-line course. The on-line course focusing on games design was met with enthusiasm, and there was general consensus that gamification was appropriate for motivating learners in structured courses such as those provided.

Keywords: Programming; Technology Acceptance Model; games-based learning; teacher development

Introduction

In both Northern Ireland and the Republic of Ireland, attempts are being made to balance the teaching of ICT skills, and the use of ICT in teaching and learning, by providing or enhancing curricular opportunities for students to learn to program. However, concerns exist in both jurisdictions with regard to the shortage of teachers currently capable of teaching beyond basic digital literacy, and also about the scarcity of professional development courses for upskilling teachers to facilitate the introduction of coding to school students.

The collaborative project "The Programming Studio" is using an innovative approach with direct relevance to the classroom to address these problems. It aims:

- to document levels of programming expertise and readiness among teachers likely to be interested in teaching programming (Phase 1);
- to allow a group of "willing" teachers to master programming languages suitable for use with pupils aged 10-14 years through on-line games-based learning (Phase 2).

A framework for assessing teacher readiness is provided by the Technology Acceptance Model (TAM), along with data on respondents' qualifications and their teaching experience and specialisms. The affordances of games-based learning contribute to the design of the on-line courses in two ways: participants learn to program by designing a computer game, and the courses themselves have gamification features, with challenges and rewards. The courses are intended initially to engage and support teachers, both in learning to program successfully and in sharing their experiences and reflections via structured feedback; however, it is hoped that they would eventually be taken by school students.

For Phase 1 of the project, a questionnaire was developed using a version of TAM adapted for programming, hence addressing TAM concepts such as perceived usefulness (for teaching), perceived ease of use, and image associated with teaching programming; it also sought appropriate demographic information. The questionnaire was directed at a purposive sample: in Northern Ireland, teachers of the secondary school subject ICT; in the Republic – since at the time no equivalent course was available – chiefly teachers who were members of the voluntary body Computers in Education Society of Ireland. For Phase 2, three on-line courses with associated activities were designed, one for each of the three programming languages Scratch, GameMaker and Greenfoot. As of summer 2015, they have been used with a small number of teachers who have provided evaluative feedback.

The development and administration of the questionnaire, and the use of the data in constructing an appropriate version of TAM, were reported in a paper given at the 2014 ATEE conference; the paper also provided more context on the press for programming in Northern Ireland and the Republic of Ireland and compared the responses from the teachers in the two jurisdictions (Cowan, Oldham, and FitzGibbon 2015). The present account focuses on respondents who declared themselves willing to undertake the games-based learning activity, and especially on those who have evaluated the on-line courses. The lens of TAM, in particular, is used to compare the responses of the "yes" ("willing") group with the responses of those who answered "no" with regard to participation. The design and initial implementation of The Programming Studio courses are described, and the feedback from the teachers who have used the courses is examined so as to judge the extent to which the courses provide a context in which participants can learn a programming language.

Theoretical frameworks
Two theoretical frameworks underpin the paper: the Technology Acceptance Model and the "Use-Modify-Create" learning progression as embedded in on-line games-based learning to scaffold the process of learning to program. They are discussed in turn in the following sections.

The Technology Acceptance Model
The original Technology Acceptance Model (TAM) was introduced in the 1980s by Davis (1989), and an extended version known as TAM2 was developed by Venkatesh and Davis (2000). In its simplest form, the model contains constructs *Perceived Usefulness* (PU – the extent to which a person believes that using the relevant technology system will enhance his or her job performance) and *Perceived Ease of Use* (PEU – the extent to which he or she believes its use will be effort free), which jointly impinge upon *Behavioural Intention* to use the system (BI); this in turn impinges on *Usage Behaviour*. For TAM2, the simple model was expanded to include determinants of the constructs, in particular of PU and PEU. Among the additional elements, those of relevance to this paper include

- *Subjective Norm* (SN): a person's perception that most people who are important to the person think he/she should or should not perform the behaviour in question
- *Image*: the degree to which use of an innovation is perceived to enhance one's status in one's social system.

Their relationships are shown in Figure 1. Justifying use of the model, Venkatesh and Davis (2000, 186) claimed that "Numerous empirical studies have found that TAM consistently

explains a substantial proportion of the variance (typically about 40%) in usage intentions and behavior."
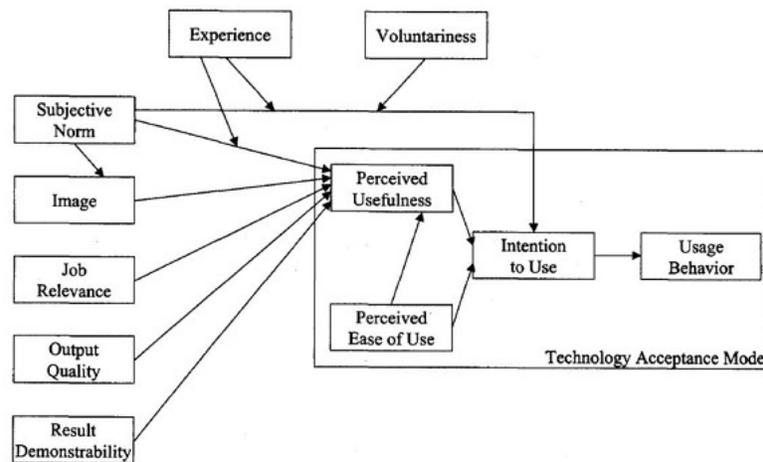
Figure 1. TAM2 – Extended Technology Acceptance Model (Venkatesh and Davis 2000, 188)

Other versions of the model have been explored, and a useful summary of work prior to 2007 is provided by Chuttur (2009). Subsequently an additional construct, *Personal Innovativeness* (PI), was introduced by Liu, Li, and Carlsson (2010); it was identified as a predictor of PEU. The explicit inclusion of *Attitude towards Use* in the model has been a subject of debate over the years. For example, López-Bonilla and López-Bonilla (2011) claim that keeping attitude in the model produces better results than omitting it, whereas Teo and Noyes (2011) argue against its inclusion; the debate is ongoing.

The different versions of TAM are implemented via questionnaires, with the constructs being operationalized by means of sets of items that form scales. Typical examples of items for core elements of TAM include:

- PU: "Using [the system] would enhance my effectiveness on the job"
- PEU: "My interaction with [the system] would be clear and understandable"
- BI: "Assuming [the system] would be available on my job, I predict that I will use it on a regular basis in the future."

The systems for which TAM has been used range from basic computer applications, such as word processing and email, to more complex ones such as expert support and telemedicine technology (Chuttur 2009). While the origins of TAM did not lie in the field of education, a number of recent studies focus on educational settings, and in particular on teacher education. Teo and Noyes (2011), cited above, considered responses from pre-service teachers. Other work with pre-service teachers includes that by Egan et al. (2012); for a cohort of pre-service teachers in the Republic of Ireland, they investigated how the students' self-reported competency in using computers was related to their responses to questionnaire items dealing with PU, PEU, PI and BI from an expanded TAM.

The model is not without its critics, and its strengths and weaknesses have been thoroughly examined (see for example Chuttur [2009] and Teo and Noyes [2011]). Overall, however, TAM "has been widely accepted as a robust and efficient model to be used across gender, settings, and times" (Teo and Noyes 2011, 1646).

On-line games-based learning and gamification

Games-based learning (GBL) is defined as having interactivity (Thornton and Cleveland 1990), rules and goals (Johnston and de Felix 1993) challenges and risks (Baranauskas, Neto, and Borges 1999) and elements of fantasy, curiosity, challenge and control (Malone 1981). It has defined learning outcomes and aims to balance subject matter with gameplay. Ideally, GBL should develop skills and knowledge relevant to the real world.

GBL uses actual games to teach concepts (GCO, 2012) while *gamification* uses "game mechanics, dynamics, and frameworks to promote desired behaviours" (MacMillan 2011), thus replicating the gaming experience within a defined learning context. Gamification aims to "inspire and motivate people to perform specific activities, to increase engagement … by creating enjoyable experiences in playful interactive environments" (Deterding et al. 2011 as cited in Tzouvara and Zaharias [2013], 2). Possibly the most notable feature of gamification is the use of "rewards, feedback and reputation using elements like points, badges, progress bars, customized messages and leaderboards" (Tzouvara and Zaharias 2013, 1) to motivate and encourage the learners to successfully complete the tasks set by the teacher.

Lee et al.'s (2011) iterative Use-Modify-Create model is frequently used for introductory experiences in programming by young people (Werner, Campe and Denner 2012) to scaffold the learner from user to modifier to creator of programmed artifacts. It mimics the procedural skills needed in authentic programming contexts, where frequently used procedures and subroutines are embedded in multiple programming codes with little or no change. The ability to solve a problem by breaking it into manageable parts, or chunks, and then drawing parallels between previous programming experiences to facilitate the re-use or modification of the code for a novel context is key to efficient programming. Using a similar approach, the on-line games design course encouraged the learners to recycle code for one object (such as a ghost in PacMan) and re-use it with other objects (ghosts) with minor changes such as initial direction or speed.

Research questions

Two research questions are considered, addressing the two phases of The Programming Studio project. They are:

1. How do respondents who stated that they were willing to undertake Phase 2 of the project compare with those stated that they were not willing, in terms of their responses to TAM, their view of programming in the curriculum, and their qualifications and teaching experience?
2. Can designing and creating a game provide a context in which learners can learn a programming language?

Research methodology

The methodologies for the two parts are addressed in turn: first the design and administration of the questionnaire for Phase 1, together with analysis of the data, and then the design of the on-line courses and their implementation with "willing" participants. A fuller account of the choice of sample, design of the questionnaire and construction of scales from appropriate items is given by Cowan, Oldham, and FitzGibbon (2015).

Questionnaire design, data collection and data analysis

Population and sample

Purposive samples aimed at targeting teachers likely to be interested in teaching programming were identified as follows. In Northern Ireland, the obvious candidates were teachers of the subject ICT. In the Republic, because of the lack of an established course in the curriculum at the time (though one is being introduced), a different approach had to be taken. Sources for locating suitable teachers were the mailing list of the Computers in Education Society of Ireland (CESI) – a voluntary body that has been involved in computer education for over forty years – and lists of participants in appropriate professional development courses.

Instrument

A questionnaire was designed to explore relevant knowledge and dispositions key to willingness to teach programming. As well as seeking background information (gender, age, number of years in teaching, and so forth), it addressed teachers' qualifications and subject teaching areas, and items intended to measure constructs relevant to the teaching of programming. Sections of interest for this paper, together with the constructs they are intended to measure, are described below.

Qualifications and subjects taught: With a view to determining how many teachers were well qualified or practising in the area of computer science / programming, free-response items were included to collect data on the respondents' specialist subject areas, both those in their degree or equivalent qualification and those in which they were currently teaching. Respondents were also asked specifically about their intentions as regards teaching programming (whether they are teaching it now or had done so in the recent past, plan to in the future, or had no such intentions).

View of the place of programming in schools: This section aimed to tap respondents' disposition towards the inclusion of programming in the school curriculum. For four stages in the education system (primary, and for second level: a minor element in the junior cycle, a main element in the junior cycle, and senior cycle), respondents were asked to state their level of agreement on a five-point scale – "strongly disagree" to "strongly agree" – with the statement that "It is essential that programming is included in the curriculum." The items form a scale (Cronbach alpha = 0.876), henceforth labelled CURRICULUM (Cowan, Oldham, and FitzGibbon 2015).

Attitudes to programming: This section was based on TAM. Likert-type items (each with five responses, "strongly disagree" to "strongly agree") were taken or adapted from versions of

TAM scales and from items used by Egan et al. (2012), cited above, adapted to address programming. A Principal Components Analysis gave five factors with reliability (Cronbach alpha) greater than 0.7 and accounting for 58% of the variance. The five factors were tentatively described as follows:

- PUT: Perceived Usefulness for Teaching
- PEU: Perceived Ease of Use
- PIBI: Personal Innovative Behaviour and Intentions
- IMAGE: Image
- SNS: Subjective Norm in School.

Details of the factors, together with indicative items for each one, are shown in Table 1. It should be noted that the factors do not correspond exactly to those in standard versions of TAM, and there are implications for measuring constructs as intended (Cowan, Oldham, and FitzGibbon 2015).

Table 1. Factor details (number of items, reliability) with selected items.

Scale	No. of items	Specimen item(s)	Alpha
PUT	7	Being able to teach a programming language enhances my effectiveness as a teacher I would be keen to introduce programming in my school	.889
PEU	4	Teaching programming is easy Programming is easy	.838
PIBI	6	If I heard about a new technology, I would look for ways to experiment with it in my teaching	.785
IMAGE	3	People in my school who can teach programming will have a high profile	.817
SNS	2	Senior staff who influence my behaviour think that I should be able to teach programming	.726

Willingness to take part in Phase 2: A question with responses "Yes" and "No" was included after the TAM items.

Piloting and administration
The instrument was piloted with Master's students studying technology and learning in Trinity College Dublin, and minor amendments were made in the light of feedback. The final version was localised where necessary to reflect differences in the Northern Ireland and Republic of Ireland education systems and contexts.

The questionnaire was administered on-line using the free survey tool SurveyGizmo. Approaches were made to prospective teachers of programming via heads of ICT departments in schools and personal contacts (Northern Ireland) and the CESI mailing list and organisers of some courses for teachers (Republic). The survey was open for six weeks in spring 2014.

Data processing

The data were downloaded and entered into SPSS. For the subject area responses, three categories were distinguished and the entries recoded correspondingly:

- Technology (for example, ICT, Construction Studies, Engineering)
- STEM (that is, Science, Technology, Engineering and Mathematics) but not technology (hence, for example, Mathematics and Physics)
- Non-STEM (for example, primary teaching, Business and Arts subjects).

The categories were devised by one author and the coding done by the other two, with any areas of difference being resolved by discussion.

For each of the factors of TAM, item scores were added and the total divided by the number of items to produce a scale score for each respondent. Possible scores range from 1 ("strongly disagree" with all component items) to 5 ("strongly agree" with all). Likewise, scale scores for CURRICULUM were computed by finding the mean of the four "programming in schools" scores for each respondent. Again, the range is from 1 to 5.

Respondents' mean ages and mean number of years teaching were computed (using the midpoints of the intervals provided in the items). Comparisons between those willing to participate in Phase 2 and those not willing were carried out for relevant variables using cross tabulations, chi-squared tests and t-tests.

Development and implementation of the on-line courses

Phase 2 of this study was planned to adopt a social constructivist view in introducing programming to teachers who had expressed an interest in learning how to program in Scratch, GameMaker or Greenfoot. To address differing levels of expertise in programming, and to ensure there was a package that was new and therefore suitable for all participating teachers, three parallel courses with associated activities were developed, one for each programming language. As stated in the Introduction, in each case the focus was on using the language to design a computer game. Links to the relevant websites (www.scratch.mit.edu, www.yoyogames.com/studio, and www.greenfoot.org) were provided so that participants could download the packages and build their games as they worked through the courses.

Eight sessions were created for each course. The design mimicked the "use-modify-create" cycle as advocated by Lee et al. (2011), commencing with an opportunity to "play" some simple games (such as PacMan) and also to reflect on the importance of clear instructions, rules and an end point: key features of games-based learning. Typical course content is shown in Table 2; week numbers can be replaced by session numbers if users are working continuously on their game.

Table 2. Illustration of the content of a games design course.

Week number	Tasks
1	Types of games and playing some games (Use)
2	Storyboarding and planning the characters (Modify)
3	Create the room, sprites and objects (Create)
4	Get the sprites moving! Looking at speed and collisions with walls.
5	Scores and Lives – initializing variables
6	Sound effects – reasons: hitting a wall, losing a life, gaining points (eating)
7	Increasing the difficulty – speed or numbers of objects in new room
8	Certificates of Completion – overall reward.

Gamification features, as described above, were built into the courses. In two of them, the gamification process was the same, namely the award of air miles for the successful completion of the tasks in each session (so that participants could "travel" to a destination of their choice) – see Figure 2. To investigate the extent to which the type of gamification impacts on the motivation of the learners, a different "reward" system, based on the board game Monopoly, was used in the third course.

Figure 2. Boarding Pass with destination and success criteria

As the target participants were located across a broad geographical area in Ireland, and in order to connect the teachers "virtually" and facilitate collaborative discussions around the series of tasks designed to scaffold the learning of the new programming language, the courses were hosted in the Fronter Virtual Learning Environment (VLE). This is available to all schools in Northern Ireland; guest access was arranged for participants from the Republic of Ireland for the duration of the project. The affordances of the VLE allowed key questions to be posted in its discussion forums, for example to encourage the teachers to reflect on the processes of learning to program and to discuss if designing a simple game was a suitable context in which to learn the programming language.

It was intended that a selection would be made from the teachers who, in the survey, declared their interest in taking the on-line courses. Groups addressing each programming language would be formed, with members in each group from each of the two jurisdictions, with the aim of enriching the discussion as participants shared their experiences of different systems and curricula.

Findings

Findings from the questionnaire
Achieved sample for willingness to participate in Phase 2
In total, 219 responses to the questionnaire were received: ninety from Northern Ireland (from around 200 to 250 teachers of ICT in the schools approached) and 129 from the Republic of Ireland (for which the target population cannot be estimated; the number of people on the CESI mailing list and course lists who are "likely to be interested in teaching programming" is not known). After elimination of seriously incomplete cases – those that contained data for very few variables of interest – 161 cases were retained. Of these, 135 responded to the question regarding participation in Phase 2; analysis in this paper is restricted to these cases. Some or all of the non-respondents may have intended their non-response to be interpreted as "no," but such cases cannot be distinguished from genuine "omits." The distribution by *age* and *years of teaching* is shown in Table 3. The means for age and number of years teaching do not differ significantly, so any distinguishing characteristics for the two groups must be sought elsewhere.

Table 3. Achieved samples for those willing / unwilling to participate in Phase 2, by age and number of years teaching.

Willing to participate in Phase 2	Number	Mean Age (Years)	Mean number of years teaching
Yes	100	37.9	13.7
No	35	40.8	15.9

One possible area is that of subject specialisation. For each of the two groups, the *Bachelor's degree or equivalent qualification* of most respondents, and their *current teaching roles*, reflect the fact that the Northern respondents were teachers of ICT, and that many of the respondents in the Republic were qualified in or were teaching subjects such as Engineering, Design Communication Graphics, Construction and Materials Technology: all coded as "Technology" in the threefold categorisation introduced above. Distributions for the two variables (qualification and teaching specialisation) are shown in Tables 4 and 5 respectively. Chi-squared tests revealed no significant differences between the groups by either qualification or specialist teaching area. However, the small numbers from backgrounds or with subject specialisations other than Technology, and especially the low participation by "STEM but not technology" teachers, mean that results have to be interpreted with caution. Some respondents had undertaken further study or attended CPD

courses in the technology area, but, owing to the great variety and scope of these, their inclusion in this analysis is outside the remit of this paper.

Table 4. Respondents willing / unwilling to participate in Phase 2, by qualification (% of qualification total).

Willing to participate in Phase 2	Bachelor's or equivalent qualification			
	Technology	STEM but not technology	Non-STEM	Total
Yes	67 (69.8%)	11 (78.6%)	21 (91.3%)	99
No	29 (30.2%)	3 (21.4%)	2 (8.7%)	34
Total	96 (100%)	14 (100%)	23 (100%)	133

Table 5. Respondents willing / unwilling to participate in Phase 2, by specialist teaching area (% of specialist area total).

Willing to participate in Phase 2	Specialist teaching area			
	Technology	STEM but not technology	Non-STEM	Total
Yes	83 (72.1%)	5 (71.4%)	12 (92.3%)	100
No	32 (27.8%)	2 (28.6%)	1 (7.7%)	35
Total	115 (100%)	7 (100%)	13 (100%)	135

Another area of interest is whether or not the respondents *were already teaching programming, had done so in the past, or planned to do so soon*. The responses are shown in Table 6. Of the "willing" group, two-fifths (41 out of a hundred) reported experience of teaching programming now or recently or an intention to do so soon, whereas, of the "no" group, only one-fifth (eight out of 35) did so; however, a chi-squared test showed that the distribution in the two-way table formed by combining the "Yes" / "plan to" / "did recently" categories narrowly missed significance ($p = 0.055$). The questionnaire did not elicit information about the extent of the respondents' programming experience. Of the 32 respondents currently teaching programming, 23 have qualifications in the technology area and 18 of these (78%) declared themselves "willing" to take part in Phase 2.

Table 6. Respondents willing / unwilling to participate in Phase 2, by status as regards teaching programming.

Willing to participate in Phase 2	Teaching programming				
	At present	Plan to soon	Did recently	No	Total
Yes	26 (81.2%)	2 (66.7%)	13 (92.9%)	59 (68.6%)	100
No	6 (18.8%)	1 (33.3%)	1 (7.1%)	27 (31.4%)	35
Total	32 (100%)	3 (100%)	14 (100%)	86 (100%)	135

An important lens for this paper is TAM, together with respondents' views of programming as an essential element of the curriculum. The mean scores for *CURRICULUM and the five TAM factors* for the "willing" and "not willing" groups are shown in Figure 3. The "willing" group had higher means for all six constructs, with the differences being significant for all variables but two: PEU and SNS, the latter being a borderline case (p = 0.054). Thus, the "willing" group's attitudes towards programming in the curriculum and their own role in teaching it are significantly more positive, but their views of programming as being easy and easy to teach do not differ essentially from those of the "unwilling" group, and they do not feel significantly more pressure to teach it. For both groups the mean score for PEU is on the negative side of the neutral score of 3, indicating that programming and teaching it tend to be viewed as challenging. The mean scores for IMAGE and SNS are also below the neutral value, pointing to the interpretation that teaching programming is not seen as a high-status activity and that there is little pressure on respondents (in particular the "unwilling" group) as regards teaching it.
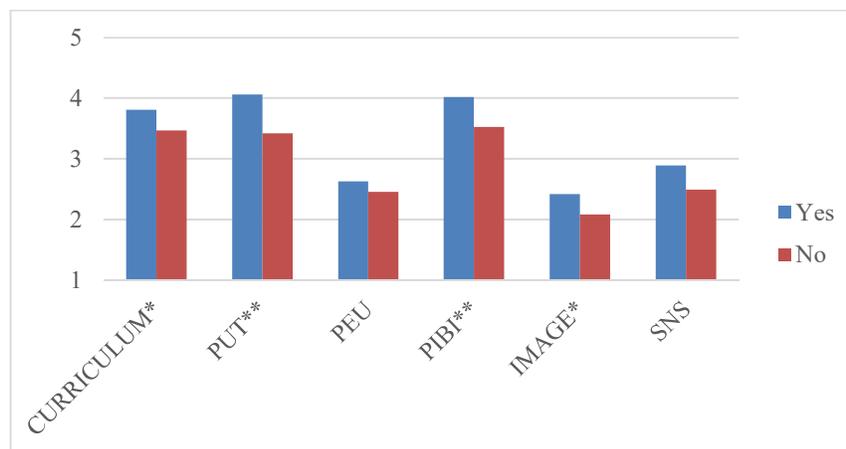
Figure 3. CURRICULUM and TAM scores by willingness to participate in Phase 2
Note: ** Highly significant difference (p < .01)
        * Significant difference (p < .05)

For the data on *qualifications* and *teaching specialisation*, all 135 respondents were considered together because of the small size of the "STEM but not technology" and "Non-STEM" groups (Tables 4 and 5). The t-tests for CURRICULUM and TAM scores revealed few significant differences. Classified by *qualifications,* the "Non-STEM" group's scores were significantly lower ($p < 0.05$) than those of the "STEM but not Technology" group for both PIBI and SNS. As regards *teaching specialisation*, the "NON-STEM" group consistently had the lowest scores; their scores were significantly lower ($p < .05$) than those of the "STEM but not Technology" group for PEU and those of the "Technology" group for PIBI.

The figures reported in Table 6 suggest that an analysis for CURRICULUM and TAM using *intentions as regards programming* would be of interest and might give more insights into the respondents' attitudes than categorisation by willingness or unwillingness to take part in Phase 2. Given the small size of the groups that "plan to soon" and "did recently" teach programming, these were merged with the "teaching now" group, and the resulting group compared with those who indicated no plans or experience. The results are shown in Figure 3. Differences are significant – in fact, highly significant – except for PEU and IMAGE, with the merged Programming group scoring more highly in all cases. The merged group's score for SNS is above the neutral score of 3, suggesting that this subgroup of respondents does feel some pressure to teach programming.
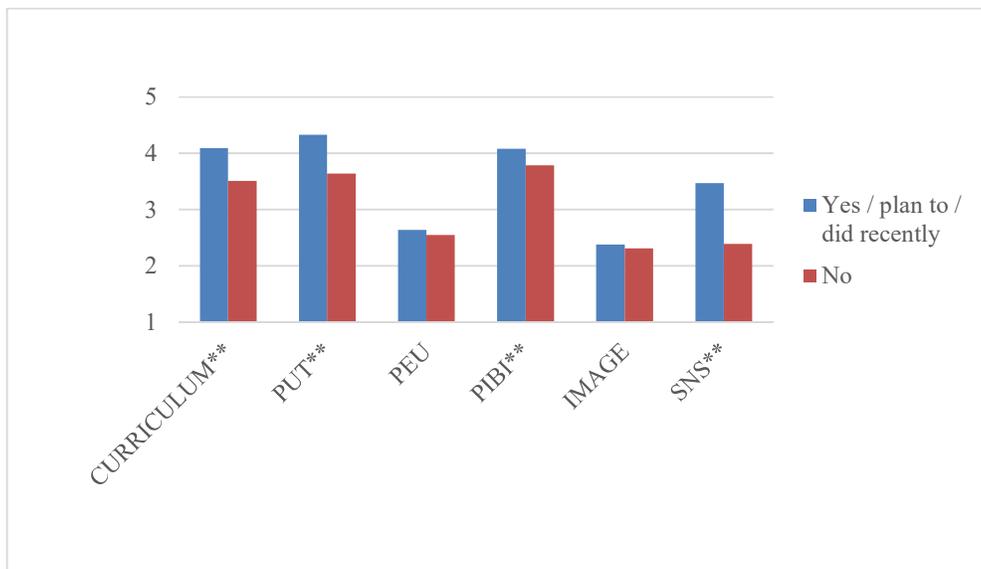
Figure 4. CURRICULUM and TAM scores intentions as regards teaching programming
Note: ** Highly significant difference ($p < .01$)

Findings from implementing the on-line courses

Programming
All participants found the courses accessible, engaging and easy to navigate, and enjoyable to complete. Participants liked the "new take" on an old game (such as PacMan) and the cross-curricular nature of the themes in the courses – "*Science would definitely be discussed – we are, in effect, building an antibody reaction here!*" Most participants felt they that had a strong grasp of the programming language at the end of the course and would be able to

extend their expertise further to stretch and challenge more able learners in their class. Structure and scaffolding in the course design assisted in the learning of the programming language, but some learners indicated it diminished the potential for creativity due to the linear nature of the course structure.

Looking at the features and programming techniques embedded in the games-based course, the underlying concepts of procedures, recursion and types were inherent in the event-driven code; however, the drag-and-drop nature of the environment (for GameMaker and Scratch) may require teachers to make additional comments to highlight the presence of these skills for the learner. In addition, "jigsaw" process of both Scratch and GameMaker meant the syntax and semantics of the code was not an issue; however, less experienced learners struggled with the syntax in Greenfoot thereby pinpointing a challenge in teaching a programming language of this nature.

Data types, although not identified explicitly, are more prominent in the blocks of the code in Scratch due to the use of colour-coded jigsaw pieces in the programming language, and also GameMaker especially where variables have been created for scores or lives. Greenfoot, on the other hand, required an understanding of data types (for values), class types (for objects) and kinds (types of type). From a programming perspective, Greenfoot offered a greater insight into the semantics and syntax of coding and better preparation for advanced programming languages in the future,

Gamification

Like any game, the purpose needs to be clear to the player. Of the two types of gamification, boarding passes and Monopoly, the boarding pass was preferred. "*The boarding pass is a recognition of achievement at each level, each new boarding pass means you have already achieved so much and you are ready for the new challenge. The boarding card holds the key information about the challenge so students may even race each other to get them.*"

There was a general consensus that younger pupils are more likely to enjoy the gamification of the learning experience more than the older age group however it was acknowledged that all ages like recognition for achievement and a reward system, whether badges or air miles, will offer this personalized form of praise. However, not everyone was so enthusiastic about the gamification. One participant revealed: "*For me the gamification was more of a distraction to the task at hand … each week/lesson I had two tasks, one the gamification part and the other working in [package] though of course success at one required engagement/completion of the other.*"

It was acknowledged that the gamification process provides the benefit of extrinsic motivation for reluctant learners and it "*gives a shared language of direction and achievement to teachers and students*" which can be viewed as supportive to the learning process – "*The Boarding Pass has its uses for those who need a check list or reminder to motivate their progression*". A drawback was also highlighted in terms of the underlying message the reward system is promoting, namely praising pupils for " *sticking to and completing the tasks in the task sheet*" rather than assuming "*ownership of the learning*" and working independently addressing the learner's own goals.

The motivational role of games and hence gamification was accepted with a distinction made between the continuous nature of rewards and the finality of an award for

successful completion – "*I would view the points as a reward and motivation factor and the certification at the end as an award.*"

Discussion

With regard to the *first research question*, the respondents who were willing to participate in Phase 2 of the study scored more highly on average than did those who were unwilling on all five factors of TAM – significantly more highly except on PEU (Perceived Ease of Use for programming / teaching programming) and SNS (Subjective Norm in Schools, reflecting pressures on the respondents to address programming). They were also significantly more inclined to agree with the statement that "it is essential" that programming is introduced as a subject in the school curriculum (CURRICULUM). However, there appeared to be general consensus that programming was challenging to teach and had a relatively low image in the school; this makes it questionable that the teachers of programming were being given the recognition they deserved from senior management in Northern Ireland, and acknowledged the low standing of programming in Republic of Ireland schools where it was not (then) in the main school curriculum

In order to consider respondents' bachelor's or equivalent qualifications, and likewise their current teaching specialisations, a tripartite classification was used: "technology," "STEM but not technology" (for example, mathematics), and "non-STEM" (for example, primary teaching). There were few significant differences in their TAM scores, though the small numbers in the "non-STEM" and especially the "STEM but not technology" groups obviate much weight being given to the findings. The fact that most respondents were in the "technology" group was a natural finding for the Northerners, who were teachers of ICT, but a revealing one for those from the Republic, where those who chose to respond came from an area not strongly represented in the current school curriculum.

An investigation based on intentions and experience regarding the teaching of programming had greater explanatory power; the respondents who currently teach programming, plan to do so soon, or did so recently, as opposed to those with no such intentions or experience, had mean scores that were highly significantly greater on the TAM scales of PUT (Perceived Usefulness for Teaching), PIBI (Personal Innovative Behaviour and Intentions) and SNS, as well as on CURRICULUM. It should be noted that, while around a quarter of the respondents reported that they were already teaching programming, the questionnaire did not elicit the extent of their involvement. It is notable that around four-fifths of those who were teaching programming and have technical qualifications were willing to take the on-line courses and so to enhance their knowledge.

The age and level of experience of teachers who are currently teaching programming indicates that they may not be *au fait* with the latest programming languages. The limited knowledge of many modern programming languages – except for very familiar ones such as HTML, Java and JavaScipt and the currently fashionable Scratch – has already been reported by Cowan, Oldham and FitzGibbon (2015).

In relation to the *second research question*, as a mechanism for introducing and promoting programming to teenagers, the use of games-based learning and gamification offered an exciting and rewarding approach to developing competence in coding, especially for Scratch and Gamemaker. The final product, being a game, hooked the learners from an early stage and the visual nature of the process offered regular insights into how the game

was progressing. The ability to play the game at various stages throughout the design process (under the auspices of "testing") was viewed as fun and enthused the learners to move to the next stage of creating sounds or scores to enhance their game further. Using PacMan as the basis for the game, increased the learners' interest as they were familiar with this game from the outset. There was also a sense of achievement at building a game to the same quality as its original format in the 1970s/80s.

As discussed already, the gamification process was suited to motivating learners as they worked through a more teacher-directed programme of tasks designed to scaffold their learning and ensure progression. It is acknowledged by the authors that a more open-ended self-directed approach would be suitable as the next step in the progression of learning to build a game whereby the learner could take ownership of the game design and could "use-modify-create" existing code from previous games in their new game, thus mimicking the recycling of subroutines and procedures in real-life programming careers

Conclusions and implications for teacher education

The project reported in this paper, The Programming Studio, addresses the issue of the preparedness of teachers in the island of Ireland to teach programming in schools. The two phases of the study dealt respectively with collecting data on teachers' disposition towards programming and teaching it, using a form of the Technology Acceptance Model (TAM) developed for the purpose, and designing and implementing on-line courses with gamification features to allow willing teachers to master one of three programming languages: Scratch, GameMaker and Greenfoot. The research questions for the paper deal mainly with the differences between those "willing" and "unwilling" to participate in the courses and with the extent to which participants can learn to program by designing and creating a game.

Notable findings include the fact that respondents willing to take the courses include many of those already teaching programming, and likewise many from a technological background, highlighting the urgent need for teacher education courses even for those who might be expected to have satisfactory expertise. The poor image accorded to programming, and the difficulties perceived in mastering and teaching it, provide a challenging context for such courses.

Designing and creating games may have a strong role to play here. As a teaching strategy to promote programming to a broad range of learners, teachers who took the courses indicated that gamification would work as a motivational tool especially for younger and more inexperienced programmers who enjoy the structure and scaffolding typical of a traditional teacher-led lesson. As the learners' ability to program extends, a more open-ended, self-directed approach to programming can be adopted to encourage independence, and to develop the learners' ability to reflect on and re-use the ideas and core programming concepts learnt through the on-line courses, in a novel context, thus mimicking the recyclable nature of code in an authentic programming context.

Overall the study has captured the current situation in compulsory education in relation to teaching programming in schools. The findings highlight the importance of offering high quality education in the programming during the initial teacher education phase, followed by timely opportunities for professional development whilst on the job. Hopefully many more teachers can be encouraged to think, code and succeed!

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Between Smartphones and Tablets: Improving Teacher Education Programmes through Mobile Devices

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This research was conducted at the University of Genoa (Italy). The student teachers attended a course focused on the use of mobile devices at school. We tried to examine the impact of mobile learning on university activities for pre-service teachers, the changes in the organization of their studying, the changes in their learning strategies, and the changes in their interaction/cooperation levels. After the course, we administered a questionnaire with both closed-ended and open-ended questions, which highlighted important findings concerning the differences between smartphones and tablets in supporting these aspects of their learning. We found that both types of devices improved interaction and cooperation among students, and being able to search for information was useful for studying. However, changes in the organization of studying and the learning strategies were supported only by tablets and only for specific aspects of learning. This study suggests solutions to improve Italian teacher education programmes and the quality of university activities.

Keywords: mobile learning; teacher education; mobile devices

Introduction

This study aimed to investigate whether and in what ways mobile devices can modify the educational activities of a university subject taking Italian teacher education programmes. The study was carried out at the Department of Education of the University of Genoa (Italy) at the end of a course called "Educational Technology," which is included within the teacher education programme for primary and secondary school teachers. There were three main aims of this study. The first aim was to examine which aspects of teacher education courses are most affected by the use of mobile devices. The second aim was to underline the educational opportunities provided by mobile devices to improve teacher education programmes. The third aim was to improve the qualification level of Italian student teachers with regard to issues arising from the use of mobile devices to allow them to face the educational and cultural challenges of a digital classroom.

Theoretical framework

The chances offered by the cloud and ubiquitous computing (Cope and Kalantzis 2009; Burdick et al. 2012) suggest several opportunities in order to modify and implement the structure of programmes in teacher education. To date, we have managed the teacher education activities with the support of eLearning platforms for sharing materials and interacting with student teachers. With mobile learning, we can imagine activities spread in different times and spaces. According to Harris (2001), "Mobile learning is the point at which mobile computing and eLearning intersect to produce an anytime, anywhere learning experience." Additionally, Schuck et al., (2013) point out that "Mobile technologies have the

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potential to be employed innovatively as powerful learning tools in higher education" (p. 2) because they can allow us broader and quicker access to information and the possibility of sharing ideas and creating materials before, during, and after university and teaching practice activities. Mobility and accessibility have become the keywords for a new teacher education paradigm.

In recent years, we have observed an increasing trend towards integrating mobile learning into teacher education contexts (Baran 2014). UNESCO (2012) emphasizes mobile devices as a global theme that can expand educational access and support instruction, administration, and professional development. Previous studies have focused on the educational opportunities offered by small mobile devices, such as the iPod (Mahruf et al. 2010; Coens et al. 2011), mobile phones, smartphones (Seppälä and Alamäki 2003; Aubusson et al. 2009; Ekanayake and Wishart 2014), tablets, (Kearney and Maher 2013; Bates and Martin 2013; Hargis et al. 2013; Hashim 2014) and combined situations in which various types of devices have been used (Järvelä et al. 2007; Husbye and Elsener 2013; Herro et al. 2013; Şad and Göktaş 2014). The participants involved in these studies have been in-service or pre-service teachers, teacher educators, administrative staff, or teacher advisors, so studies on the relationship between mobile devices and teacher education are heterogeneous. This paper can be included in the area of pre-service education because it involves student teachers who had the opportunity to use smartphones and tablets. This choice was made because we wanted to analyse the effect of the devices that are generally used by young teachers for the development of meaningful interaction and learning.

Previous studies focused on these issues highlight the importance of the possibility of sharing knowledge and skills through a high level of participation and interaction (Ekanayake and Wishart 2014). Kearney and Maher (2013) emphasize the role of mobile learning approaches for the improvement of pre-service teacher education. In particular, they state that "pre-service teachers use the tablets to enhance organizational aspects of their professional learning. They initially use productivity apps in class, often in a 'just in time', spontaneous fashion to take notes; plan, evaluate and observe lessons on professional experience; and record and annotate media, including their own multi-modal reflections. Many pre-service teachers mention the ability of the mobile device to conveniently keep records of their own learning journey both on and off campus" (Kearney and Maher 2013, p. 81). Broda, Schmidt, and Wereley (2011) emphasize the need for educators to adopt a "progressive ethic for teaching and learning, supporting efforts to think differently and use the technology tools to explore and embody the fluid nature of learning and teaching." (p. 3150)

Schuck et al. (2013) report some advantages of mobile learning, including flexibility, convenience, user-friendliness, an enhanced ability to undertake complex tasks, enhanced communication, opportunities for group learning, and increased sharing and interactions with local and global communities. In this way, the authors see mobile devices as vectors for arranging educational opportunities for the contextualization and personalization of learning tasks and as support for project-based and inquiry-based learning approaches.

The learning activities performed on mobile devices feature a different concept of time-space. Formal learning is traditionally "characterized by two constants or boundaries: time and space. Learning places occupy fixed, physical spaces which are defined by relatively impermeable boundary objects such as walls, classrooms and school buildings. Mobile devices create what we term malleable spatial-temporal contexts for learning " (Kearney et al. 2012). It is crucial that we recognize and acknowledge the importance of the organization of the learning environment in terms of time-space because it profoundly affects mobile

learning experiences (Ling and Donner 2009).

Kearney et al. (2012) propose a framework to qualify mobile learning experiences through the use of time-space to develop learning and professionalism among pre-service teachers.
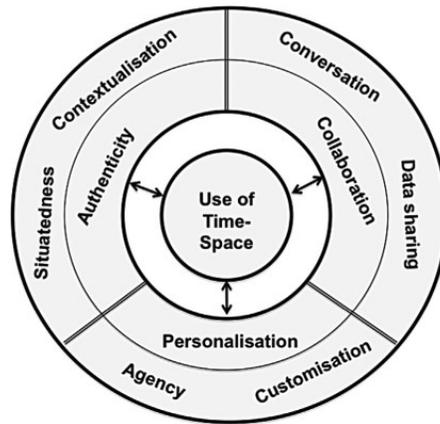
Figure 1. Three distinctive characteristics of m-learning experiences with sub-scales (Kearney et al., 2012).

Three distinctive characteristics of mobile learning experiences, along with their respective sub-scales, are described by the authors. Authenticity represents the possibility of facing real instructional situations in real contexts. In fact, "mobile learning episodes potentially involve high degrees of task and process authenticity as learners participate in rich, contextual tasks (setting, characters, tools), involving real-life practices" (Kearney et al. 2012). Learners can generate their own rich contexts (Pachler et al. 2009) with or through their mobile devices. Thus, student teachers have the opportunity to contextualize their learning in situated experiences by participating in a real community of practice. Collaboration among student teachers can be improved through mobile learning experiences because mobile devices support dynamic and real-in-time dialogue and conversation, with a high possibility of material and data sharing that can be retrieved online or generated by student teachers. Finally, personalization refers to the opportunity offered by mobile devices to customize the learning paths of student teachers. Student teachers can use tools and apps to record, organize, and reflect on their own learning experiences over time; they can negotiate learning choices (e.g., content and goals), and ultimately, they can design their own learning paths by selecting, producing, or sharing materials.

In our framework, authenticity represents the challenge of modifying university activities (lectures and classes, workshops, and teaching practice); collaboration refers to the changes and opportunities in implementing interaction and cooperation among student teachers; and personalization is connected with potential changes in the studying organization and learning styles and strategies of student teachers. Our study aimed to analyse how these factors are supported during teacher education activities, such as during a class or in teaching practice. In particular, our framework focuses on the role of the new spatial-temporal dimensions offered by mobile devices to examine how they can modify, enhance, improve, and affect student teachers' interaction, collaboration, and learning strategies.

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Research design

Context and research question
The Italian teacher education programmes for primary and secondary school are different. Primary school teacher education lasts five years and includes subjects focused on both pedagogical and psychological aspects. This course is attended by student teachers after receiving a high school certification. Secondary school teacher education is a one-year master's degree course in a specific subject (maths, history, philosophy, etc.). Both programmes include a subject called "Educational Technology," which is focused on the use of mobile devices at school.

This research was conducted during the 2014–2015 academic year. The professor presented online digital materials, and the students had to elaborate, share, and cooperate online through their own mobile devices. For instance, the professor uploaded documents to cloud storage, and the students had to begin an argumentative discussion that highlighted and underlined the most important points while adding comments and exchanging materials.

All of the student teachers had smartphones, but some of them did not have tablets. In this case, they worked together with colleagues to experience both devices. At the end of the course, the students took two types of examinations. The first was a traditional exam in the form of a written test that focused on the theoretical aspects included in a textbook. The second was innovative: the students had to simulate a lesson with the use of mobile devices and prepare all the materials.

Based on this educational situation, we had the opportunity to analyse the main factors in a teacher education course that could be affected and, consequently, modified and improved by mobile devices. The research question can be summarized as follows: has the use of mobile devices affected the main aspects of a subject included in a teacher education programme? In particular, we wanted to analyse the following areas:
   (A) University activities (lectures, workshops, and teaching practice);
   (B) Changes in individuals' studying organization at home;
   (C) Changes in students' learning styles and strategies;
   (D) Changes in the interaction/cooperation among students.

Participants, procedure and instrument
The participants involved in the study attended three different kinds of courses. The SFP course (*Scienze della Formazione Primaria*, or "Teacher Education Programme") was for primary school teachers. The TFA course (*Tirocinio Formativo Attivo*, or "Effective Teaching Practice") was for secondary school teachers and it was composed of student teachers with little teaching experience. The PAS course (*Percorsi Abilitanti Speciali*, or "Special Qualified Course") was for secondary school teachers and it was composed of student teachers with a lot of teaching experience (at least three years). For these reasons, as you can see in Table 1, the PAS students were older than the students in the other courses (41 years old) and they have been teaching for nine years on average. The TFA students were a bit younger (33 years old) and they have been teaching for two and a half years. The SFP students were very young and they did not have school experience.

We chose a mixed approach to collect both qualitative and quantitative data because we wanted to stress distinctive benchmarks for the mobile learning activities in teacher education and to develop a more profound understanding of the reasons for these points of reference. After the end of the course, we administered an online questionnaire to

the participants. The questionnaire was developed by the authors and was composed of 16 closed-ended questions and 4 open-ended questions focused on the areas indicated in the previous paragraph. Each closed-ended question was divided into two parts. The first referred to smartphones and the second to tablets to identify the differences between the use of the two types of devices.

Table 1. The participants' characteristics.

Level	Participants	Gender	Age (M & SD)	Teaching area	Seniority (M & SD)
SFP	49	46 F (93.88%)	25.102 (5.11)	PRIM 10.87%; DO NOT TEACH 89.13%	Not available
		3 M (6.12%)	25.33 (4.04)	PRIM 33.33%; DO NOT TEACH 66.67%	Not available
PAS	113	100 F (88.5%)	42.55 (6.03)	LIN 57%; SCI 35%; TEC 8%	9.25 (3.61)
		13 M (11.5%)	40.08 (6.31)	LIN 61.5%; SCI 30.8%; TEC 7.7%	9.03 (3.62)
TFA	99	51 F (51.5%)	33.47 (7.83)	LIN 41.2%; SCI 29.4%; TEC 11.8%; PRIM 5.9%; DO NOT TEACH 11.8%	2.59 (1.88)
		48 M (48.5%)	33.88 (7.48)	LIN 31.3%; SCI 33.3%; TEC 27.1%; DO NOT TEACH 8.3%	2.61 (2.19)
Labels: PRIM = primary; LIN = linguistic area; SCI = scientific area; TEC = technical area					

In Table 2, we show the structure of the questionnaire. A five-point Likert scale was used to register the responses for the closed-ended questions: Yes, completely = 5, Yes, a lot = 4, Neither yes nor no = 3, No, a little = 2, Not at all = 1. The aim of the structure of this questionnaire was to clearly highlight the modalities of student teachers while they were using both smartphones and tablets.

Table 2. Structure of the questionnaire.

			Sample item	
	Area	**Sub-area**	*close-ended questions*	*open-ended questions*
A	University activities	A1-lectures A2-teaching practice at school A3- teaching practice at university A4-workshops	Did the use of mobile devices make the lectures more interesting?	Can mobile devices improve the organization of teacher education programmes?
B	Changes in individual studying/organization at home	B1-studying at home B2-search for information B3-digital materials B4-books and other instruments or media B5-personalized learning	Did the use of mobile devices modify your studying style at home?	Did the mobile devices change the way you prepared for the exam?
C	Changes in learning styles and strategies	C1-memorization C2-elaboration of information C3-critical thinking C4-metacognition	Did the use of mobile devices help you in thinking over your own learning style?	Did the mobile devices support the development of your critical thinking?

D	Changes in the interaction/cooperation among students	D1-interaction among students D2-cooperation among students D3-sharing digital materials	Did the use of mobile devices increase opportunities to cooperate with other student teachers?	Did the ways of interacting and cooperating among student teachers change when they used mobile devices?

Layout of the closed-ended questions

e.g., C3. Did the use of mobile devices help you in thinking about your own learning style?

[T] Tablet	Yes, completely	Yes, a lot	Neither yes nor no	No, a little	Not at all
[S] Smartphone	Yes, completely	Yes, a lot	Neither yes nor no	No, a little	Not at all

Data analysis

The data analysis focused on the quantitative data, whereas the qualitative data were used to explain and understand the quantitative results in the discussion section.

Table 3. The item distribution.

	areas	device	SFP	PAS	TFA
SECTOR 1 **M >4**	A	*Tablet*	-	-	-
		Smartphone	-	-	-
	B	*Tablet*	2	2	2
		Smartphone	-	-	-
	C	*Tablet*	-	-	-
		Smartphone	-	-	-
	D	*Tablet*	1-3	1-3	2-3
		Smartphone	1-3	1-2-3	1-2-3
SECTOR 2 **3.5<M<3.99**	A	*Tablet*	1-2-3-4	1	3-4
		Smartphone	-	-	-
	B	*Tablet*	3-4	1-3-4-5	4
		Smartphone	2	2	2
	C	*Tablet*	-	-	-
		Smartphone	-	-	-
	D	*Tablet*	2	2	1
		Smartphone	2	-	-
SECTOR 3 **3<M<3.49**	A	*Tablet*	-	-	1-2
		Smartphone	1-2-3-4	1	1-2-3-4
	B	*Tablet*	1-5	-	1-3-5
		Smartphone	-	1-3-4-5	4
	C	*Tablet*	2-3-4	2-3-4	2
		Smartphone	3-4	2-4	-
	D	*Tablet*	-	-	-
		Smartphone	-	-	-
SECTOR 4 **Item <3**	A	*Tablet*	-	-	-
		Smartphone	-	-	-
	B	*Tablet*	-	-	-
		Smartphone	1-3-4-5	-	1-3-5
	C	*Tablet*	1	1	1-3-4
		Smartphone	1-2	1-3	1-2-3-4
	D	*Tablet*	-	-	-
		Smartphone	-	-	-

NB: Area A of the questionnaire for PAS students provided only item A1.

In Table 3, we grouped the items into four sectors to highlight the most significant aspects and underline the differences among the three types of courses. The first sector includes the items that received a high evaluation (greater than 4), the items in the second sector received a good evaluation (between 3.50 and 3.99), the items in the third sector were evaluated positively but with low scores (between 3 and 3.49), and finally, the last items (sector 4) received a negative evaluation (less than 3).

We can state that:

- the items are evenly distributed among the three types of students (SFP, TFA, and PAS);
- the items of area D are concentrated in sector 1, with high scores together with item B2, which also focused on the retrieval of useful information to study more thoroughly, but only for tablets (B2 [T]);
- the items related to university activities (area A) with tablets are grouped in sector 2 with a good evaluation, whereas items in the same area but with smartphones are included in sector 3;
- the items of area B (changes in individual studying organization at home) are distributed between sectors 2 and 3; in the second sector, we find the items with tablets are predominant; in the third sector, there are items with smartphones, but we can underline a high-level dispersion; in addition, the students teachers of primary school (SFP) include the item with smartphones, even in the sector with lowest scores (sector 4);
- the items of area C (changes in learning styles and strategies) appear as the most critical because they are grouped into sector 3 (with tablets) and sector 4 (with smartphones); the TFA students include all items of area C in sector 4.

To identify the presence of statistically significant differences between the areas of the questionnaire, we conducted an analysis of variance with repeated measures (rANOVA). Cronbach's Alpha was high for all areas of the questionnaire, so we could aggregate and subdivide the data into the parts related to smartphones and tablets. As shown in Figure 2, we compared the data and found the following:
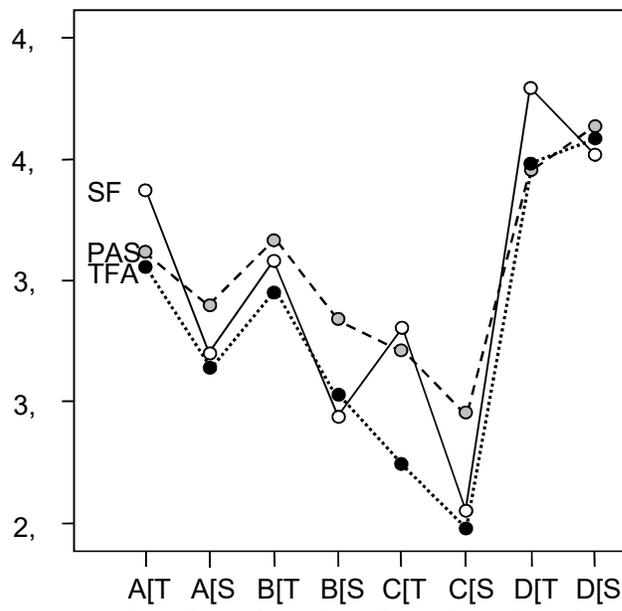
Figure 2. rANOVA with repeated measures.

- the SFP students think that tablets offer the opportunity to modify university activities (A[T]), but there is no significant difference between the groups;
- the PAS students consider the smartphone as a useful device in order to modify individual studying organization at home (B[S]); the scores are higher compared to those of SFP students, but not to those of TFA students; the difference is not significant among the three courses ($F_{(217.2)}$ = 2.846; p = .060); however, comparing in pairs, the post-hoc test (conducted with the Bonferroni method) shows the difference between PAS and SFP students;
- the TFA students do not see the tablets as useful devices to improve their own learning stategies (C[T]); in fact, the scorse are statistically lower compared to those of both SFP and TFA students ($F_{(219.2)}$ = 8.061; p = .000);
- instead, the PAS students consider smartphones as very useful devices to improve their own learning strategies (C[S]) compared to TFA students; there is a significant difference among the courses ($F_{(212.2)}$ = 4.748; p = .010) and the post-hoc test confirms the difference between PAS and TFA students.

Discussion

When analysing the data grouped in the first sector of Table 3, we find that both types of devices, i.e., tablets and smartphones, support interaction and cooperation among students, and they are useful for rapid information searches. Thus, we can affirm that the use of both smartphones and tablets can improve interaction and collaboration among students, and the retrieval of information useful for studying.

The qualitative analysis supports the quantitative data. The open-ended question regarding cooperation (area D) was, "Did the ways of interacting and cooperating among student teachers change when they used mobile devices?" One of the SFP students answered this question by saying, "Thanks to mobile devices, I've been able to communicate with my university-mates from everywhere at any time and to collaborate with them during digital activities very rapidly and in a functional way."

Combining the quantitative analysis (referring to the second sector of Table 3) and the qualitative data, we can affirm that university activities (lectures, workshops, and teaching practice) may be improved with the use of mobile devices. In this case, tablets are more useful because they have large screens and can be used to create digital materials, which seems impossible with smartphones because of their small size. The participants noted that only tablets can support the effectiveness of lectures, workshops, and teaching practice to improve the quality of university activities. Smartphones are quick and convenient for the exchange of information and materials, but they are useless for reading, modifying, or creating digital materials. One of the SFP participants wrote the following answer to the open-ended question from area A ("Can mobile devices improve the organization of teacher education programmes?'): "The mobile devices allow a global approach to the subjects, because the topics debated during a lesson can be studied more thoroughly and integrated with whatever kind of information, in the sense that they can be personalized; for instance, the teacher is talking about a topic that excites my curiosity, so I'm looking for additional information about that topic online and I integrate my notes."

Study organization at home (area B) has conflicting results. It can be improved mainly by using tablets because the small screens of smartphones do not allow students to easily create digital materials. Tablets appear to be crucial for preliminary study organization, but some students have difficulty when they have to pick up their digital

materials to study for an exam. We must underline that the PAS students prefer the use of smartphones; in fact, one of them claims: "With my device, I can find information, websites, materials, videos useful for studying at any time and everywhere and, above all, I can check always MY materials and MY documents, even if I forgot my USB stick! The mobile devices make all places a studying place. Everywhere they make you feel...at home!"

Area C (learning strategies) is complex because the most critical point is represented by changes in the students' learning styles and strategies, in particular for TFA students. Tablets seem to help students by enhancing the elaboration of relevant information, critical thinking and metacognition, but they do not support the memorization of information. One TFA student says: "I think that the critical thinking development is not enhanced directly by the use of the mobile devices but I think that they can support such development...since they can allow the access to a lot of channels and information. Of course, only the access is not enough but a precise intentionality is necessary."

Findings and conclusions

In conclusion, we can emphasize some ways that mobile devices are particularly useful for the development of Italian teacher education programmes. First, mobile devices can improve teacher education programmes with regard to opportunities to find and share information, create digital materials, and enhance cooperation among students. This is particularly true for tablets, but smartphones are also useful because of their flexibility and because they allow students to contact their classmates to exchange information rapidly.

For these reasons, university activities should support mobile devices' affordances, such as arranging lectures that require searching for information, elaboration of materials, and sharing ideas in order to discuss and improve this critical comparison.

Area C is our main aim for the future. We want to investigate more thoroughly the connection between interaction and the development of critical thinking and learning strategies. It is important to highlight the link between the usefulness of mobile devices in supporting interaction and collaboration, and it shows a clear and evident improvement of the learning strategies and study organization of each student.

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A Developmental Model for introducing the e-Portfolio Methodology:
Promoting an 'Enquiring and Reflective Practitioner' Approach.

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> As part of the renovation activities within the Faculty of Education at the University of Malta, the Department of Leadership for Learning and Innovation has been entrusted with the implementation of the e-Portfolio framework. A developmental model based on the JISC - Joint Information Systems Committee e-Portfolio Implementation model has been developed, comprising a theoretical framework and an implementation strategy. It will be used to promote reflection about the critical factors that determine the successful integration of the e-Portfolio framework within initial teacher education. Successful implementation is based on the implementer's ability to communicate, engage, support, and disseminate the project's vision, objectives, methodology, and implications to all stakeholders. A detailed implementation strategy has been designed to guide the development and integration process. Data obtained from qualitative and quantitative research activities will be used to customize as much as possible this design and development process in an attempt to address a wide range of individual and institutional needs.
>
> **Keywords:** e-Portfolio, educational innovation, innovation management, pedagogy

1. Context

The Faculty of Education at the University of Malta (UoM) is engaging in a process of renovation and re-structuring involving the formulation of a vision for the faculty in the context of 21st century education. Such a vision of 21st century teachers demands constant renovation of teacher education and the professional development of teacher educators. This scenario instigated intensive and extensive discussions and reflection within the Faculty of Education about the different dimensions that need to be considered during this renovation process. Such transformation demands revisiting and redefining the driving epistemology and developing a strategy to put the identified vision into practice. This will have direct implications on the organizational structure of the faculty, the curriculum, and the mode of interaction with schools.

Key collective decisions were made after long consultations within the faculty and with a wide range of stakeholders. These include the upgrading of the initial teacher education program to a masters level, the adoption of the Inquiring and Reflective Practitioner epistemology, the restructuring of the faculty into a new set of departments, the restructuring of the curriculum, the embedding of school-based teacher education within professional partnerships between the faculty and schools, the introduction of a mentoring program, and the embedding of digital technologies within the faculty processes. It was also decided to adopt the e-portfolio framework to address and organize these various proposals.

2. Theoretical Framework

UNESCO's Information and Communication Technology - ICT Competence Framework for Teachers (Hine 2011) claims that traditional educational practices no longer provide prospective teachers with all the necessary skills for teaching students to survive economically in today's workplace. This framework proposes three complementary approaches that connect education policy with economic development. These are the *technology literacy* approach, the *knowledge deepening* approach and the *knowledge creation* approach. There is a shift in emphasis from instructional approaches (characterized by the technology literacy approach) to collaborative, project-based learning activities, and ultimately, to constructionist and reflective activity in knowledge creation methodologies.

This shift to more learner-centered and learner-managed approaches, which are typical for e-portfolio-based methodologies, are discussed in the OECD document *The Nature of Learning* (Dumont et al. 2010). According to this, an educational agenda should be learner-centered, where the environment is highly focused on learning as the principal activity. It should be structured and well-designed based on learning design principles that leave ample room for inquiry and autonomous learning. Being profoundly personalized, the learning environment is acutely sensitive to individual and group differences as well as inclusivity, and thus it is sensitive to the needs of minorities. At the same time, learning is a profoundly social activity and therefore effective when it takes place in group settings, based on collaboration and embedded in learning communities.

The e-portfolio methodology will be applied in Initial Teacher Education (ITE) with the specific objective of promoting an Inquiring and Reflective Teacher model. Donaldson (2010) outlines the qualities of teachers needed in 21st century schools: they need a high levels of expertise within their area of specialization in pedagogy and in educational theory; they should have secure values manifested as personal and professional accountability for the wellbeing of all young people; they are inquisitive and reflective with the skill for asking hard questions of themselves and others; they take the prime responsibility for their own professional growth and development; they are able to engage in well-planned and well-researched innovation; and they can adopt an outward-looking approach and seek partnerships. The e-portfolio methodology is a sound approach to develop these skills in teacher education programs.

3. Method

The JISC e-Portfolio Implementation Model (Gray & Joyes 2012) will be adopted and adapted to introduce the e-portfolio to the Faculty of Education. Non-formal interaction and formal professional development activities will be organized with the various stakeholders (teacher educators, student teachers, faculty administration, mentor teachers, school management teams, and the technical support teams) to:

- **Communicate** and **inform** through planning, research, procurement, and definition/clarification of the faculty and project vision;
- **Engage** through consultation, integration, and facilitation;
- **Support** through development, design, and alignment;
- **Disseminate** through sharing the development and implementation experience, through reflection on examples of good and innovative practice, through

monitoring, reviewing, evaluation, and embedding in curriculum and professional practice.

This will be supported by research to provide qualitative and quantitative data for the continual evaluation of the different dimensions of the model and will inform decision-making in the various stages of the implementation process.

4. **Implementation Strategy**

The implementation strategy is based on the four dimensions of the JISC - Joint Information Systems Committee model, that is, communicate, engage, support, and disseminate (Gray & Joyes, 2012, Pg 11-12). Each of these dimensions will be discussed and applied to the context of the Faculty of Education.

a. *Communicate*

The development and implementation of the e-portfolio framework has to be inspired by a shared faculty vision, that is, the teacher as an inquiring and reflective practitioner. This also implies a shared pedagogical framework integrating didactical, constructivist, constructionist, and connectivist pedagogical approaches and complemented by an integrated approach in assessment. The e-portfolio will be promoted as the most appropriate tool for operationalizing these pedagogical objectives.

The various benefits that such an innovation would provoke will be communicated to individual stakeholders and also to the institution. At an institutional level, the benefits include an opportunity and a means for renovating pedagogy within the Faculty of Education, which hopefully will lead to renovating school pedagogy. The e-portfolio methodology will also serve to promote renovation in assessment procedures and underlying philosophies. Another organizational benefit of the e-portfolio system is that it provides an integrated approach to information management, comprised of professional contribution by academics, course assessment, and student records.

The e-portfolio system offers a number of benefits to teacher educators. It provides an online personal space through which one can record all the professional activity, networks, and interactions and it serves as a repository of digital items. Students will benefit from the e-portfolio system as it nurtures knowledge society skills, serves as a planning tool for learning, provides an online personal space that supports authoring, synthesizes and presents material for different purposes and audiences, captures dialogues and reflection on learning, and serves as a repository for digital artifacts.

Using practice-based evidence, the implementation team will also communicate the project plans that propose how the e-portfolio will be integrated in the faculty courses and processes. This also involves alignment of ITE course objectives with student needs and the affordances of the selected digital system to ensure identified learning outcomes. While engaging teacher educators, teachers and students in e-portfolio use, roles, and responsibilities will be clearly identified.

To ensure success, users should be well informed about the procured e-portfolio system and method of use. This involves evaluating the affordances of different e-portfolio systems, comparing the adopted system to those used by different institutions, and identifying strengths and weaknesses of each system. It also involves ensuring good alignment between the purpose, the tool, the suitability for different contexts of use, and

the intended outcomes. Users will be provided with an easy method to access the e-portfolio, whose layout will be customized to maximize ease of use.

b. Engage
A "middle-out model" will be adopted, with a competent coordinator (an academic specializing in technology-enhanced teaching and learning) animating an implementation core group, who will then manage the e-portfolio implementation program. The different stakeholders will be consulted to maximize uptake of the project. Discussions will be held with the faculty administration about the relevance of the e-portfolio framework to the faculty's vision about the major objectives of the project and the e-portfolio methodology, its alignment with the institution's strategic aims, and its implications on the administrative and academic processes of the faculty.

Faculty academics will be initiated gradually to integrating the e-portfolio system within their professional practice. Initially, the e-portfolio system will be piloted with a small group (6–8) of faculty/staff members from different departments who have a positive attitude towards technology. The e-portfolio methodology, the underpinning pedagogy, and the digital tools to be used will be introduced, considering the benefits of adopting this approach. This experience will then be extended to other small groups of academics. The same approach will be adopted by students by organizing them in small groups according to their area of specialization and using the e-portfolio both for the course work and the school-based experience. They will be consulted about the choice of the tool, its integration in the different aspects of the ITE course, and about the possibility for personalizing the interface and customizing their e-portfolios. While implementing the e-portfolio methodology in these small learning groups, the evolving experience will be discussed with the department heads to explore how the e-portfolio framework can be integrated in their respective departments.

One key factor in determining the successful engagement of stakeholders in this project is the facilitation of tool development and implementation. The Mahara 15.4 e-portfolio system will be proposed and this will be linked to Moodle, the virtual learning environment used by UoM, to ensure a single login to both systems. A customized, user-friendly Mahara interface will be developed through constant feedback from the various stakeholders. The e-portfolio system will eventually be linked to other student support services, including the eSIMS (electronic student information management system) and the graduate records office. Users of the e-portfolio system will be carefully guided to make a clear distinction between the e-portfolio and the Moodle VLE.

Towards the end of the initial piloting period, professional development sessions will be organized with the different faculty departments to extend facilitation of this implementation. At this stage, each department has to identify activities/course units to be structured in the e-portfolio. Both pedagogical and technical support in structuring units and learning activities within the e-portfolio framework will be provided.

c. Support
Throughout the implementation process, constant support will be needed for developing, designing, and aligning the framework with institutional and individual objectives. Early adopters will be assisted in designing e-portfolio-based learning activities, and they will then take the role of representatives in providing advice, support, and testimony. Tutors and

students will be organized into learning communities in which support is provided to develop innovative pedagogical practice, promote digital competence in working with the e-portfolio, and promote attitudinal change about working with technology. Support will also be provided to promote a learning design attitude that deals with the fundamental changes in curriculum design and delivery through this technology-enhanced system that enables ubiquitous access and learning.

Persons involved in this process will definitely encounter difficulty arising from new pedagogical strategies, new tools, and lack of self-efficacy. Since e-portfolio-based learning places the locus of control with the learner, this can conflict with established mind-sets and practice, leading users to lose control over the direction of learning. Learners might find the emphasis on reflection, inquiry, and collaboration characterizing the e-portfolio methodology equally challenging. Therefore, both tutors and learners will be given ample time to familiarize themselves with e-portfolio-based learning and will also be provided with any technical or pedagogical support required. Continuous support will be provided to help users align e-portfolio use with the institution's strategic and pedagogic aims.

d. Disseminate

A well-organized dissemination strategy, involving monitoring, reviewing, evaluating, and embedding is a key success factor. Consequently, regular feedback from the different stakeholders will be collected to identify new purposes for e-portfolios as well as to indicate where refinements to the existing service are required. The pilot and implementation process will be reviewed to identify the success factors and barriers for the different learning groups. At the same time, reviewing the structure of the developed e-portfolio through customized usability surveys and evaluating it alongside the adopted Virtual Learning Environment ensures that individual and institutional needs are being addressed.

The embedding of e-portfolio in coursework and in teaching practice will require the development of relevant policies that guide its use both within the Faculty of Education and in schools. Stakeholders will be organized into groups and supported in developing policy frameworks. Dissemination of the project and related support can be provided by representatives of different departments and areas of specialization.

5. Conclusion

The JISC e-portfolio implementation model provides a developmental framework that guides the challenging, multifaceted innovation process of integrating the e-portfolio framework into initial teacher education. It organizes the process into a sequence of decisions to be made and tasks to be executed. It is a valuable tool in the hands of educational innovators that guides them in promoting and managing a systematic change along different dimensions: epistemological, pedagogical, technological, and organizational. Consequently it serves as an excellent methodology to operationalize the Inquiring-Reflective Practitioner metaphor in teacher education.

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Investigating Irish prospective primary teachers' awareness of applications of the ratio concept: implications for teacher education

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Learning about ratio has been identified as problematic for many students and at least some teachers of mathematics, pointing to a need for appropriate teacher education in the area. In 2011, the Science and Mathematics Education RDC at ATEE initiated a multiple case study of prospective teachers' content knowledge of ratio for teaching mathematics and science. They designed an instrument, one item of which seeks information from the respondents on when they, and other people, use ratio. Data were collected in Ireland from graduates who were completing an eighteen-month Postgraduate Diploma course in Primary Teaching. This paper reports their responses to the item on awareness of uses of ratio, and suggests the need for Irish teacher education courses to emphasise relevant applications of ratio to everyday life. Comparisons are made with responses from groups in Portugal and the USA as part of the ongoing "ATEE Ratio Project."

Keywords: Ratio; applications; teachers' content knowledge; primary teacher education

Introduction

The topic of *ratio* is important in school mathematics curricula, not only because typically it appears explicitly in senior primary and second-level curriculum specifications, but also because it, and the allied areas of proportional thinking and multiplicative reasoning, are keys to the development of many mathematical concepts and skills. However, evidence (discussed below) points to ratio being problematic for many students and at least some teachers. In view of the importance of teachers' content knowledge for teaching (see for example Ball, Thames, and Phelps [2008]), the latter situation needs to be addressed through appropriate teacher education: first by ascertaining the extent of the problem and then by developing suitable approaches to improving the situation where necessary.

At the 2011 ATEE annual conference, the Science and Mathematics Education Research and Development Community initiated a multiple case study of prospective teachers' content knowledge of ratio for teaching mathematics and science. An instrument was designed to elicit the meanings that respondents ascribed to "ratio," the uses (both their own and other people's) of ratio that they identified, and the ways in which they represented the concept in particular by symbols and drawings. Data were collected at four institutions involved in teacher education, including one in Ireland, and the findings were reported at the 2012 conference (Berenson et al. 2013). The "ATEE Ratio Project" has continued as a cluster of case studies in different countries, with data being collected from several groups, again including ones in Ireland. The major focus in reports to date has been on documenting and comparing the meanings, representations and uses provided by the various cohorts of students, primarily for research purposes; however, attention has also been paid to using the instrument as a learning tool in teacher education classes.

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The study addressed in this paper is the first element of the Ratio Project to deal with Irish primary teacher education (for prospective teachers of children in grades preK-6). The findings with regard to meanings for and representations of ratio were reported at the ATEE annual conference in 2014 (Oldham, Stafford, and O'Dowd 2015). In the current paper, the *uses* of ratio described by participating students are investigated; the research questions address the uses and users identified by the Irish respondents and also the similarities and differences between these respondents and comparable groups from other case studies in the Ratio Project

The paper begins by describing the theoretical framework underpinning the Ratio Project and in particular the current paper. Context is provided by an account of the origins of the project and a summary of the work completed to date. The methodology and findings of the current Irish study are reported, and the paper concludes with discussion and consideration of implications for teacher education.

Theoretical framework
The three areas that provide a theoretical framework for the Ratio Project, and in particular for analyzing the data on uses of ratio, are *ratio as a problematic area in mathematics education*, *teaching and learning with understanding*, and *the role of applications*. They are discussed in turn.

Ratio as a problematic area in mathematics education
A starting point is provided by research carried out in the 1970s and 1980s by Hart and her team; it documents students' difficulties with ratio and other topics (Hart 1981, 1984; Hart et al. 1989). Subsequent important developments can be traced through the work of Lamon. In the early 1990s, she aimed to move research "beyond the level of identifying a litany of task variables that affect problem difficulty, towards the identification of components that offer more explanatory power for children's performances in the domain" (Lamon 1993, 42). Advances since that time are analysed in her major summary of research on rational numbers and proportional reasoning (Lamon 2007); while ratio *per se* is not the main focus, many relevant issues are included. More recent summaries provide further evidence that students in the middle years of schooling have poor understanding of ratio and proportional reasoning (see for example Livy and Vale [2011]), and suggest that the work of forming a ratio and reasoning proportionally is primarily a cognitive task, not an algorithm or a procedure (Ellis 2013) – an aspect taken up below.

Research also points to teachers' and prospective teachers' difficulties with ratio. Lamon (2007, 633), referring to research prior to 1995, noted that "Many adults… including middle school teachers … and preservice teachers … struggle with the same concepts and hold the same primitive ideas and misconceptions as students do." Indications of a continuing problem come for instance from Livy and Vale (2011), who found low levels of correct responses to relevant ratio and proportion test items in their study of 297 prospective primary teachers in the first year of their course; also, Chick's (2010) study of 40 practising secondary teachers identified deficiencies in their knowledge for teaching ratio.

Some of the problems with regard to ratio lie in the fact that the underlying concept is not always clearly defined (Lamon 2007), and terminology differs according to the cultural contexts. While the basic feature is that two quantities are compared, the relationships

allowed between the two quantities provide an area of confusion. For example, Suggate, Davis, and Goulding (2006) – writing in an English context – identify three common situations in which comparisons are made: part-part (ratio), part-whole (proportion) and whole-whole (scaling). By contrast, for instance, Hunter, Bush, and Karp (2014, 363) – primarily addressing an American audience – explicitly state: "a ratio can represent a part-whole, part-part, or whole-part relationship." Reflecting a closely argued debate on the issue, Clark, Berenson, and Cavey (2003) suggest that preference may be given to models clearly involving two distinct variables, such as those provided typically by part-part relationships, while part-whole relationships may be situated in the intersection between ratio and fraction. For the ATEE Ratio Project, described more fully below, meanings and representations *clearly reflecting two variables* are taken as better indicators of understanding than are those based on a part-whole concept, especially if the latter are presented alone.

The difference in cultural tradition provides a further area of confusion. Thus, Ellis (2013, 1), writing for the (American) National Council of Teachers of Mathematics, defines "a proportion" as "a relationship of equality between two ratios"; Suggate, Davis, and Goulding (2006), in line with usage in England, refer to "proportion" as the relationship of some part of the whole to the whole itself and do not use the terminology "a proportion." The Irish tradition is the same as the English in this respect (see for example NCCA [1999]).

Teaching and learning ratio with understanding
The foregoing discussion raises the issue of *understanding*. The National Research Council (NRC) (2001, 5) recommended that students should develop "mathematical proficiency," comprising both conceptual understanding and procedural fluency along with three other "strands." The current objectives of the Irish second-level mathematics curriculum (for grades 7-12) are formulated using this language (Department of Education and Science n.d. [2013]). In the Ratio Project, and in earlier versions of the Irish mathematics curriculum (Department of Education and Science n.d. [2000]), the language used was that of Skemp's (1976) seminal work on relational and instrumental understanding: the former dealing with reasons and relationships, the latter focusing on knowing what to do. While there has been much debate about the balance to be struck between the two forms of understanding, or equivalently between conceptual understanding and procedural fluency, research suggests that "a heavier emphasis on features related to conceptual understanding" is appropriate for teaching (Hiebert and Grouws 2009, 11). With regard to ratio, Ellis's (2013) conclusion that forming a ratio and reasoning proportionally is primarily a cognitive task, not an algorithm or a procedure, is in line with such thinking.

Two features relevant for developing students' relational understanding are meaning-making and the use of representations. The role of *meaning* with regard to understanding, and the varying emphases given to it during different periods of curricular change, was discussed by Hiebert et al. (1997); they saw meaning-making as crucial. *Representations* were addressed in the 1980s, for instance by Lesh, Post, and Behr (1987). By the turn of the twenty-first century, it was generally agreed that "use of particular modes of representations (e.g. visual or concrete) leads to improvement of students' mathematical abilities and development of their advanced problem solving and reasoning skills…. the use

of *multiple representations* facilitates students' development of mathematical concepts" (Pape and Tscoshanov 2001, 120, emphasis added).

Teacher knowledge is important here also. Work such as that of Ball, Thames, and Phelps (2008) examines the kind of content knowledge that teachers require in order to help their students learn with relational understanding, and identifies teachers' own relational understanding as one of several important factors. Barmby, Bolden, and Harries (2011) examine the role that representations can play in developing the confidence of prospective primary school teachers; of particular relevance to the present discussion is that they note problems related to proportional thinking.

The role of applications

Emphasis on the application of mathematics and problem solving in real life contexts has been the trend in mathematics education for many decades (Pollak 1979; Cockcroft 1982; NCTM 1991; Gravemeijer 1998; Blum 2002). Research suggests that teachers themselves need to have good understanding of the application of mathematical concepts to everyday life in order to support children's understanding. Pollak (1979), one of the pioneers of the debate on 'application and modelling' in mathematics education, highlighted the importance of teacher education including experiences involving application of mathematics. Blum contends that "Nearly all questions and problems in mathematics education, that is questions and problems concerning human learning and teaching of mathematics, affect and are affected by relations between mathematics and the real world" (2002, 150-151). Fuson and Abrahamson assert the importance of helping children relate ratio and proportion word problems to real-world situations to support them "in mathematizing the situations" (2005, 217). Thus, prospective teachers' ability to see the application of ratio and proportional thinking in the real world is of significant importance in their future teaching.

The Irish Primary School Curriculum for Mathematics has recognised the importance of application and has as its second aim "to develop problem-solving abilities and a facility for the application of mathematics to everyday life." Further, it sets as a broad objective that "the child will be enabled to… make mathematical connections within mathematics itself, throughout other subjects, and in applications of mathematics in practical everyday contexts" (NCCA 1999a, 12).

The ATEE Ratio Project

As pointed out above, the ATEE Ratio Project was initiated in 2011, chiefly to study prospective teachers' content knowledge of ratio for teaching mathematics and science. A one-page instrument was designed, consisting of four items that reflect the theoretical framework described above:

1. What does the term 'ratio' mean to you?
2. a. When do you use ratios?
   b. Who else uses ratios?
3. How do you represent a ratio using mathematical symbols?
4. Draw several representations of how ratios are used.

It was intended that the instrument would take only ten to fifteen minutes to complete, and so could be administered during lectures without causing much loss of teaching time. In 2012, data were collected at four institutions involved in teacher education: two in the USA, one in Ireland, and one (utilising an appropriately translated version of the instrument) in Portugal. Data on meanings and representations were analysed using a grounded theory approach, and three emergent themes were identified. Some descriptions or representations indicated or allowed the inference that the participants' concepts included the notion of *two distinct variables*; some appeared to refer to *uses or applications* or special types of ratio; and some related to *part-whole* relationships. Examples of key aspects to which participants referred in their responses to item 1 are given in Table 1.

Table 1. Emergent themes for participants' descriptions of the meanings they ascribed to ratio

Two variables	Uses / Applications	Part / whole
Comparison	Rate	Fraction
Relationship	Scale	Decimal
	Odds	Percent?
	Proportion	
	Division / splitting	
	Percent	

Analysis of the meanings and representations in the light of literature led to the conjecture that *participants who offered meanings reflecting two variables, and who provided many, varied, and relevant representations, possessed relational understanding of ratio* (Berenson et al. 2013). The joint analysis did not include data from item 2.

In subsequent case studies for the Ratio Project, emphasis has been on the percentage of respondents in (or responses from) the various groups falling into categories of interest, thus offering an insight into the general level of relational understanding and awareness of applications within the responding groups, rather than on attempting to label individual students as having or not having relational understanding. The main concern has been with teacher education; this is reflected in the fact that almost all the respondents for the original (2012) study were prospective teachers preparing to teach in primary or secondary schools. However, comparisons with different cohorts are also of interest. Thus, while some studies have focused only on students in teacher education or related courses (Fernandes and Leite 2015; Oldham, Stafford, and O'Dowd 2015), others have included responses from science majors (Price 2013, 2014), undergraduate mathematics specialists (Oldham and Ni Shuilleabhain 2014) and serving teachers (Price 2014). The reports by Price (2013, 2014) and Fernandes and Leite (2015) presented data from item 2.

The instrument has undergone some local modifications since its first use. However, item 2 has remained the same, except in the second Portuguese study; for this, item 2b was amended so that when translated into English it read "Who else uses ratios, and when do they use them?" (Fernandes and Leite 2015). Other developments considered for the project include introduction of an interview schedule (Berenson et al. 2013) and use of the instrument as a learning tool in teacher education classes (Oldham and Ni Shuilleabhain

2014). Recent work has focused on using the instrument to promote reflection among participants (Amit 2015).

Reports on Irish elements of the Ratio Project have highlighted that ratio has not been the subject of much Irish research, and that the topic is under-represented in the Irish curriculum (Oldham and Ni Shuilleabhain 2014). Analysis of the Primary School Curriculum for Mathematics (NCCA 1999a), reported by Stafford, Oldham, and O'Dowd (2015), found little explicit reference to ratio and no mention of the word "proportion" or "proportional." Within the Number strand (Fraction strand unit), ratio appears as a learning outcome for 6th class (ages 11-12 years); the learning outcome states that "[the] child will be enabled to … understand and use simple ratios" (NCCA 1999a, 90). The only other mention of ratio is in the glossary, where it is given a two-variable meaning, "Ratio: the relationship between two numbers of the same kind; e.g. the ratio of 2 kg to 6 kg is 2 : 6" (NCCA 1999a, 125). This definition seems to exclude examples such as the ratio of flour to butter in a recipe. Although the colon symbol is used in places, ratio does not feature explicitly in other strands and strand units of the curriculum such as data, probability and scale, which involve proportional thinking. Moreover, the ratio-related ideas fundamental to early work on multiplication and fractions, highlighted by Ellis (2013), are not made explicit in the teacher guidelines (NCCA 1999b).

Irish textbooks examined as part of the same study, and also reported by Stafford, Oldham, and O'Dowd (2015), were likewise limited in their presentation of ratio, which is addressed only in the chapters on fractions. Contexts such as fractions, sharing, unequal sharing, dividing, measures and unitary method are presented, but procedures are the main focus and there is very limited reference to applications. As in the curriculum documents, in the textbooks examined there is no mention of ratio in the chapters on probability, data and scale.

Methodology

This section describes the methodology for the current Irish case study and in particular for the aspect reported in this paper. As part of the ongoing Ratio Project, appropriate ethical clearance was obtained and data are being collected from prospective primary teachers. The students whose responses are used in this paper are graduates who were completing an eighteen-month Postgraduate Diploma course in Primary Teaching (for grades PreK-6) in 2014; they had varied academic backgrounds and, in particular, very varied levels of achievement in mathematics. Copies of the instrument – containing the four items described above – were distributed to the students toward the end of their course. This paper reports only on their responses to item 2:

    a. When do you use ratios?
    b. Who else uses ratios?

For each part of the item, two of the authors of this paper studied and tallied the responses separately, and then agreed on tentative categories. The authors proceeded to code the data independently, using these categories; the coding was checked and reconciled where necessary, final agreement being reached through discussion. When difficulties arose in judging what students meant by their responses, their entries for items 1, 3 and 4 were considered to help decipher the meaning.

The initial categories were grouped into broader ones to allow comparisons with data from partners in the Ratio Project; to guide this process, reference was made to the findings reported by Fernandes and Leite (2015) and Price (2013, 2014). The categorized data were then used to address the *research questions*:

- What personal uses and users did the Irish respondents identify for ratio?
- What are the similarities and differences between these responses and those from comparable groups of prospective teachers in the Ratio Project – specifically from groups in Portugal and the USA?

It should be noted that the purpose of the comparisons is to illuminate and prompt further research; the groups are not representative samples but the subjects of case studies, and the use of statistical techniques would be inappropriate.

Findings
Fifty-nine completed or partially completed instruments were collected. Many of the students' responses were simplistic, and reference to responses to items 1, 3, 4 was needed in order to help decipher the meanings; this helped in some instances, but in others the responses remained incomprehensible. Moreover, some students put a question mark after their entry, suggesting that they were not confident of their answer.   Despite these limitations, the coded data allowed the research question "What personal uses and users did the Irish respondents identify for ratio?" to be addressed and a comparative study to be made with responses from other groups in the Ratio Project.

Findings for the Irish prospective teachers
Among the Irish prospective teachers, the most popular answer for item 2a ("When do you use ratios?") was 'Comparing' at 32.2%, followed by 'Academic' (covering responses such as 'mathematics' and 'teaching') at 27.1%. The next highest frequency, 16.9%, referred to respondents who gave no answer or provided answers that were incomprehensible. 'Gambling / Betting / Horse Racing' was mentioned by 10.2% of respondents. Table 2 below shows the responses to each category by student and number of responses.

Table 2. Responses to item 2a: "When do you use ratios?"

Categories	Number of Students	% (N=59)
Comparing	19	32.2
Academic: mathematics, etc.	16	27.1
Stats. / Surveys / Research	11	18.6
Incomprehensible / No Answer	10	16.9
Cooking / Baking	7	11.9
Gambling / Betting / Horseracing	6	10.2
Dividing / Sharing	5	8.5
Sport	4	6.8
Maps	3	5.1
Business / Accounting	2	3.4

Some students showed clear understanding of personal application of ratio with responses such as: " Use ratio day to day doing things like cooking, baking e.g. two eggs to one cup of milk in a recipe (two ingredients)   eggs – 2 : 1 milk cup" (Student 2). However, other students' responses seemed not to demonstrate good understanding of application of ratio, and follow-up questioning of the students would have been needed to ascertain what exactly they meant. Examples include "Dividing tips in a restaurant" (Student 9); "When you wish to divide something, for example a bag of sweets between children" (Student 14); "When measuring?" (Student 12); and "To weight figures" (Student 24).

Likewise, in their responses to item 2b ("Who else uses ratios?"), many students showed good understanding of the applications of ratio in everyday life, but more than 30% of respondents did not provide a reasonable application; as with item 2a, some gave vague responses like "Friends, classmates, parents" (Student 36), suggesting poor understanding. Only 42% of respondents provided more than one reasonable application for ratio, but 22% provided three or more reasonable applications via responses such as "Doctors, teachers, accountants, quantity surveyors, everybody" (Student 16). 'Bookies / Betting / Horse Racing' was popular, being identified by just over 27% of respondents. Most applications were work related, and many may refer to the areas of the students' undergraduate degree subjects. The category 'other' included responses such as dressmaking, sports, food labels, teacher/pupil ratio, students, media, employers, and historians. Table 3 shows the number and percentage of responses to item 2b.

Table 3. Responses to item 2b: "Who else uses ratios?"

Category	Number of Students	% (N=59)
Incomprehensible / No Answer	18	30.5
Bookies / Betting / Racing	16	27.1
Statisticians / Analysts / Surveys	11	18.6
Professions	11	18.6
Other	9	15.3
Builders / Construction	7	11.9
Mathematicians / Scientists	6	10.2
Cooking / Baking	6	10.2
Everyone / Anyone	5	8.5
Policymakers / Govts. / Census	4	6.8
Researchers	3	5.1

Findings for the comparison study
The data collected in the Irish study for item 2 was compared with responses for item 2 in studies from the USA (Price 2013) and Portugal (Fernandes and Leite, 2015). As indicated

above, item 2b in the Portuguese study had an additional part: "and when do they use them?" Table 4 shows the number of students for each group.

Table 4. Number of participants by country

Country	Number of Students
Ireland	59
Portugal	81
USA	37

Categories for the three groups were generally similar for both parts of item 2, though with some variations possibly reflecting cultural differences. For example, 'Bookies / Betting / Horse Racing' was a frequent response in the Irish study for both parts of the item, while it did not appear in either of the other two studies. For item 2a, 'Agriculture' and 'Arts' featured in the Portuguese study, but did not appear in the Irish or United States study; 'Comparing' was the most popular use for the Irish and American cohorts, but was not considered by the Portuguese prospective teachers; however, 'Academic' contexts ranked highly for all groups, and 'Cooking / Baking' featured in all three studies. Table 5 shows a comparison of countries for item 2a.

Table 5. Comparison of prospective teachers' own use of ratios (Item 2a) {N= number of students}

Ireland	% N=59	USA	% N=64	Portugal	% N=81
Comparing	32	Comparing	41		
Academic: Mathematics, etc.	27	Mathematics Science School	28 7 5	Mathematics Physics / Chemistry	65 11
Statistics / Surveys / Researchers	19	Statistics	3		
Cooking / Baking	12	Recipes / Cooking	6	Cooking / Baking	2
Gambling / Betting / Horseracing	10				
				Shopping	5
				Arts	19
				Agriculture	2
Incomprehensible / No answer	17	Other	67	Does not specify	23

For item 2b, the most notable feature is that many students in the Irish and Portuguese studies did not provide a reasonable application for ratio. 'Bookies / Betting / Racing' was a popular response for the Irish prospective teachers, as was 'Builders / Construction,' but neither category featured for either of the other two groups. Table 6 shows a comparison of countries for item 2b.

Table 6. Comparison of prospective teachers' perceptions of people using ratios (Item 2b) {N= number of students}

Ireland	% N=59	USA	% N=64	Portugal	% N=81
Incomprehensible / No Answer	31			Incomprehensible / No Answer	28
Bookies / Betting / Racing	27				
Professions	19	Accountants Engineers Teachers Business	3 6 33 9	Business Law	11 2
Statisticians / Analysts / Surveys	19	Statisticians	9		
Other	27	Other	5	Other	16
Builders / Construction	12				
Mathematicians / Scientists	10	Mathematicians Scientists	9 17	Mathematics Science Human Sciences	23 25 12
Cooking / Baking	10	Cooks	3		
Everyone / Anyone	9			People	16

Discussion

The rather limited nature of the responses from the Irish students, and the lack of clarity as to what some of the responses mean, may reflect poor understanding of ratio and little awareness of its applications. However, several mitigating factors need to be considered. One of these is an element of ambiguity in item 2a; some students' responses are consistent with the interpretation that they took it to mean "When does one use ratios?" rather than "When do you personally use ratios?" Rewording item 2a in the latter form, and also using the revised version of item 2b from the Portuguese study – "Who else uses ratios and when do they use them?" (Fernandes and Leite 2015) – might elicit more detailed responses in future studies. A second factor is the time at which the data were collected: at the end of the teacher education programme. While this should allow the responses to reflect their completed studies in mathematics education, the period of administration may have come

when the students were focused on other end-of-programme activities and therefore not inclined to give of their best in responding.

With regard to the comparisons with the Portuguese and USA cohorts, it must be borne in mind that the elements of the Ratio Project are case studies and that the groups are not intended to be representative of their countries' students; the purpose is to obtain some insights that would prompt further research, rather than to undertake statistical analyses. However, mathematics education is inevitably set in a cultural context (Berenson et al. 2013), and some of the findings point to the influence of culture on respondents' awareness of applications. For example, the emphasis on gambling manifest in the Irish responses would be expected, as Ireland has a strong tradition and culture of horse racing, and betting on horses is enjoyed by people from all walks of life.

Conclusions and implications for teacher education

The study reported in this paper is one element of the ATEE Ratio Project, a multiple case study of prospective teachers' content knowledge of ratio for teaching mathematics and science. The study is the first Ratio Project element in Ireland to address prospective primary teachers. The focus here is on participants' responses to items asking about their own uses of ratio and their awareness of who else uses ratio. The majority of the Irish prospective teachers listed some ratio uses and users from everyday contexts. However, worryingly, many offered limited applications and were unsure of their responses; of even greater concern is the number who provided no reasonable applications of ratio.

The data provide a worthwhile, but limited, snapshot of Irish prospective primary teachers' understanding and awareness of the applications of ratio. The participants were graduates approaching the end of an eighteen-month diploma course qualifying them as primary teachers, and some of the students may have used little formal mathematics between the end of their own schooldays and the beginning of their (rather short) teacher education programme; hence, they may be more out of touch with mathematics than would students in an undergraduate teacher education programme. However, if the findings are typical of all Irish prospective primary teachers, then it can be said that Irish prospective primary teachers' understanding of ratio applications in real life is not strong enough to support primary school children's understanding and awareness of applications. The results suggest a need for more work in Irish primary teacher education programmes on ratio and its applications, with a particular focus on applications in everyday life. Further research is necessary to investigate what applications prospective primary teachers actually understand. The comparative element of the study – examining similarities to and differences from responses made by cohorts of students in Portugal and the USA – reveal considerable commonality but suggest some culturally influenced variations.

An ongoing part of the Irish study is the use of the instrument in think-pair-share mode during teacher education lectures, focusing on development (rather than just assessment) of relational understanding and its applications. Both approaches – reflective discussion and data collection – may be useful for future research. Hopefully they will lead to augmentation of the rather slight body of work done on the teaching and learning of ratio in Ireland, as well as contributing to the ongoing ATEE Ratio Project.

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Limitations in mathematical and pedagogical content knowledge among in-service and pre-service first- and second-grade mathematics teachers

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Little research exists in the literature regarding the mathematical content knowledge (MCK) and pedagogical content knowledge (MPCK) required by first- and second-grade mathematics teachers. The current study investigates the level of MCK and MPCK among first- and second-grade mathematics teachers and examines whether the training given to them provides them with an adequate level of knowledge. The sample includes 150 first- and second-grade in-service teachers, 75 pre-service teachers studying in the first year, and 75 third- and fourth-year students; the pre-service teachers all studied in the Early Childhood Education track. The data collected by the MCK and MPCK tests represented the four sub-domains: numbers, arithmetic operations, geometry/measurements, and word problems. The principal findings of the study indicate that all three groups possess limited knowledge of both MCK and MPCK in all sub-domains. Moreover, the lowest MCK mean was in the geometry/measurements domain, and the lowest MPCK mean was in the word-problems domain.

Keywords: Mathematical content knowledge, mathematical pedagogical content knowledge, mathematics teachers, pre-service teachers.

Context of the research

The first grade of primary school is critical for providing all students with a fundamental understanding of mathematics, thus preventing future difficulties and learning disabilities (Clarke, Doabler, Nelson, & Shanley 2015). Despite the importance of the role of mathematics teachers in the first and second grade, in Israel, these teachers generally receive training through the Department of Early Childhood Education and, more recently, in continuing education courses, which are not given until the end of the pre-school teacher training program. This track does not offer specialization in mathematics, but rather resembles the training in various other countries that allows first- and second-grade teachers to teach language, science, and mathematics (Akerson 2004; Cheang et al. 2007). The majority of education colleges in Israel offer, at most, two or three mathematics and mathematical education courses in their early childhood training programs. Likewise, Ginsburg, Lee, and Boyd (2008) reported that American colleges and universities offer only a minimal number of mathematics or mathematics education courses in their early childhood training programs, if at all. As a comprehensive study conducted in the United States has indicated, first- and second-grade mathematics teachers frequently lack mathematics specialization (Malzahn 2002). Little research exists in the literature regarding the mathematical and pedagogical content knowledge required by first- and second-grade teachers, a circumstance that reflects the assumption that teachers understand foundational topics such as addition and subtraction, whole numbers, and other primary subjects (Mewborn 2001).

Research aims

The primary goal of the current study is to discover the limitations in mathematical content knowledge (MCK) and pedagogical content knowledge (MPCK) of in-service first- and second-grade mathematics teachers and pre-service teachers who are studying in the Early Childhood Education track. It also seeks to compare the MCK and MPCK levels of in-service first- and second-grade mathematics teachers and of pre-service teachers in the initial and final stages of their training. In doing so, the study addresses the following questions:

1. To what extent do the first- and second-grade in-service mathematics teachers and pre-service teachers in the Early Childhood Education track have limitations in their MCK/MCPK?

2. To what extent are the MCK/MCPK levels of the in-service teachers different from the pre-service teachers during their initial and final stages of their training?

3. How are specific topic areas within each domain in MCK/MCPK distributed among first- and second-grade in-service mathematics teachers and pre-service teachers in the Early Childhood Education track?

Theoretical framework

Mathematical content knowledge (MCK) and mathematical pedagogical content knowledge (MPCK)

Content knowledge and pedagogical content knowledge (PCK) are key components of teacher competence that affect student learning (Kleickmann, Richter, Kunter, Elsner, Besser, Krauss, & Baumert 2013). The content knowledge includes the structure of knowledge, facts, theories, and principles in the field (Shulman 1986), in addition to knowledge regarding the historical development of central mathematical concepts and the relationship between the ideas, analogies, and images related to the various principles (Davis & Simmt 2006). MCK includes common content knowledge and specialized content knowledge (Ball, Thame, & Phelps 2008). The former relates to the content of the curriculum and includes recognition of terms and correct notions as well as the ability to read and write these notions correctly and perceive when the textbook gives an inaccurate definition. Specialized content knowledge refers to the knowledge and skills of teachers that surpass the mathematical knowledge of educated non-teachers (Delaney, Ball, Hill, Schilling, & Zopf 2008). It includes an understanding of mathematical structures, which enables the handling of tasks that require significant mathematical resources (Ball et al. 2008) and allows teachers to follow students' mathematical thinking, in addition to evaluating the validity of student-generated strategies and making sense of a range of student-generated solution paths (Hill, Ball, & Schilling 2008).

PCK is the knowledge needed to make subject matter reachable to students (Shulman 1986). It comprises an awareness of students' difficulties and misconceptions about the concepts being taught, comprehension of the various ways in which the content is taught and represented, and an understanding of the teaching methods that make learning easy or difficult (Shulman 1986). Ball et al. (2008) separated MPCK into two subcategories: knowledge of content and teaching, and knowledge of content and students. The earlier combines knowledge about teaching with knowledge about mathematics. Teachers need to

be aware of which examples are appropriate as a starting point and understand the instruction design, the diverse representations of the explanatory concept, and how to evaluate the advantages and disadvantages of these representations (Ball et al. 2008). The latter is a type of PCK that combines an understanding of students with expertise in mathematics; in other words, content knowledge is intertwined with an awareness of how students think, know, and learn this specific mathematical content (Hill et al. 2008).

In-service and pre-service teachers' MCK and MPCK
Little attention has been paid to the knowledge appropriate for first- and second–grade mathematics, which is manifested in the knowledge of the teachers teaching these grades (Mewborn 2001). Some findings have demonstrated that second-grade mathematics teachers show lower levels of MCK and less positive attitudes towards mathematics than their third-grade counterparts (Wilkins 2008). Malzahn (2002) noted that almost half of the second-grade mathematic teachers in her study reported that they felt a need for a higher level of content knowledge in the subjects they teach, stressing the importance of deepening their knowledge and their understanding of students' thought processes. This finding, corroborated by Van Steenbrugge, Valcke and Desoete's (2009) study, indicated that primary school mathematics teachers regard the subjects taught in the second-grade curriculum as more difficult than those taught in other grades. Similar findings were obtained in relation to the numbers domain by Ball (1988), who reported that although the teachers in her study could perform algorithms correctly, they struggled to explain the algorithmic principle and its relationship to the place-value. According to Jones (2000; cf. Swafford, Jones, & Thornton 1997), teachers also demonstrated limited knowledge of geometry/measurements, a domain that, to date, has attracted relatively little interest with far more studies addressing the numbers and operations domains (Tutak 2009; Mewborn 2001).

Despite their low MCK levels, pre-service teachers have shown a willingness to become effective mathematics teachers (Morris 2001; Stevens & Wenner 1996); the disparity between knowledge and levels of self-confidence seems to derive from misconceptions in various mathematics subjects (Morris 2001).

Method
Setting and participants
The sample comprised 300 subjects, all female, divided into 150 first- and second-grade in-service teachers and 150 pre-service teachers studying in the Early Childhood Education track, 75 first-year students, and 75 third- and fourth-year students. The pre-service teachers all were studying in the same college in the northern zone of Israel. The in-service teachers were selected by a three-stage cluster sampling method: in the first stage, cities and towns were randomly selected; in the second stage, 37 schools also were randomly selected; and in the third stage, teachers with over five years' experience in the selected schools were randomly selected.

The training process for first- and second-grade teachers
As noted above, although for many years first- and second-grade teachers could only train in the Early Childhood Education track in Israeli teacher training colleges, they can now also

receive continuing education courses at the end of their training in the pre-school track. Pre-service teachers generally take three courses in mathematics and mathematics education.

Most colleges offer courses in geometry and arithmetic. According to the syllabi, these courses cover different topics in geometry and arithmetic, which are included in the curricula for grades K–9. These topics include various concepts, rules, and content in geometry and arithmetic, such as points, lines, rays, angles, and planes as well as the definition and classification of figures and polygons, perimeters, and areas of geometric figures. They also cover systems of measurement, and congruent and similar triangles. In addition, the delineation of the rules for adding, subtracting, multiplying, and dividing whole numbers, primes and composite numbers, word problems, and fractions and decimals are also included.

MCK and MPCK assessment methods

A proper assessment of teacher knowledge is based on an examination of content knowledge in specific domains rather than on the number of courses taken (Ball, Lubienski, & Mewborn 2001). Numerous studies of MCK and MPCK of in-service and pre-service teachers were conducted using various methods. Some employed items from already-existing student tests such as the National Assessment for Educational Progress (NAEP) test, designed specifically for grades eleven and twelve (Stevens & Wenner 1996) and the Trends in International Mathematics and Science Study (TIMSS) test for grades four through eight (Wilkins 2008; Tatto et al. 2008). Other tests address specific topics or domains taught in a particular grade, or topics appropriate for two or more grades above. Southwell, White, Way, and Perry (2006) tested the mathematics knowledge of primary school teachers via tasks that involve four arithmetic operations: fractions operations, decimals, percentages, measurements, and word problems. The Learning Mathematics for Teaching (LMT) test employs tasks relating to grade eight in numbers, arithmetic operations, functions, and algebra; and relating to grades three through eight in geometry, as recommended by Hill, Rowan and Ball (2005). Tasks may also relate to the curricula of higher grades (Goulding 2003).

The components used to assess MPCK also differ. Several studies have utilized items relating to different domains. Cheang et al. (2007), for example, employed sixteen items relating to numbers, geometry, algebra, and data processing. Others focused on the MPCK of specific mathematical topics (such as the mathematical knowledge of first- and third-grade teachers) by analyzing the solution strategies adopted by their students to solve arithmetic operations (Hill, Rowan, & Ball 2005). Alternatively, the MPCK of first-grade teachers was assessed by testing their ability to distinguish difficult problems, their general knowledge of strategies, and their specific knowledge of the strategies their students adopt to solve subtraction and addition word problems (Peterson et al. 1989).

Data in the current study were collected using two tools (a MCK test and a MPCK test), with the items on each representing the four sub-domains studied in first and second grade: numbers, arithmetic operations, geometry/measurements, and word problems. Some of the items were written by the researchers while the remainder were collected from other sources, including teacher evaluation projects, Ministry of Education tests of teacher professionalism, and other various studies.

MCK test

The MCK test was structured along the lines recommended by Ball et al. (2001), who stress that assessment should relate to subjects that the participant is currently teaching or hopes to teach in the future. It consists of 25 items, representing four sub-domains: numbers, arithmetic operations, geometry/measurements, and word problems.

In what follows, we present in Tables 1-4 all different items in each sub-domain that were included in the MCK test.

Table 1

MCK numbers' sub-domain items

Item	Source
Ms. Dominguez was working with a new textbook and noticed that it paid more attention to the number 0 than the old book. She came across a page that asked students to determine whether statements about 0 were true or false. Intrigued, she showed them to her sister—who is also a teacher—and asked her what she thought. Which statement(s) should the sisters select as true? Mark YES, NO, or NOT SURE for each item below: <table><tr><td></td><td>Yes</td><td>No</td><td>Not sure</td></tr><tr><td>a) 0 is an even number</td><td></td><td></td><td></td></tr><tr><td>b) 0 is not really a number but a placeholder in writing large numbers</td><td></td><td></td><td></td></tr><tr><td>c) The number 8 can written as 008.</td><td></td><td></td><td></td></tr></table>	(Hill et al. 2004)
258a2 is a 5-digit number; "a" is the tenth digit. What could be "a" if the given number is divided by 2? Write all the possibilities.	Ministry of Education professionalism test
Given that all the digits in a 3-digit number are even and equal, is the given number divisible by 10 without a remainder? Explain your answer.	Ministry of Education professionalism test
If k is the unit's digit of a three-digit number ($k \neq 0$), the tenth digit is twice as much as the unit's digit and the hundredth digit is three times as much as the unit's digit. What is the correct algebraic expression of this number? a) $3k + 2k + k$ b) $300k + 20k + k$ c) $100k + 20k + 3k$ d) Another answer	Ministry of Education professionalism test
Explain why, when adding an even number to an odd number, the result is an odd number. Explain in two different ways, if possible.	Researchers

Table 2
MCK arithmetic operations' sub-domain items

Item	Source
If "a = 685–269," complete the equation 785–169 = ☐ by using "a"	Ministry of Education professionalism test
Let N be a positive integer. If you divide this number by 2, you get a remainder 1. If you divide this number by 3, you get a remainder 1. If you divide this number by 6, you get a remainder 1. What is the smallest number that has all these three properties?	Ministry of Education professionalism test
Use the numbers 3,4,6, and 9. Write them in the following squares in order to get the greatest result. $+\begin{array}{cc}\square & \square \\ \square & \square \end{array}$	Researchers
Use the numbers 3,4,6, and 9. Write them in the following squares in order to get the smallest positive result. $-\begin{array}{cc}\square & \square \\ \square & \square \end{array}$	Researchers

Given the following multiplication exercise, write the missing numbers in the two empty squares.	Researchers
3 □ X 5 ────── 1 6 ?	
If 4 × m = k, (Circle the correct answer) a) m is a multiple of 4. b) k divided by m is 4. c) m divided by k is 4. d) all of the above answers are wrong.	Researchers

Table 3

MCK geometry/measurements' sub-domain items

Item	Source
The following figure describes a balance, with a bag of oranges and standard masses in both pans. The two sides are balanced. What is the weight of the bag of oranges? Oranges 50 gr $\frac{1}{2}$ kg 3 kg	Ministry of Education professionalism test
Dina drew a rectangle and reflected it along one of its sides. The combination of the rectangle and the reflection produced a square. Was the reflection along the long or the short side of the rectangle? Explain your answer.	Ministry of Education professionalism test
Given a shape with a grayed area. Sketch network lines with a different form (different pattern) that has the same area of the given shape.	Ministry of Education professionalism test
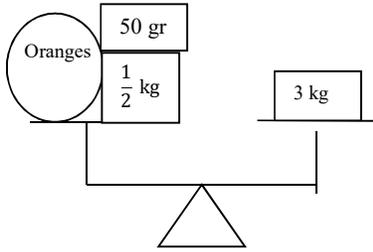
149

In each net drew a rectangle with a vertex laying in a point of the net and one of its edg is on the drawn segment. . . . . / . . . . \ . . . . / . . . . \	Ministry of Education professionalism test
If a square is separated into two parts by a straight line, which polygon with the largest number of sides may you get?	Researchers
The above figures are cover faces (without the bases) for three solids. Can you know what the solids are?	Ministry of Education professionalism test
Write the dimensions of a box whose volume is three times the box drawn below. cm 1 cm	Ministry of Education professionalism test
Given a triangular pyramid and triangular prism that have congruent bases, if we glue the base of the pyramid to the base of the triangular prism, vertex-to-vertex, we get a polyhedron. A. How many vertices does the polyhedron have? _____ vertices. B. How many sides does the polyhedron have? _____ sides. C. How many faces does the polyhedron have? _____ faces.	Ministry of Education professionalism test
How many centimeters are there in 1.5 m?	Researchers
How many meters are there in 250 cm?	Researchers
A game began at 11:30 and ended at 14:15. How long did the game last?	Researchers
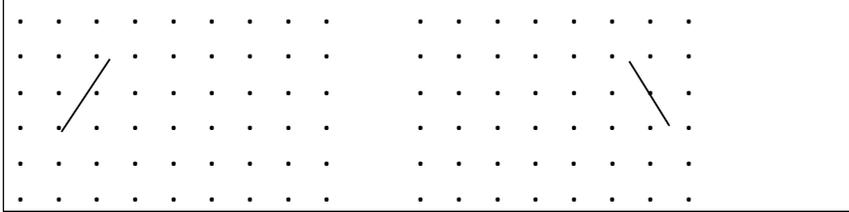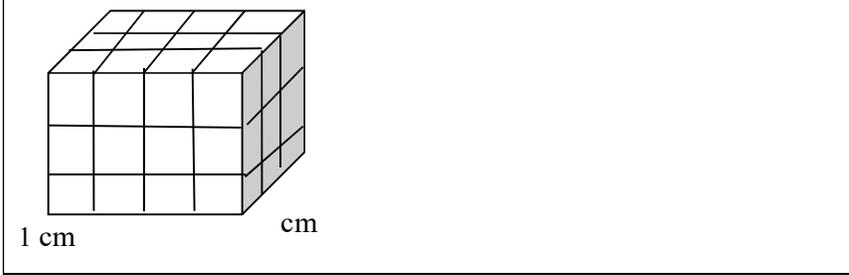
Table 4

MCK word problems' sub-domain items

Item	Source
The difference between two numbers is 72. What is the larger number if the smallest is 123?	Researchers
The son's age is 29; the father is 32 years older than his son is. How much is the sum of their ages?	Researchers
Rami bought 3 kg apples and paid for them with N Shekels. Simon also bought apples at the same store, and he paid 40 Shekels. What was the quantity of apples that Simon bought? Express your answer using N.	Ministry of Education professionalism test

Validity and reliability of the MCK test

The validity was examined by experts in mathematics education and by expert teachers. Cronbach's α for the overall test was high (0.89). For the numbers sub-domain, α= 0.65; for the arithmetic operations sub-domain, α = 0.68; for the geometry/measurements sub-domain, α = 0.88; and for the word problems sub-domain, α = 0.74.

MPCK test

The items used to assess MPCK, as proposed by Cheang et al. (2007), include comprehension of mathematical structures and relationships, understanding of difficulties, misconceptions, student solution strategies and suitable responses, knowledge of alternative teaching methods and the representation of various explanatory concepts. The 16 items represent four sub-domains in Tables 5-8

Table 5

MPCK numbers sub-domain items

Item	Source
The teacher showed her students many patterns of numbers from zero to 10 (shown above), and asked her students to represent the number 27 used the patterns. Rami chose two patterns and ordered them in the following way: Explain Rami's solution. Which pattern would you choose?	(Losq 2005)
The teacher presented the series "90, 63, 38, 7" to the students and asked them to circle the even numbers. In checking the answers, she discovered that one of the students did not circle any of the numbers. A. What does this fact reveal regarding the student's understanding of the odd-even domain? B. What numbers would you present to test a student's understanding of the nature of even numbers?	(Ball & Bass 2000)

Table 6

MPCK arithmetic operation sub-domain items

Item	Source
Mrs. Jackson wants to work with groups of students who are making the same kind of mistake. When she looks at a recent quiz to see how they approach the problem, she sees these three miscalculations:	III II I 1 1 1 32 45 38 14 + 37 + 49 + 19 29 65 64 101 142 Which contain the same kind of error? (mark ONE answer only): a) I and II b) I and III c) II and III d) I, II, and III	(Hill et al. 2004)

Mrs. Jackson wants to work with groups of students who are making the same kind of mistake. When she looks at a recent quiz to see how they approach the problem, she sees these three miscalculations:
 	
             III   II   I
 	
    4 12   4   15   6 9 8 15
    5 0 2   3 5 0 0 5   7 0 0 5
    - 6   -   6   -   7
    ———   ———   ———
    4 0 6   3 4 0 0 9   6 9 8 8
 	
Which contain the same kind of error? (mark ONE answer only):
a) I and II
b) I and III
c) II and III
d) I, II, and III
	LTM learning mathematics for teaching

One student uses the following method to solve a subtraction exercise.
 	
     3 7
  -
     1 9
    - 2
    2 0
    1 8
 	
How do you think the teacher should respond?
   a) Tell the student the method works only in this exercise but not in other exercises.
   b) Tell the student it is not correct method according to the logic of mathematics.
   c) Tell the student to test this method on all the numbers in subtraction exercises.
   d) Tell the student that the method only works in certain exercises.
	(Ball & Hill 2002).

Rami solved the multiplication problem in the following way:
 	
     2
    3 5
       x
     4
    2 0 0
 	
Explain how Rami solved this exercise.
	(Kamii & Dominick 1998)

Rank the following exercises according to their first-grade learning sequence: 12 + 4 = ? 4 + 3 = ? 8 + 4 = ?	Researchers

Tammy solved the addition exercises, some of them in the right way and some in the wrong way, as described in the exercises below:
 	
    85   42   8   18   46
+   +   +   +   +
  6   56   16   30   3
 19   98   15   48   13
 	
What is the answer to the sixth exercise according to Tammy's strategy?
 	
       72
     +
        5
	Lim-Teo, Chua, Cheang & Yeo 2007)

A pupil solved the following exercises:
 	
    604   546   648
    -        -   -
    238   308   217
    434   242   431
 	
Explain her strategies.
	Ministry of Education professionalism test

Given the exercise: 3 + 12 : 3 – 2 x 2 = suggest three solutions students may mistakenly offer.	Researchers

Table 7

MPCK geometry/measurements sub-domain items

Item	Source
Rami, Dani, and Sami calculate the perimeter of the following shape. Rami's response was 28. Dani's answer was 26. Sami's response was 27. Explain how each student has calculated the perimeter?	Researchers
A student claimed that the two paths AB and GH are equal. Explain the student's comparative strategy.	Researchers

Rami is required to complete the following shape as a 6-sided polygon. Rami completed it as a 5-sided polygon with 6 vertices. However, he was sure that he had drawn a polygon with six sides and six vertices. Complete the shape from Rami's perspective.	Researchers
When teaching children about measurement for the first time, Mrs. Ho prefers to begin by asking them to measure the width of their book first using paper clips and then using pencils. Why do you think she prefers to do this rather than simply teaching the children how to use a ruler?	(Lim-Teo et al. 2007)
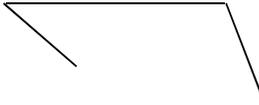
Table 8
MPCK word problems sub-domain items

Item	Source
Write six word problems represented by six given number sentences: 5 + 7 =? 6 +? = 11 ? + 4 = 12 13 – 4 =? 15 –? = 9 ? – 3 = 9	(Carpenter, et al., 1988)
Sort the division word problems for the second grade into two categories. What characterizes each category?	Researchers

Validity and reliability of the MPCK test
The validity was examined by experts in mathematics education and by expert teachers The Cronbach's α for the overall test was high (0.90). For the numbers, α = 0.70; for the arithmetic operations, α = 0.680; for geometry/measurements, α = 0.70; and for word problems; α = 0.88.

A correct answer gained one point, and incorrect answers and non-responses gained zero points. Five scores were calculated for each participant for each test: overall score, numbers score, arithmetic operations score, geometry/measurements score, and word problems score. The total was derived from ten scores.

Procedure
The in-service teachers performed the tests during the school year, the first-year pre-service teachers performed the test in the first month of the academic year, and the third- and fourth-year pre-service teachers performed it in the last month of the academic year. Both tests were administered individually at one-week intervals. While no time limitation was

imposed for completion, each test required an hour on average. The in-service teachers' tests were administered at the beginning of the school day, and some participants were asked to complete it before the end of the day. The pre-service teachers' test was administered as part of a regular lesson.

Findings

Our findings concentrate on the differences between the three research groups with respect to MCK and MPCK. In addition, the findings include the differences between the four domains: numbers, arithmetic operations, geometry/measurements, and word problems in both MCK and MPCK. Moreover, in each domain (numbers, operations, etc.), we present participants' performance on different specific topics.

MCK

The findings indicate that for the overall MCK test, in-service teachers displayed a mean of 64 (on a scale of 0–100), third- and fourth-year pre-service teachers displayed a mean of 46, and first-year pre-service teachers showed a mean of 36 (Figure 1). Moreover, Figure 1 clarifies the diversity between several groups in each sub-domain; it is clear that the number sub-domain gains the highest mean (for all the groups), while the geometry sub-domain gained the lowest mean for all.
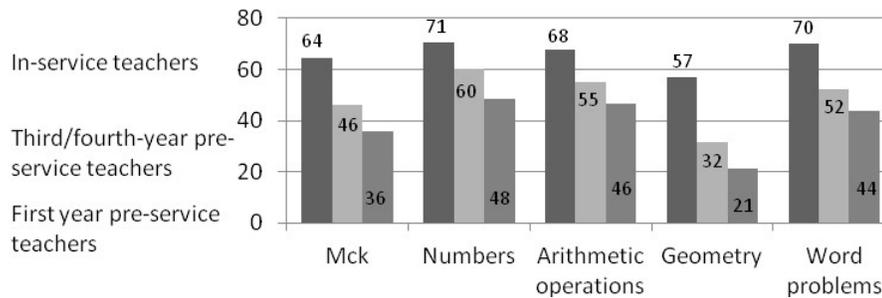
Figure 1. The mean of the three research groups in the four sub-domains.

The findings obtained from the one-way ANOVA indicate that the differences in MCK in general and in each domain individually were statistically significant (see Table 9).

Table 9. Results of One-Way ANOVA for MCK.

	F	Df
MCK	62.07*	(2,297)
Numbers	33.07*	(2,297)
Arithmetic operations	18.14*	(2,297)
Geometry	61.31*	(2,297)
Word problems	24.06*	(2,297)

*p<.001

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The source of the disparity between the groups in the MCK and in all domains was the in-service group. The differences between the two groups of pre-service teachers was only significant in the MCK and in the numbers and geometry/measurements domains (separately), as demonstrated by the post hoc Scheffé test. The lowest MCK domain between the three groups was the geometry/measurements mean. The paired-samples t-test demonstrated a significant difference between the geometry/measurements mean and each of the other three MCK domains.

MCK in specific topic areas

In this section, we present the means of specific topic areas in each sub-domain. As was mentioned in the instrument section, each sub-domain included several specific topic areas, as clarified in Table 10, column 2.

For each sub-domain, we computed the mean and the standard deviation (SD) among all research participants (N=300). The findings indicate that the lowest MCK mean was in the "solids" topic area, and the highest MCK mean was in the "addition operation" topic area. The means for all the topic areas are presented in Table 10. The topics "the zero feature" and "divisibility" were the dominant topics in the number sub-domain while the other topics in this sub-domain had similar means (Table 10). As mentioned earlier, the "addition operation" was the dominant specific topic; it gained the highest mean while the three other specific topics in the arithmetic operation sub-domain were similar and significantly different from the "addition operation." The highest means in the measurements sub-domain were gained by the "time" and "area" specific topics, which were significantly similar, and significantly different from the three other specific topics in this sub-domain (length, volume, and weight); moreover, Table 2 points to the low means (which include the lowest mean of all) in the other geometry topics: polygons, solids, spanning, and reflection). Finally, Table 10 emphasizes the significant difference between "addition and subtraction" word problems and "multiplication and division" word problems.

Table 10. The mean (on a scale 0–100) and SD of MCK specific topics and operation.

Domain	Subject		Mean	SD	N
Number	Zero features		72	27	300
	Odd and even numbers		30	45	300
	Digits value		33	47	300
	Numbers divisible by 2, 5, and 10		74	43	300
Arithmetic operations	Addition		83	37	300
	Subtraction		58	37	299
	Multiplication		56	50	300
	Division		53	49	299
Geometry and measurements	Measurements	Length	58	49	299
		Time	7	45	298
		Volume	32	47	299
		Area	73	45	300
		Weight	57	49	300
	Polygons		47	37	300
	Solid		20	40	299
	Spanning		38	48	299
	Reflection		44	49	300
Word problems	Word problems, including addition and subtraction		74	43	299
	Word problems, including multiplication and division		29	45	299

MPCK

The findings demonstrate that the general MPCK mean was lower than the MCK mean in all the domains in all the groups (Figures 1 and 2). The highest mean of 55 (on a scale of 0–100) was observed among in-service teachers; third-and fourth-year pre-service teachers showed a mean of 22, and first-year pre-service teachers had a mean of 17.
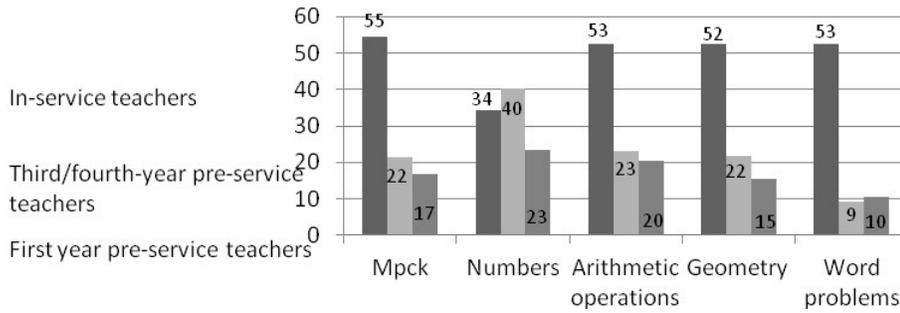
Figure 2. The mean of the three research groups in the four sub-domains.

The results of the one-way ANOVA indicate that the differences in MPCK in general and in each domain individually are statistically significant between the groups (see Table 11).

Table 11: Results of One-Way ANOVA for MPCK

	F	Df
MPCK	85.30*	(2,294)
MPCK Numbers	30.61*	(2,294)
MPCK Arithmetic Operations	50.49*	(2,293)
MPCK Geometry	53.43*	(2,293)
MPCK Word problems	95.22*	(2,293)

*p<.001

The source of the disparity between the groups in the MPCK in general and in all domains individually was the in-service teacher group. The sole significant difference between the two groups of pre-service teachers lay in the numbers domain, as demonstrated by the post hoc Scheffé test. The lowest MPCK mean was found in the word-problems domain. The paired-samples t-test indicates that the differences between the word-problem mean and the other MPCK domains were significant among the pre-service teacher groups, but not among the in-service teachers.

MPCK in specific topics and operation

In each domain, we computed the mean and the SD among all participants (N=300). The findings indicate that the lowest MPCK mean was in polygons, and the highest MPCK mean was in digits value. The mean of all the domains is presented in Table 12. It is worth pointing out the low mean general tendency; in other words, the highest specific topic mean was only 51.

Table 12. Mean (scale 0–100) and SD of MPCK specific topics and operations.

Domain	Subject		Mean	SD	N
Number	Odd and even numbers		29	45	293
	Digits value		51	50	296
Arithmetic operations	Addition		33	31	296
	Subtraction		43	44	297
	Multiplication		47	50	295
	Ordering of arithmetic operation		29	45	293
Geometry and measurements	Measurements	Length	40	40	296
		Perimeter	50	50	296
	Polygons		10	30	294
Word problems	Word problems, including addition and subtraction		34	36	296
	Word problems, including division		14	35	294

Discussion

The study findings indicate limitations in both MCK and MPCK among first- and second-grade in-service teachers and pre-service teachers studying in the Early Childhood Education track (both those at the beginning of their studies and those in their final year), with respect to the contents taught in first and second grade. This result is consistent with Malzahn's (2002) study, according to which almost half of the second-grade teacher participants reported feeling the need to improve and deepen their mathematical and pedagogical content knowledge. And consistent with findings from the extensive research into MCK and MPCK, many in-service and pre-service mathematics teachers exhibit very low levels of both, as evident in their poor grasp of mathematical concepts, subjects, and components (Livy & Vale 2011; Tutak 2009). This level in MCK and MPCK may be attributed the participants' failure to remember school-level mathematics (Hamlet 2007), or to a general weakness in mathematics.

The differences in MCK and MPCK among third- and fourth-year pre-service teachers and first-year pre-service teachers were only significant in some domains, which might suggest a deficiency in their training. A comparison between in-service teachers' MCK and MPCK indicates that the MPCK mean was higher than at the end of their training; similar findings were addressed by Kleickmann, Richter, Kunter, Elsner, Besser, Krauss, and Baumert (2013), who indicated that experienced in-service teachers showed almost the same MCK scores as student teachers at the end of their training. This disparity may result from experiential learning on the job (Cheang et al. 2007). In order to address this, Friedrichsen et al. (2009) added two other factors: teachers' own K–12 learning experiences and professional development programs.

The lowest score among the three research groups was found in the geometry/measurements MCK, a finding consistent with and highlighted in other studies conducted among teachers (Jones 2000; Baturo & Nason 1996). This result may also reflect a lack of knowledge and poor academic training (Jones 2000), with novice teachers expected to teach the subject based on the geometry they learned in high school.

The predicted research finding regarding geometry/measurements was confirmed, showing that pre-service teachers are reluctant to teach geometry during their practicum periods. Inadequate training in geometry/measurements may influence the attitude of teachers towards the subject, and their reluctance to teach it may adversely affect their students' geometric abilities (Tutak 2009) and explain why geometry is often ignored in early education (Sarama & Clements 2009).

The weakest domain in MPCK was word problems. Participants exhibited a greater capacity to solve word problems and a decreased ability to deal with tasks relating to writing word problems in specific exercises, particularly in cases in which the initial number is unknown. They also demonstrated difficulty in sorting division problems, despite the fact that both types form part of the second-grade curriculum. The findings of the present study in this regard are consistent with those of Carpenter et al. (1988).

The two weakest MCK and MCPK domains among the in-service teachers were also the weakest among the pre-service teachers. The latter regarded word problems as a difficult subject (Rogers 2004), with geometry/measurements ranking as the weakest domain among students from different countries who participated in the TIMSS (Tatsuoka, Corter, & Tatsuoka 2004). The correlation between teachers' knowledge and students' achievements is verified in the literature (Hill et al. 2005; Peterson et al. 1989). While numbers is viewed as the strongest MCK and MPCK domain among the three study groups, the level of knowledge in this domain is also relatively poor. The findings demonstrate that the numbers domain forms the basis of all the other domains.

The current study findings regarding the low levels of in-service and pre-service mathematics teachers' MCK and MPCK has been highlighted in various studies (Amarto & Watson 2003; Morris 2001), and they emphasize the need to reinforce MCK in teacher-training programs and continuing education courses for teachers (Tutak 2009; Hill et al. 2005).

Conclusions and implications for teacher education

The study's results highlight the importance of revising the professional development programs of first- and second-grade mathematics teachers. In addition, they emphasize the need to expand the program of the Early Childhood Education track by adding courses in mathematics and mathematics education courses. Mathematics and mathematics education courses should deal with the mathematical and pedagogical content aspects of first- and second-grade curricula and should offer special intervention programs in various mathematics domains, particularly in geometry/measurements and word problems, the two domains considered the weakest areas by both in-service and pre-service teachers. The recommendation of introducing enrichment courses is based on the findings of other studies, which have indicated that first-graders demonstrate higher levels of achievement in reading and mathematics in schools where teachers report increased coursework in these subject areas during their training (Croninger, Rice, Rathbun, & Nishio 2007).

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Experiences as knowledge in teachers` professional development

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Professional development should be a continually ongoing process in higher education. This demands insight into how knowledge management, among both teachers and teacher educators, can be enhanced and developed. We aim here to focus on how learning can be transformed into knowledge so as to affect the discussion within teacher education. We ask how we should go about ensuring that teacher education programs prepare future teachers, through dialogue and reflection, to transform concrete experience into learning, resulting in knowledge that becomes a part of ourselves. This paper aims to discuss the research question: "How may teacher educators and teachers transform their experiences into knowledge?"

Keywords: Experience, reflections, learning, transformation, knowledge, process.

Introduction to the topic

Teacher educators and teachers are often challenged to teach and work within complex and changing contexts. Their work is often structured in a manner that requires individual teachers to teach groups of students. In other words, when a lot of their teaching is planned down to the hour, many teachers spend most of their time in the class-room teaching without the presence of other teachers.

The result can be that valuable knowledge that teachers develop remains with the individual and are seldom shared with colleagues. It can also mean that experiences remain just as experiences without being transformed to knowledge, omitting the role of reflection and shared reflection required to connect these experiences to theory.

This paper examines how to enhance teachers` knowledge management, by drawing on Kolb`s (1984/2015) understanding of the learning process as a way of transforming experiences into knowledge. He uses the term "experiential" as a way to describe a theoretical perspective on individual learning. This theory might help explain how experience can be transformed from learning to knowing. As such, the theory might also be used by teacher educators and teachers to revise, add to and change their knowledge and skills when needed.

Although organisational literature to some extent has dealt with continuity in teachers' learning, I will argue that it is necessary to focus on how teacher educators and teachers, through experiential learning, can open up for collaborative learning communities through which all those participating can achieve good knowledge outcomes. Collaboration should contribute to an understanding of how professional development is a continually ongoing

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process throughout a long working career. This understanding will affect how we as teachers challenge our ability to transform experience into knowledge and facilitate learning in daily life. It is essential that we, on the basis of the knowledge we acquire in these processes, can develop further skills by sharing them with colleagues and students. These processes can be the building blocks in an organisation that continues to learn.

Research question

In this paper the research question is addressed theoretically but the question will also be highlighted by interviews where students from our practical teacher training (PPU) tell us about their own experiences with learning. The research question is: "How may teacher educators and teachers transform their experiences into knowledge?"

Theoretical framework

Traditionally, teacher educators and teachers have many tasks and a tight timetable in their daily work. If it is not considered highly important that experiences are shared, there will be other and often more practical tasks that receive priority in the, usually, short amount of time available for teachers to work together.

Presumably this means that a lot of valuable experiences will never be shared among colleagues, and knowledge being developed will remain with the individual.

Kolb uses the term "experiential" about learning for two reasons. The first is to tie it clearly to its origins in the work of John Dewey (1938), Kurt Lewin (1951) and Jean Piaget (1971), whom he claims as the foremost intellectual ancestors of experiential learning theory. The second reason is to emphasise the central role experience plays in the learning process. The theory offers a foundation for an approach to education and learning as a lifelong process based in traditions of social psychology, philosophy and cognitive psychology where Kolb emphasises the importance of the work of Carl Jung (1960), Erik Erikson (1959) and Carl Rogers (1951).

According to Dewey, experiences consist of a complex relation between cognitive, social and emotional aspects (Ertsås & Irgens 2014). "I take it that the fundamental unity of the newer philosophy is found in the idea that there is an intimate and necessary relation between the process of actual experience and education." (Dewey 1938, p. 19, 20). Dewey explicitly discusses the development in the learning process by describing how learning transforms from concrete experiences, through observation and reflection towards a generalisation from analysed data, resulting in knowledge that becomes a part of ourselves. "…As an individual passes from one situation to another,….what he has learned in the way of knowledge and skill in one situation becomes an instrument of understanding and dealing effectively with the situations which follow. The process goes on as long as life and learning continue" (Dewey 1938, p.35, 44).

Kurt Lewin (1951) emphasises a similar process for us where observations are assimilated into a kind of theory from which new implications for action can be formed. The process happens through testing knowledge in new situations where the learning process can be verified.

Kolb himself focuses on this working definition of learning: "Learning is the process whereby knowledge is created through the transformation of experience" (Kolb 1984, p.26).

The definition emphasises several critical aspects of the learning process as viewed from the experiential perspective:

- The process of adaption and learning as opposed to content or outcomes.
- Knowledge is a transformation process being continuously created and recreated.
- Learning transforms experience in both its objective and subjective forms.
- To understand learning, we must understand the nature of knowledge and vice versa. (Kolb 2015, p. 49).

Kolb makes the point that learning is best conceived as a process, not in terms of outcomes. Ideas are not fixed and immutable elements of thought but are formed and reformed through experience. Learning is described as a process whereby concepts are derived from and continuously modified by experience. In this process, learning occurs through the active extension and grounding of ideas and experiences in the external world and through internal reflection about the attributes of these experiences and ideas.

Knowledge, according to Dewey (1938), can be the result of a transformation of a problematic situation to a manageable situation. Knowledge can give us the possibility to understand and explain answers. This ability does not necessarily make it easier to solve problems, but it provides a direction for how to work with them.
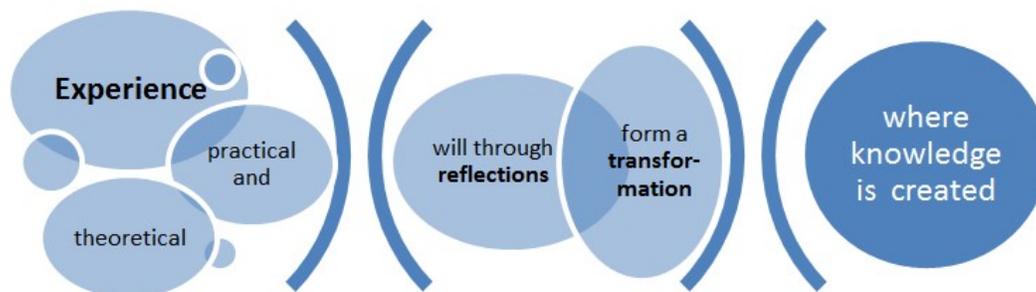
fig.1 Experience, reflection, transformation, knowledge

Let us share knowledge together
Kolb (1984 / 2015) builds his theory out of an understanding that experiential learning offers an approach to education and learning as a lifelong process. His theory is based on intellectual traditions of cognitive and social psychology and philosophy. This means that a learning process should contain experiences that are shared and interpreted through dialogue and reflection with others, and that this process can be the missing link between theory and practice. "..our survival depends on our ability to adapt not only in the reactive sense of fitting into the physical and social worlds, but in the proactive sense of creating and shaping those worlds" (Kolb 1984, p.1).This process of experiential learning focuses on how learning takes place through a transformation of experience to knowledge. Traditionally, in higher education in Norway, teacher educators and teachers have been more concerned about what students should learn than how they learn.

Furthermore, Kolb (ibid) insists that experiential learning provides a framework for examining and strengthening critical linkages between education, work and personal development.

> *"Experiential learning theory offers a fundamentally different view of the learning process from that of the behavioral theories of learning based on an empirical epistemology or the more implicit theories of learning that underlie traditional educational methods, methods that for the most part are based on a rational idealist epistemology. From this different perspective emerge some very different prescriptions for the conduct of education, the proper relationships among learning, work, and other life activities, and the creation of knowledge itself"* (Kolb 1984:20).
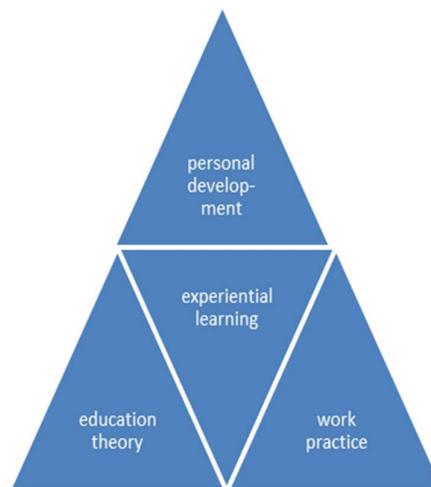
fig.2 Kolb (1984, p.4)

This model illustrates linkages between theory, work practice and our own personal learning opportunities. There are two aspects to this learning model:

1. It emphasises the role of here-and-now concrete experiences in validating and testing abstract concepts. In this model, personal experiences are the focal point for learning, giving life, texture, and subjective meaning to abstract concepts.

2. It also focuses on an action research which is based on feedback processes. The aim is to integrate these two aspects into an effective, goal-directed learning process.

Kolb (1984, 2015) claims there are an increasing number of people who see experiential learning and education as a way to revitalise the university and college curriculum and to cope with many of the challenges facing higher education today. There is a focus on the necessity for the further development of teacher educators and a closer collaboration with students, schools and society. The challenge is how to get teacher educators to realise that closer collaboration is necessary. Teacher educators should also be encouraged to make an effort to use experiential learning as a tool in their own learning. Higher education could benefit from using methods from experiential learning in order to

develop new theories for validating and testing new experiences. This way new knowledge has the potential to develop.

Kolb`s theory of experiential learning has had considerable impact (Illeris 2000, Ertsås & Irgens 2014) which may be because of the potential the theory has to organise experiences, learning and knowledge in context. But Ertsås and Irgens (2014) also emphasise that the theory has its flaws. In spite of its prevalence and practical use, the theory also has its critics and sceptics. Some educators are more concerned about technique and theoretical processes than content and substance. For some academics it can appear too pragmatic and anti-intellectual. The theory, as in fig.1, can be read as a reflection on how experiences will configure learning into knowledge. This can give a too simplified picture of what learning and knowledge is about. This is consistent with what Ertsås and Irgens (2014) highlight from hermeneutical philosophy, in which every situation is understood and interpreted in the light of the knowledge a person already possesses.

Kolb (1984 / 2015) is in this context concerned with pointing out to us that experiential learning theory offers something more substantial than just new handy tricks for educators. The models must be understood as tools to draw attention to complex processes and can help us give key concepts a manageable content.

"Without denying the reality of biological maturation and developmental achievements, the experiential learning theory of development focuses on the transaction between internal characteristics and external circumstances, between personal knowledge and social knowledge. It is the process of learning from experience that shapes and actualizes development potentialities. The course of individual development is shaped by the cultural system of social knowledge" (Kolb 1984, p.133)

Through his theory and understanding of experiential learning, Kolb gives us an approach to how we can make education and learning a lifetime process. This is not a simple process, and it is not only a process applying to the individual. It is a process that impacts on society and the way we are affected by cultural contexts.

To illustrate themes that emerge in this theoretical framework based on Kolb theories of experiential learning, I will highlight a case from our students' practical training within our teacher training.

Research methodology
Case: Sunrise School, a place for experiences, learning and knowledge.

After a few weeks at the university, our student teachers have a period of practical teacher training with pupils. In that connection we have a close collaboration and partnership with a high school called Sunrise School.

Every autumn, for three days, 60 of our students and teacher educators take full responsibility for all the pupils at this school. These students have already completed their academic training and have started a year of teacher training. As a part of this training, they have a period of teaching practice with pupils at Sunrise School. Students collaborate in

groups and are responsible for classes while the teacher educators work as student supervisors.

The school has approximately 400 pupils, aged from 13 to 16. The regular teachers have their own seminar outside the school area during this period. Headmaster and one of the inspectors are present at their offices at school and can assist if necessary. The arrangement is that students will have full responsibility for the school and the pupils. So far this arrangement has been a success.

In this connection the research question: "How may teacher educators and teachers transform their experiences into knowledge?", using Kolb´s theory, is highly relevant. Ertsås and Irgens (2014) have the following focus on Kolb`s theory: "In a practice perspective, knowledge is a dynamic and procedural phenomenon. Knowledge might therefore be understood as: mediated, situated, provisional, pragmatic and contested" (p.166). From this perspective they interpret "mediated" as knowledge that is not random. Furthermore, being "situated" and "provisional", knowledge is attached to time and context as long as it has validity. Based upon a pragmatic understanding we can see knowledge as being in a process and in constant movement and also associated with power. Therefore knowledge might increasingly be challenged (ibid). Not everybody will share this view of knowledge, but it builds a foundation in our teacher training and with this perspective on knowledge we start the preparations for the three days together with the students.

When we, as teacher educators, prepare our students for the three days at Sunrise School, we focus through lectures on with themes like the teaching profession and its role in our society, historically and today. This is meant to be a foundation for the students before practicing as teachers. Furthermore, they work in groups on subjects like: How to plan, manage and evaluate the learning activities for a diversity of pupils. The discussions from these works ends up in a specific curriculum they can use during these three days with their class or with the specific group of pupils they are responsible for.

These three days usually contains excitement, joy, frustration, laughter, anxiety, sweat (and almost tears) and a lot of creativity. The challenge for the teacher educators is to make time for reflections and discussions, and hopefully to experience the students` awareness of their own learning processes. Teacher educators also have a responsibility to connect experiences and theory in these reflections and thus, hopefully, make it clear how learning can be turned into knowledge.

To make space for these discussions we put aside approximately one hour before and after each school day to discuss experiences, starting with the question: What did we learn in school today? Students and teacher educators have developed questions like:

- What do I want with my teaching? Why? What do I know from before?
- What were the most important experiences of today?
- How can I use these experiences, now and later?
- What have I learned and what does that mean to me?
- How can I collaborate with others for the benefit for all of us?

From reflections and debate around these questions we have tried to find answers to the question of how knowledge arises from experiences.

> *"There are increasing demands on the teacher's skills, commitment and knowledge. The teacher's role today is already complex, complicated and challenging. Demands on teachers will increase because school will change and require more flexibility and innovation. Teachers work will be more interdisciplinary, using new and more differentiated methods."*(Student)

Using a high school as a practical, educational institution for our students confronts us all with the reality teachers and pupils meet in daily life. It provides an extraordinary opportunity to build on these experiences, in teacher training, to study and learn what teaching is really about and what the future has in store for both students *and* teacher educators.

> "Teachers must have the ability to be flexible, have relational skills, be confident in their encounters with pupils and be able to work independently. They must also be able to facilitate a good learning environment. As educators we need to be sensitive. It is therefore important that we, as students, are positive, enthusiastic and welcoming from the start." (Student)

Conclusions and implications for teacher education

The traditions of social and cognitive psychology and philosophy have taught us that experience plays a vital role in the learning process. Kolb`s theory offers a foundation for an approach to education and learning as a lifelong process. It is also important to have an awareness of the possibilities and limitations such a theory can have in daily life. This paper is one of many contributions to the debate on how learning can be transformed into knowledge. A process in which concrete experiences, through observation and reflection, and then through the analysis of data, are transformed into knowledge that becomes part of ourselves.

A driving force in this discussion is the awareness of how knowledge in one situation becomes an understanding in dealing with other situations. We believe that the case from Sunrise School also contributes to this understanding in showing how important it is to focus on dialogues, discussions and reflections in collaboration with others. The challenge is to investigate whether this kind of learning is also valid among teacher educators. We want to put the development of knowledge for teacher educators and teachers on the agenda in order to raise our consciousness about learning processes. We wonder how this can affect our own teaching and what implications it can have for our students´ learning and practice in the future.

This paper aims to encourage teacher educators to make an effort to use experiential learning as a tool in order to develop new theories.

Acknowledgements

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Educating the phronetic teacher and the theory-practice problem

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This theoretical research concerns the question of practical knowledge in education and educational relationship contexts, using the Aristotelian concept of phronesis and the theory of action as important key concepts for teacher education. Far from abandoning the value of theory and results of scientific research, the study attempts to reallocate them to an important position, especially for the development of the prime premises or general knowledge regarding educational action, even those which are not directly applicable to educational action. In order to respond to the uniqueness of different educational contexts, a view of practical action is proposed, where a central role is given to concepts such as the intention, disposition, and judgment of the teacher. This can represent a counterbalance to technical rationality, which is largely present nowadays in educational discourse. At the same time, this is a call to improve teacher ethical reflectiveness in in-service formation.

Keywords: theory and practice; reflectiveness; teacher and researcher; tri-dimensional teacher education.

Introduction to the theme

The teacher and different kinds of knowledge

The relationship between a teacher and knowledge is inevitably native to the idea of teaching practice. Knowledge can be described as the "content" of a specific discipline, or as the best way to teach and to whom. Normally, this relationship is not questioned, just as the link between the physician and the knowledge of medical science s/he needs is not normally questioned, or the link between medical practice and the pursuit of health. The great difficulty when one enters into this knowledge is determining what is worth transmitting and how to transmit it. This study explores the distinction between content knowledge and the knowledge, defined in this study, for action, which has its epistemological foundation in similar areas of research such as modern history and research fields that deal with the teaching of history. The teacher is a practitioner interweaving different worlds, both theoretical and practical (Carr 1995b); he has received and may receive more knowledge, results of investigations, and experiments from different disciplines, namely those concerning his initial training, during which he specialized or kept abreast of pedagogical, psychological, and didactical knowledge. In addition, it must not be forgotten that the teacher is a person of practice who experiences various issues, from the cognitive and behavioral problems of pupils to dealing with management and legislative changes imposed by institutions. Theory and practice are really the worlds in which the teacher is immersed, but it often seems that while the former has dominated the teacher's initial formation, the latter definitely prevails in the rest of his professional life, with the exception of getting opportunities to update. Even when this updating is directed to upgrade professional practice, it should be noted that it is not exactly practice that is discussed, but theory of practice. "Practice" to a teacher in fact refers to concrete classroom activities.

Given these issues, the question at hand is "What cultural choices have been made about the need to respond to the request for knowledge for the praxis of the teachers?" This retrospective question could be useful for the specific purpose of current teacher education, assuming that it is a matter of the history of ideas. However, the task of philosophy of education, as taught by Luis Arnaud Reid, is to cast doubt on the well-known or the familiar in order to understand if the choices we make are the only possible ones (Reid 1963, 8). Furthermore, it must be explored whether or not these choices are somehow complete in order to account for the complexity of education, or are they only the result of external pressure from the world of education? Can the characteristics of the paradigm be re-evaluated and the possibility of changing it be re-visited?

Aim of the research

The aim of this paper is to propose a counterbalance to the most widespread approach to education and to teacher education itself; specifically, it is to examine the instrumental or technical approaches needed to create collaborative learning communities. To this end, teachers need to be educated with a first-person deliberating, flexible, and ethics-involved rationality (Ellet 2012). The instrumental approach to education is related to the mere implementation of the theory. This can be seen, for example, when an educational theory guides empirical research and the results are supposed to be good enough to be applied by educators, as are the instruments to be used by them. In didactics, instruments can include not only intellectual ones, but can involve technological devices as well.

Far from abandoning the value of theoretical and scientific results, this study attempts to reallocate them to a very important position, that is, the education of the teacher. In order to respond to the uniqueness of educational context, this study proposes a theory of practical action where a central role is given to such concepts as the intention and disposition of the teacher, which then engenders an educational action defined as a confluence of care reasoning (Juujärvi, Myyry, and Pesso 2010) and wisdom (Morgan 2003).

Theoretical framework

An Aristotelian retrieval

The Aristotelian sense of *praxis* implies distinguishing three kinds of knowledge: theoretical, practical and poietical. This notion could represent in education the possibility of having a broader frame in order to observe whether the anthropological implications of educating are respected in educational theories and actions. It is claimed that the practical (*praxis*) is the genuine educational condition in which the human in his entirety is considered. It is also something very different from the poietical, which is sometimes discovered as the hidden guideline of contemporary educational processes.

> The logic whereby so much that seemed to me ineliminable from teaching could be so lightly disregarded was *instrumentalist* one. In profiling a teacher's objectives, this model sought to separate ends and means, to repose everything of value that a teacher might accomplish in the ends (i.e., objectives) and then to construe all problems of teaching as ones simply of finding the most activity could now be conceived as purely instrumental, i.e., as means which was in itself neutral and therefore substitutable in principle by any other means, the only criterion for such substitutions being efficiency and economy in achieving the ends. (Dunne, 1993)

Praxis cannot be pre-determined; it involves the personal disposition of the teacher, his caring and phronetic attitude, and/or the formation of his wisdom in order to make the right choices at the right moment. This perspective leads to the necessity of thinking about the philosophical (anthropological and ethical) premises involved in the educational context. It allows for a sort of pre-analysis of the principles to be used in defining education.

Following an Aristotelian way of reasoning instead allows a clear separation of the field of scientific knowledge on educational processes or policies and the practical knowledge involved in action (Hogan 2011). Another characteristic of this framework is that it compels the researcher at the same time to reflect on the best role of knowledge that comes from the same scientific enquiries.

For the purposes of this study, Aristotle's masterwork, *Nicomachean Etichs* (2009), represents the starting point of the theoretical discussion; also followed are the arguments of Joseph Dunne who, in his work *Back to the Rough Ground* (1993), has retrieved much of the Aristotelian perspective in education.

Instrumental rationality and the use of knowledge

For a deeper analysis of instrumental rationality, and in order to better understand the value of the genuine *praxis*, further description is necessary.

Due to a rich and witty literature in the humanities and philosophy of education, it is not difficult nowadays to discover that two great cultural and social processes (discussed below) have had a great influence on the knowledge promoted in schools as well as in school policies. These two processes have had a deep influence, and they could even be described as natural rather than naturalized.

The mechanical explanation

The first element that influences knowledge today has a remote origin and can be defined as endogenous because it was born inside the world of philosophy and science a few centuries ago. This is the mentality related to technical rationality, which conditioned the idea of "good" knowledge. Alasdair McIntyre explains:

> The ideal of mechanical explanation was transferred from physics to the understanding of human behavior by a number of English and French thinkers in the seventeenth and eighteenth centuries who differed a good deal among themselves over the details of their enterprise. […] And then: The notion of 'fact' with respect to human beings is thus transformed in the transition from the Aristotelian to the mechanistic view. On the former view, human action, because it is to be explained teleologically, not only can, but must be characterized with reference to the hierarchy of goods which provide the ends of human action. On the latter view, human action not only can, but must be characterized without any reference to such goods. (McIntyre 2007, 97–99).

Although different schools of thought from the last four centuries may be highlighted, it is not possible to do so without reflecting on the fact that the current proposal regarding the relationship of theory and practice in education is immersed in so-called "instrumental rationality," where "methods become mechanical replacement" (Smith 2006, 160). This means that the search for pure facts, even in the humanities, suspends ethical implications in order to propose the application of certain knowledge in such a way that the action will function and be effective. This is the case, for example, of current

evidence-based education (EBE). In short, educators are still children of the "instrumental revolution" with respect to knowledge and action. In this view, teachers thereby become receptors and also implementers of what is conceived elsewhere, and one precious dimension is forgotten: the so-called Aristotelian phronesis (wisdom), which refers to the moral disposition to make judgments and correct choices (Kinsella and Pitman 2012). Following instrumental rationality, the idea of teacher education here (i.e., in EBE) requires a continuous training in the latest evidence generated from scientific investigation. At the same time, the practitioner is seen as an expert who is increasingly able to formulate a plan for every eventuality. The vision of knowledge that is implied here is first accumulative, which then risks dimidiating the theoretical aspects and reaching only the part of theorizing that can satisfy applicability and effectiveness. Gert Biesta writes:

> On the research side, evidence-based education seems to favor a technocratic model in which it is assumed that only relevant research questions are questions about the effectiveness of educational means and techniques, forgetting, among other things, that what counts as "effective" crucially depends on judgments about what is educationally desirable. (Biesta 2007, 5)

Useful knowledge
The second cultural process that increasingly dominates social and school life, and is often not so disjointed from what has been mentioned, is undoubtedly that of the definition of learning objectives by governments, which is frequently dictated by the market economy for the purpose of global competition. This pressure tends to favor very expendable knowledge and practices in the sense of production, especially for the purpose of technological advancement. Humanistic knowledge is judged valid and as such, is dimidiated only in its more functional and ancillary aspects into economical objectives. The idea of "transferable skills" (Evans et al. 2013, 34) has been emphasized in order to create an alliance between instrumental rationality and the desired goals of governments. Data coming from research are therefore used to illuminate particular components of educational processes, namely those that are more interesting for creating opinion on things that are shown to be good or bad depending on the direction taken by the policy of that government (Lawn and Grek 2012, 69–82). However, these processes, as well as dominant cultural visions of teaching and training of teachers, clearly generate a certain type of practice based on the application, effectiveness, and narrow temporality outcomes, all of which are driven by the predetermined objectives that are required by the current social and economic world. All this provokes a direct relationship between theory and practice, which, among other things, inevitably fails to take into account the reality of the context and the presence of human agents—in other words, the genuine praxis. What is left behind in this model? What has been forgotten or is not recognized in the same educational practice and in theoretical knowledge? In other words there is a lack of judgment, disposition, ethical involvement, pre-scientific (but not doxastic) knowledge, and practical wisdom and practical rationality.

Practical rationality, practical action
Also missed in this instrumental vision is that the judgment and the decisions of the teacher take place in an unusual, completely new situation, and that these choices have moral consequences because they face another human agent, not a machine that responds to stimuli. The consequence of this is the necessity of reintroducing into the education of teachers the Aristotelian distinction between practical and instrumental action, where the

latter is productive with the aim of pursuing extrinsic goods (such as education for skills and competences). The purpose of genuine praxis is only intrinsic goods (purely anthropological) that are ethically oriented. The larger aim here is achieving moral disposition and improving teachers' faculties as moral agents. This is related to what Aristotle calls *eudaimonia* and the flourishing of a human being (Kristjánsson 2014). To this end, Dunne writes:

> In being initiated into the practice of teaching, student-teachers need not only experience in the classroom but also the right conditions for reflecting on this experience–so that reflectiveness […]can become more and more an abiding attitude and disposition. The main aim of 'educational studies' should be to contribute to the development of this disposition. (Dunne 1993, 369).

Therefore, the useful and poietical knowledge should be the last part of education, but not so totalitarian as to affect the type of action of the teacher, nor a mechanical action of producing human beings for the labor market. The anthropological purposes, namely those that become internal ends of the action, claim and generate another type of action, which is the proper praxis. Thus, writes Dunne, it is necessary to form the teacher so that he can achieve dispositions in making the right choices at the right time with the students in front of him; in other words, let the teacher become wise and possess phronesis. However, Dunne also adds: "What teachers lack is not phronesis but rather 'practical philosophy'" (Dunne 1993, 368). For this reason, it is necessary to reintroduce knowledge that is mostly valid as Aristotle said, but which can help with the choice or the resolution of the new praxic situations, such as moral philosophy and the philosophy of education. All this can help the development of reflectiveness in order to act phronetically or with practical wisdom.

It cannot be denied that, according to Dunne, this virtue has totally disappeared in teachers, but instrumental rationality is reducing possibilities for the exercise and development of it. Dunne also states:

> For even good teachers can easily be intimidated by the sophistication, apparent power, and high prestige of technicist approaches. Insofar as they do not have the conceptual resources to articulate the nature of their enterprise, they are vulnerable; hardly able to avoid frustration and resentment at what they intuitively recognize as Procustean advances from technocratic 'educationalists', they may still lack confidence in the integrity or respectability of what they already do well (Dunne 1993, 368).

For this reason, phronetic disposition has to be supported by reflective disciplines, namely humanistic knowledge. In addition to this, it is highly necessary to recommence thinking about the fact that the action of the teacher has an unavoidable teleological component, that is, it is very important to think about the intrinsic good of the person. In this way, teacher education can avoid being merely respondent to the social and historical demands of the time. In *Nicomachean Ethics*, Aristotle wrote:

> Again, our definition accords with the description of the happy man as one who 'lives well' or 'does well'; for it has virtually identified happiness with a form of good life or doing well (Aristotle 2009, 1098b).

Discussion

What are the possible connections between researchers and teachers, and scientific results and educational action?

Every researcher has to face the initial problem of the what, the how, and the why of his work. The initial preoccupations usually concern the choice of objectives (Burke and Christensen 2004, 22–25), following a research question about the fragment of reality chosen to be investigated. The what, then, is intertwined with personal intellectual curiosity, a desire to contribute to the growth of knowledge, and sometimes with the condition to be a part of an already-started research project. How to investigate is elicited within different methods such as questionnaires, interviews, and so on, depending on the nature of the research objectives.

But a problematization of the way to proceed might be needed, especially for young educational researchers, in order to avoid in settling for a mere *medias res* process. Researchers can ask themselves, for example, if the given research tools lead them to obtaining a certain type of knowledge and not to other types, as well as what kind of *forma mentis,* rationality, they are using. Thus, for the first research question, the proposal here is to expand reflectiveness by adding a broader form of epistemological thoughtful competence. Doing so aids in making choices about the cultural paradigm, theory, methods, and instruments. This could prevent taking as unproblematic words such as: "reality and objectivity […] truth […] fact […] theory […] knowledge." (Pring 2004, 209).

This leads to the proposal that will be discussed in further depth later on, which is that the researcher has to pose primarily not a methodological question, but a question on methodology if he intends to provide knowledge to teachers or educators. What does this mean? Firstly, that rather than starting with the choice of the question, the method, data collection etc., the researcher has to reflect on, for example, the kind of knowledge he is going to contribute to acquiring and, secondly, on the nature of education as a practice involving human actions. How can an academic investigation be beneficial for teachers in different situations, schools, and countries?

The discussion of methodology leaves it to the young researcher to discover the existence of different kinds of knowledge worthy of being taken into account, such as scientific knowledge, and knowledge involving individual perspectives with ethical implications that are related to ever-changing dimensions of human actions and which allow achievement of so-called personal dispositions.

If the reasoning is instrumental, it is considered that valid and scientific knowledge is that which can be applied, that is, what works is the truth, which is that the only idea of truth that describes the research results becomes the effectiveness of that research. According to Richard Smith:

> In other words Bacon's own ambition to formulate precise rules for the 'work' of the 'understanding' carried the seeds of its distortion. This is an evil against which we did not sufficiently prepare; and in narrow conceptions of 'research methods', especially in education, it has even now come to pass. (Smith 2006, 167–168)

This paradigm teaches a direct relationship between theory and practice, where the latter legitimates the former in the practice itself. This causes a dimidiation of the possibilities of theorizing as well, and in fact, a pure and interesting speculative knowledge does exist without possessing applicability in the moment. What also lacks here is reference

to the ethical implications of what has been done, keeping in mind that that education has to deal with humans, not with atoms.

If a researcher becomes able to identify different types of knowledge and rationality, it can be said that he is on the right path to achieving a broad epistemological competence that allows for highlighting the questions of methodology before the methodological question. Effectively, the direct consequence of the capacity to distinguish rationalities and types of knowledge (Carr 1995a, 137–140) affords the possibility to choose.

The strict problem, then, is not really the epistemology inherited from the 17th century governing over the sciences, but whether that paradigm is entirely good for governing educational human sciences. The applicative theory-practice model is really tempting because it gives a great deal of prestige to the academic research, but hides some pitfalls and problems that do not emerge at first glance. First, instrumental rationality is applied to a human dimension such as education, where the actions that involve agency and practical decisions cannot be predetermined. Second, the idea of true knowledge that emerges is only functional and transferable without involving personal significance. Third, the only kind of theoretical elements that are valuable are the applicable ones. In this way, theorizing is justified only by effectiveness; this can affect the freedom of scientific enterprise, and limits its possibilities due to a contingent social demand.

Another risk is that young researchers receive only this paradigm, and enter to take part in an already-consolidated tradition that often marginalizes reflection on methodology inside the self-referential philosophical discussion, causing great damage both to philosophy (of education) and education sciences. The main damage relates to the theoretical depth and extension of research and the way teacher practice is conceived.

The reduction of theoretical studies generates another problem that affects the correctness of the same instrumental theory-practice model. It is true that:

The trouble is that thinking generally of educational perspectives in terms of theories tends inevitably towards an understanding of education as a sort of causal process susceptible of explanation in terms of essentially scientific concepts and categories apt for technical analysis and application in the light of empirical observation and experiment. (Carr 1995b, 328)

However, it seems that some investigations take directly from practice (often current ideology-influenced) key concepts that guide the research itself, without being justified by a theorical perspective or theoretical tradition, which is the only way to exercise a more rational and democratic confrontation in science. In fact:

Secretaries of State, politicians, and the various lobby groups, which advise them, are against theory. [...] Theory is seen as a disease, which has to be eradicated and replaced by professional judgment. (Pring 2004, 218–219).

For example, if a questionnaire about the future aspirations of young people is proposed without declaring any reference as a starting point, for instance, to a psychological or philosophical school, are the data collected just mass media-broadcasted ideology from the answers of the adolescents? I mean that only a theory with its hypothesis can prevent from the risk to insert common sense ideas into an empirical research:

Facts or pieces of data are *not* evidence. Depending on the formulation of a hypothesis, facts *become* evidence. In other words, evidence is made, not found. [...]What makes something evidence is that it stands in a certain relation to a hypothesis, namely confirmation or disconfirmation. (Kvernbekk 2011, 531-532)

A similar case is data collected about reality and observed practices. If it is supposed that these are genuine data, is it forgotten that in order to call something data, a theoretical framework and hypothesis must be declared, by which to observe the fragment of reality chosen? The scientific revolution did not start with a mere observation: Galileo observed but observed through a non-conventional theory.

The strict theory-practice model has its own coherence, but it reaches complete justification only in the technological field, where it can find its legitimacy. Educational sciences need more complex theorization; this can be realized by having a bond with the theoretical domain. This difference between the theorical and the theoretical should become the soul of the reflective competence of the researcher, and represents the possible dialogue between science, philosophy, common sense and teacher deliberation. Pring states:

Theory here, then, refers to the articulation of the framework of beliefs and understandings which are embedded in the practice we engage in. Such a theoretical position may be expressed in everyday, non-theoretical language. But, nonetheless, it is what we bring to our observation of the world and to the interpretation of those observations. (Pring 2004, 219)

For example, it is possible to choose a learning theory from a psychological school, formulate a research question and hypothesis, do an experiment in a school, and then provide the results of the investigation in order to apply what works in every similar situation. This way of researching is internally more correct, but it is incorrect if it purports to tell something completely true to be applied in educational action (which refers to human beings); that is, the cultural framework must be improved by a new theoretical effort. Who wants robot-teacher or a pure application of what has memorized from scientific literature? This model, according to Aristotle's view (*NE, Book VI*), could be identified as poietical, or productive (learning outcomes) when the ends are extrinsic to the action itself. This, for Aristotle, is the third kind of knowledge and relative rationality.

The final aspiration is conceiving the dimension of human action (*praxis*) as not predetermined; in this case the teacher (not the research results) is the real agent, a teacher whose professionalism has certainly, but not exclusively, been formed through educational sciences. A researcher that investigates in order to give new information for the formation of the teacher has a totally different view (and methodology) from a researcher that thinks the results of the research are supposed to be applied and possess only an effective nature. In order to better link the work of the researcher to the work of the teacher, better science and better action are needed, as well as a good distinction between the two, the improved disposition of teachers, and improving educational sciences in a such a way that they can become increasingly free from the established way of thinking.

Conclusions and implications for teacher education

Aiding educational action with a three-dimensional teacher education

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Teacher education requires a greater extension and greater balance of types of knowledge than it has today. The extension of knowledge is a *de facto* a paradigm shift, because the introduction of knowledge to help the development of dispositions, such as practical wisdom, delegitimizes EBE's claim to be directly applicable. This should certainly be considered and enhanced, but in the context of an enlargement of the major premises mentioned by Aristotle. Scientific results cannot rule on what relates to changing dimensions as actions, for these might be needed to reach a decision of what is best to do now or, in other words, the minor premises that guide the action caught by the phronetic teacher (Orton 1998). EBE cannot become evidence-based action. Thus, the first theoretical teacher education area could pair up disciplinary content and educational sciences investigations (sociology and psychology of education, pedagogy, etc.). In addition to this, within the empirical realm, there needs to be a distinction between simple data collection (deeper socially influenced information) and experimentation and theory-guided empirical research.

Following the Aristotelian terms, if the scientific investigation can contribute to forming the major premises (theoretical knowledge) of the understanding of the educational world, there is also the realm of the minor, contextual, and ethically involved premises that guide the actions.

The existence of a practical contextual knowledge also has to be supported with different research than empirical research. Only the ethical speculation can properly think the question of the good deliberation and give birth to a different knowledge connected with wisdom. Hoveid for example speaks about an implicit, tacit knowledge present only inside practice:

> My argument is that if we are going to be able to inhabit this space where this 'no-knowledge' can appear more comfortably, if we are going to be able to enter it and explore it (in its peaceful and non-violent connotations), we need ideas/notions about what kind of sources of (no-) knowledge or expressions of knowledge would be appropriate. As a start, instead of naming this 'no-knowledge', which is to name it in terms of denial, let us instead start out by indicating that this other kind of knowledge, expressed through our appearance in the world of human beings, could, maybe, be referred to as an in-between knowledge. Is this in-between knowledge a kind of relational knowledge, practical knowledge, tacit knowledge or knowledge expressed through transfer in educational processes? (Hoveid 2012, 255)

Therefore, in order to help the concrete action of the teacher with another kind of research, study and knowledge (those that improve the practical reason and judgments) are needed. From David Carr, it is seen that the literature (humanities in general) often gives more information about what education is than much empirical research does (Carr 2003). Practical knowledge derived from philosophy and literature has to be cultivated and proposed to teachers without being considered less than the one given by educational science. The ethical factor and acquired practical wisdom disposition might allow teachers to reconsider the education science knowledge that they acquired, if it is good and allowed to flourish, in order to improve the condition of the pupils they have in front of them.

In order to improve and encourage a caring and phronetic attitude (Hansen 2007) with reflectiveness and capacity of judgment, a humanistic teacher formation must be restored. Reading and studying literature, for example, allow for an improvement in

reflectiveness on agency and ethical issues. After the theoretical and the practical-ethical aspects are involved, the productive knowledge that offers know-how in doing things, for example, regarding the training of a particular category of teacher involved in vocational schools may be achieved. These could continue to be transmitted but resized, balanced with others, and left in the didactical hands of the wise teacher.

By presenting a wider range of knowledge and rationality, the researcher could reflect on the one he prefers to contribute to, being conscious that the connection between the research domain and the teaching domain is not really unproblematic, and nor is it a matter of merely providing knowledge. However, this discussion raises another question that deserves to be studied further, i.e., whether a tri-dimensional teacher education (human sciences, ethics and humanities, didactics) takes into account initial or in-service learning (or formation in a more global sense). It could be very interesting to teachers for the development of their disposition by constituting reflective groups about everyday school life problems, where not only discipline-oriented questions arise, but also ethical dilemmas (Tirri 2010), self-perception (Wringe 2015), and sense dilemmas about the profession. This approach promotes the concept of in-service formation, and this in-service activity is different from improving knowledge about the discipline taught or about the educational sciences.

Finally, the second type of education, the one that aids the praxical educational dimension and is supported by a diverse knowledge from science, needs wider in-service formation opportunities, which is quite contrary to today's reality.

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Collaborating to help education students get a foot in the door and "kick it" during interviews

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This manuscript explains the collaborative nature of a hiring simulation for educational leadership and pre-service teacher candidates. In this simulation, faculty members across three academic programs partner to organize an annual hiring simulation. During the course of the mock interviews, teacher education students are introduced to aspiring leaders from surrounding school districts, and these leadership candidates receive an introduction to pre-service teachers enrolled in the university's certification programs. This multidisciplinary collaboration benefits both aspiring teachers and leader candidates in their individual quests within their respective educational fields by leaving them better prepared for real-world job interviews.

Keywords: hiring simulation; teacher education; educational collaboration; simulation methods; interviewing.

Introduction

In academic communities, each spring brings with it anticipation, nervousness, and excitement as soon-to-be graduates begin their quest for employment. In the field of education, it is no different. In an effort to adequately prepare both aspiring teachers and aspiring administrators, the professors of these respective groups turn to each other. The result of the ensuing collaboration is an annual hiring simulation involving the two groups of aspiring educators, during which the leadership candidates interview the pre-service teachers. This multidisciplinary collaboration benefits each in their individual quests within their respective educational fields by leaving them better prepared for real-world job interviews.

Aim

The aim of collaborating to produce the hiring simulation described in this study is twofold: 1) the exercise provides a safe environment in which pre-service teachers are able to practice interviewing for positions before they encounter a real-world interview with consequences, and 2) participation allows aspiring leaders to hone their questioning skills to improve upon their astuteness when choosing new educators to work in their schools.

Theoretical framework

The need for high-quality hiring practices

Research broadly supports that school or district hiring practices directly affect positive or negative outcomes for organizational advancement in critical areas, including student achievement, school climate, and teacher retention (Clement 2013; Hughes 2014; Peterson 2002). National attention to the cultivation of best hiring practices, however, suffered a heavy setback during the recent years of economic decline in the U.S. and the ensuing reductions of classroom teachers that resulted from long-term funding losses (Hughes 2014). In addition to economic drivers, other teacher attrition factors have also contributed

to improvisatory hiring practices. These include increased state and federal mandates (Hughes 2014), a greying "Baby Boomer" population that includes more than half of all teachers (Carroll 2009), and professional dissatisfaction among novice teachers (Ingersoll, Merrill, and May 2012).

As the national economy strengthens, so does the need for qualified teachers prepared to enter U.S. classrooms, with a projected need of over two million within the next decade (Hughes 2014; Lee 2005). Numerous studies explore the data surrounding current teacher forecasts. Lee, for example, suggests the pool of qualified, classroom-ready teachers will not keep pace with forecasted need, though according to Aaronson and Meckel (2009), student birth rates over the next decade are projected to fall within historical norms. The National Commission on Teaching and America's Future (2003) states that high teacher turnover is driving national teacher shortages. These are among the reasons a growing number of educational leaders are showing renewed interest in hiring practices and human capital management as key to attracting and retaining quality teachers for improving their schools (Donaldson 2013). Scholarly attention to national hiring practices, according to Hughes (2014), is also on the rise as the need for more teachers increases with the rebounding national economy.

An essential hiring practice that often challenges both school administrators and teacher applicants alike is the job interview (Peterson 2002; Clement 2013). The job interview, despite its flaws and complexities, is a critical component of the personnel selection process for school administrators seeking the best teacher applicants (Peterson 2002). While an applicant's ability to create a favorable impression during an interview does not guarantee the candidate will be an effective teacher, Clement (2013) and Hughes (2014) suggest that hiring interviews are helpful in revealing important candidate attributes. Among these are response to a pressured environment, communication skills, content knowledge, and community awareness (Peterson 2002).

The benefits of hiring simulations
Preparing for and participating in interviews can challenge even the most well-prepared job candidates. Hiring simulations are one method of experiential simulation designed to help alleviate interview jitters experienced by many of those who are new to the job market (Newberry and Collins 2012). According to Newberry and Collins, the fail-safe laboratory environment is one of the most important benefits of participating in a hiring simulation. In studying their own students, for example, Schaff and Randles (1972) found them frustrated and nervous prior to participation in hiring interviews, regardless of rigorous study and preparation. Even extensive practice and discussion of good interviewing tactics did not alleviate the fear they felt when the real hiring interview presented itself (Schaff and Randles 1972). Schaff and Randles responded to their students' needs by creating a simulated interview program that offered both student interns and administrative interns an opportunity to role-play in a hiring interview.

A sound research base exists supporting the use of hiring simulations or role-playing exercises as a means of preparing participants for success in real-world interview opportunities in both the educational arena and greater business community (Brooks 2010; Cairns 1995; Kolb 1983; Schaff and Randles 1972; Wells 1982). Kolb, for example, suggests that role-playing simulations can provide a conceptual bridge for transitioning from an academic environment to career roles. Researchers from other fields, including business, education, and healthcare, report similar findings with the use of experiential simulations such as those used for hiring practices (Newberry and Collins 2012; Oh and Solomon 2014).

A body of research found primarily in the areas of business and social science holds a range of suggestions concerning how to prepare for and act during a mock interview (Brooks 2010; Hansen et al. 2009; Oh and Solomon 2014). In an overview of career transitions, Brooks discusses the simulated job interview and suggests ways to handle a role-play. These include thinking ahead about situations that may occur in the desired position: What are the responsibilities of the position? Are there products, such as reports, that must be produced, and what might they look like? Will you have to manage a group? Topics such as these are often adapted and used by interviewers in preparing questions and scenarios and are typical of those used to encourage an interviewee's planned response strategy. Brooks reminds participants to put on their "best self," suggesting that interviewees seek to balance talking with careful listening to gain knowledge of the culture of the organization. Similar advice regarding strategic response includes the importance of nonverbal cues, active listening, structured responses, and post-interview follow-up (Hansen et al. 2009; Newbery and Collins 2012; Oh and Solomon 2014). Post-interview debriefing and feedback are particularly important in improving interview skills or technique (Newberry and Collins 2012; Oh and Solomon 2014).

Smith and Glover (2002) wrote about their experiences combining simulations with writing assignments. They emphasize that college students have a practical approach to learning; thus, the simulation provides an exciting learning experience for them. Their research focused on both cognitive and affective objectives in addition to the simulation itself; the combination of these objectives paints a richer, more complex experience for students. Students learn the process of hiring, the tools they need to participate successfully, how to read job announcements and descriptions, as well as how to write their résumés and cover letters. Students are also prompted in how to act as a professional; they learn to listen acutely and communicate using professional language as they are introduced to the environment in which interviews occur. These exercises promote the readiness of preservice teachers to present themselves at their best during their real-world hiring applications and interviews.

The need for collaboration

Hiring simulations that are managed well depend upon successful collaboration. The nature of faculty work has been shifting in recent years, and the current trend for interdisciplinary teaching to support student learning promotes collaboration in new and different ways (Eddy 2010). According to Sill (1996), an important strength of interdisciplinary studies is the ability to guide students in developing higher-order thinking skills such as synthesis, creativity, and evaluation. When faculty across disciplines share goals and visions for student outcomes, the collaborations become meaningful not only for the students' achievement, but for the intrinsic motivation of the involved faculty. Effective collaboration provides a strong foundation for the success of the hiring simulation, and productive professional learning community (PLC) groups are a natural outcome.

DuFour (2007), Eston (2012), and others describe PLCs as most effective when they emerge internally, are based on collegial relationships, and share a common vision that centers on creative problem solving. Relationships that support collaboration among higher education faculty, pre-service teachers, and leadership candidate PLCs were key in planning and implementing the hiring simulation lab experience. Though the strategic focus of the three PLCs was unique to the interests of its participants, these characteristics were evident in the collaborative efforts that guided the work of each group to ensure a successful event.

The use of PLCs for strategic problem solving is growing as a means of professional practice among public school personnel, yet institutional barriers result in a more limited use of this collaborative approach among higher education faculty (Addis et al. 2013). Consequently, research on the role of higher education faculty in developing and facilitating PLCs is also an emerging field. Early studies suggest higher education faculty play an important role in supporting the work of school-based PLCs. In their collective case study involving PLC participants working on a range of diverse committee topics that included formative assessments, math, and the effects of poverty, Linder, Post, and Calabrese (2012) found that participation of university faculty can increase PLC productivity. These researchers noted that in-depth study of issues, topical expertise, and facilitating the selection, analysis, and discussion of selected tasks and activities are among the more important contributions of higher education faculty to the work of PLCs (Linder, Post, and Calabrese 2012).

Collaborative hiring simulation preparation and process

Preparation and coordination by faculty

Execution of the particular hiring simulation presented in this study involved a collaborative process among faculty from three university programs. The hiring simulation was initiated with one class of approximately 25 health and physical education teacher candidates during their capstone internship course and a similarly-sized class of leadership candidates in a course related to the recruitment, selection, hiring, and retention of school personnel as a way to meet the needs of both groups: upon completion of their respective programs, they must be prepared for real-world job interviews. As the program for secondary certification at the master's level grew to a similar size, these pre-service teachers were also invited to join the exercise. Open and ongoing communication is critical for establishing the foundation needed for a successful hiring simulation. Fortunately, the three programs involved with the simulation presented in this study are all housed within the Department of Leadership and Instruction within the university's College of Education. In many universities, that is not the case; secondary education programs are typically housed within the academic department of the teaching area of certification. If coordination must take place across multiple departments in several colleges across campus, collaborative planning is even more critical.

Initial planning for the event began approximately six months prior to the hiring simulation. Because the simulation involved student participants from three programs and thus three courses, the date had to be established early enough to appear in the course bulletin; students needed to be advised of the date and their required attendance when they registered for the courses, and they were reminded of the date when they received their course syllabi at the beginning of the semester. Pre-event planning included selecting an appropriate venue, creating interview teams, scheduling participants and interview sessions, and developing feedback surveys.

Logistics, particularly those involving locating and securing a physical meeting space, was one of the key pieces in planning the hiring simulation. Selecting a venue that would adequately accommodate both large and small groups in lecture and job interview formats on campus involved early and continuous collaboration with numerous departments and staff across campus. The university coliseum (a new facility housing state-of-the-art technology, a computer lab, lecture hall, classrooms, and comfort facilities) was identified as the best fit for the hiring simulation needs. Confirming the venue well ahead of the hiring

simulation, a Saturday event, also proved wise due to high demand for use of the coliseum during weekends.

Interview teams were composed of two to three school and district administrators. Participants were matched as closely as possible to their real-world grade levels or district positions. Because pre-service teacher "applicants" were interviewing for school-based grade level positions, district-level administrators were assigned to interview teams with elementary, middle, or high school administrators. Once the teams were formed, the roster of pre-service teacher "applicants" was surveyed to tally the types of positions that would need to be offered in a mock job posting. Grade levels and subject areas of expertise were taken into account during this planning phase. After the interview teams were formed and the positions were created, pre-service teachers were matched to an appropriate interview panel.

Preparation of leadership candidates and preservice teachers
Participants began their hiring activities approximately six weeks in advance. Each team of school administrators worked collaboratively to identify a school and select an existing or projected employment vacancy within the school for use in building an interview scenario. In most instances, the teaching vacancies were invented; however, some administrative teams elected to post genuine job searches. The interview teams then crafted and posted a job description with detailed instructions for the application process. Job advertisements were "posted" through course resources available online exclusively to pre-service teachers. School administrators developed questions and evaluation rubrics for scoring teacher candidates' responses during the interview; a sample teacher candidate interview evaluation rubric can be found in Appendix 1. Preparations for the pre-service teachers were done as components of their capstone seminar course. Course assignments included writing a résumé and letter of application, which were a natural fit for the simulation requirements; the students were able to write these and receive feedback from their course instructor prior to making their revisions in anticipation of the hiring simulation.

Process of the hiring simulation
A series of three one-hour sessions was scheduled for each administrative team. Time allotted during the one-hour interview sessions included a 30-minute interview, a ten-minute panel debriefing, ten minutes of post-interview feedback, and ten minutes for room transitions. Teacher candidates entered each one-hour session in assigned groups of three, with one teacher candidate scheduled to be interviewed while the remaining two teacher candidates recorded observations. At the end of the interview session, peer observers provided written feedback to the interviewing candidate and the administrative panel. Strategic scheduling ensured that teacher candidates serving as observers were not assigned to provide feedback for their own interview team. This precaution served to ensure the integrity of the hiring simulation interview experience for all participants.

Following completion of the teacher interview, the administrative team excused the teacher candidate from the room for a ten-minute panel debriefing. During this time, each administrative team member was allotted five to seven minutes to independently rate the preservice teacher candidate on two levels: the preceding application letter and résumé and the interview itself. Refer to Appendix 1 for a sample evaluation chart that was used by members of the administrative interview panel to rate each pre-service teacher candidate. The evaluation instrument was designed using proficiency standards from a Likert-based rubric with intervals ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Administrators

used the remaining portion of the ten-minute debrief to collectively prepare warm and cool feedback for the teacher candidate.

While the interview panel discussed and evaluated each teacher candidate, the teacher candidates also reflected on the interview process during the ten minutes immediately following the interview. Part of their reflection took the form of a written summary, as Smith and Glover (2002) suggested. Candidates were instructed to spend approximately five minutes jotting notes regarding their experiences while they were still fresh in their memories. These first impressions would serve for lengthier response papers to be turned in later as part of their seminar coursework. Suggested writing prompts included what the learning opportunities were, what they might do differently next time, and how the simulation experience would help during preparation for an actual interview. The candidates were also given a survey to rank their interview panel during the remainder of this time. Refer to Appendix 2 for a sample evaluation chart that was used by each pre-service teacher candidate to rate the members of the administrative interview panel.

Following the ten-minute debriefing session, the teacher candidate returned to the interview room to meet with the panel of administrators. Returning to the interview room in a more relaxed atmosphere was beneficial for the participants as they exchanged ideas about what went well and what could be strengthened. Focus areas included feedback from the administrators regarding the teacher candidate's first impression, body language, responses to questions, and suggestions to strengthen weak responses, as well as critiques of the résumé and letter of application. Feedback was also given by the teacher candidate so the panel could learn ways to put the interviewees more at ease, how to follow responses with probing questions to elicit greater depth or examples, and questions the candidate was expecting to be asked but were missed opportunities by the administrative teams.

After all three rounds of interviews were completed, the whole group reconvened in the lecture hall. During this meeting, each administrative team congratulated the best teacher candidate that they had interviewed, and each job winner was awarded a certificate as an "employment offer." At the conclusion of the hiring simulation, all participants were provided with an opportunity to give feedback to the organizing faculty regarding their overall impressions of the simulation. The survey questions that were given to the teacher candidates and leadership candidates can be found in Appendices 3 and 4, respectively. The surveys that are collected following each hiring simulation are used to make improvements during successive years.

Implications for teacher education

Benefits for collaborating faculty
The hiring simulation provided collaborating faculty a unique opportunity to work within a PLC model across university departments and program areas, a rare approach among higher education faculty (Addis et al. 2013). In addition to sharing the heavy workload inherent to planning and implementing a major event, numerous other benefits resulted from collaboration among higher education faculty. Among these were stronger professional relationships, distribution of responsibilities aligned with faculty expertise, and greater efficiency in managing time and resources. The higher education faculty that engaged in planning and implementing the hiring simulation noted these positive outcomes during a collegial debriefing and review of the reflective analyses received from participants. Positive outcomes for the authors and other higher education faculty involved in the hiring

simulation PLC suggest that additional research may better inform the work of similar groups participating in future PLC collaborative models.

Benefits for participating student groups

The interdisciplinary study provides students the opportunity to engage in higher-order thinking skills. Bloom's (1956) taxonomy of educational objectives is the standard by which educators measure their students' academic engagement through the use of active verbs; the highest four of the six levels of Bloom's revised taxonomy are focal points of the hiring simulation. Participants *create* the documents that will be used during the interviews and *apply* their knowledge of education and educational practice to asking and answering questions during the interview; both teacher and leader candidates have opportunities to *analyze* the interview process and *evaluate* themselves, their counterparts, and their peers.

The hiring simulation offers participants a safe environment in which to experience the positive and negative factors often present during the employment process. While some of the administrative teams, for example, quickly reached a post-interview selection, others were challenged in determining a single "job winner." Administrative teams experiencing the greatest success during the post-interview decision making process, similar to the functions of real-world PLCs, remained conscious of their goal, centered discussion on relevant circumstances, and contributed positively to problem-solving efforts (DuFour 2007). Though the employment opportunities from administrative teams were based on artificial criteria, post-interview discussion and decision-making were driven by authentic responses from the teacher applicants. Introduction of the human element created an even greater sense of responsibility for administrators in making the "right" decision while protecting the integrity of all pre-service teachers involved in the interview process. Kolb (1983) describes this transformation as a bridge that transitions participant thinking from a simulated environment to real-world application.

The final 10 minutes of each interview round consisted of warm and cool feedback from the interview team to the teacher applicant, and from the teacher applicant to the interview team. Providing post-interview feedback offered both the teacher candidate and administrative interview team members an opportunity to gain understanding of the impression they make on others as they answer questions, exercise communication skills, and demonstrate knowledge about subject area content in a pressured environment (Peterson 2002). Administrative teams worked collaboratively to identify key points of feedback to encourage the teacher applicant while offering suggestions to strengthen future interviews in real-world environments. Similarly, teacher interviewees and peers assigned to observe the interview in progress collaborated to provide warm and cool feedback for the interview team (Clement 2013; Hughes 2014).

Including the application process as a component of the hiring simulation exercise served parallel purposes that were mutually beneficial for administrator and teacher participants. Teacher candidates gained knowledge regarding procedures for initial contact protocols and submitting completed applications with supporting documentation; school administrators benefitted from analyzing the qualifications, preparation of candidates, and self-described skill sets found in applications to the ideal candidate's qualities as advertised in the job description.

Participants were positive in their evaluation responses, which leads the authors to believe the simulation practice is a good one. Students in both programs benefitted from their respective roles in the simulation and felt better prepared for the real event of interviewing.

Benefits for regional school districts

Participation in the hiring simulation reaches beyond providing prospective teachers and leaders stronger skills in the interview process. Because participants include pre-service teachers and leadership candidates from schools and districts throughout the university service area, regional school districts gain a better understanding of the applicant pool from which they may draw ahead of the traditional spring hiring season. Additionally, pre-service teachers participating in the hiring simulation are provided an opportunity to interact with leadership candidates, many of whom are practicing principals or assistant principals at local schools. On occasion, participation in the hiring simulation has led to real-world employment opportunities at regional schools for some pre-service teachers.

Concluding Remarks

This is a winning proposition for all concerned. Professors collaborate across disciplines. Students in educational leadership and student teaching internships are exposed to and practice the art of interviewing successfully from their respective points of view. Pre-service teachers are allowed to practice in a "safe" environment for the adventure awaiting them after successfully interviewing for a teaching position. In addition, aspiring leaders practice a critical portion of their position, interviewing and evaluating teachers, again in a safe environment. The university, as a result, exposes its educational partners to its programs, as evidenced through the contributions of students in this event.

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Appendix 1. Hiring fair simulation teacher candidate evaluation rubric

Hiring Fair Simulation
Teacher Candidate Interview Evaluation Rubric

Interview Panel Members:
Complete one rating form for each teacher candidate interviewed. The candidate receiving the highest total score upon completion of all interviews will receive a certificate awarding them an "employment offer." In the event of a tie, the highest average score for Preparation will determine the winning candidate.

Circle the appropriate rating:

1 – Strongly Disagree   2 – Disagree   3 – Neutral   4 – Agree   5 – Strongly Agree

Introduction					
Arrived on time	1	2	3	4	5
Delivered a firm handshake	1	2	3	4	5
Arrived dressed appropriately	1	2	3	4	5
Greeted interview panel members using proper names	1	2	3	4	5
Poise					
Demonstrated good eye contact	1	2	3	4	5
Demonstrated appropriate posture	1	2	3	4	5
Was courteous	1	2	3	4	5
Delivered good non-verbal feedback	1	2	3	4	5
Stated verbal thanks immediately following interview	1	2	3	4	5
Preparation					
Demonstrated preparation for interview question responses	1	2	3	4	5
Applied appropriate learning theory to question responses	1	2	3	4	5
Asked insightful follow-up questions	1	2	3	4	5
Spoke from "experiences" rather than "what I would do"	1	2	3	4	5
Asked about next steps following the interview process	1	2	3	4	5
Subtotal: Interview score _____ / 70					

Application Paperwork					
Pre-interview revisions made as recommended by interview team	1	2	3	4	5
Résumé and cover letter described candidate accurately	1	2	3	4	5
Résumé and cover letter ready for real-world job market use	1	2	3	4	5
References with complete contact information provided	1	2	3	4	5
Evidence of state teaching certification held or in progress	1	2	3	4	5
Thank-you letter in proper business format included in packet	1	2	3	4	5
Subtotal: Application score _____ / 30					
TOTAL: Interview and Application _____ / 100					

Comments:

Appendix 2. Hiring fair simulation administrator evaluation rubric

Hiring Fair Simulation
Administrator Interview Evaluation Rubric

Teacher Candidate:
Complete one rating form for each member of your interview panel.

Circle the appropriate rating:

1 – Strongly Disagree   2 – Disagree   3 – Neutral   4 – Agree   5 – Strongly Agree

Introduction					
Began on time	1	2	3	4	5
Delivered a firm handshake	1	2	3	4	5
Dressed appropriately	1	2	3	4	5
Greeted candidate using proper name	1	2	3	4	5
Poise					
Demonstrated good eye contact	1	2	3	4	5
Demonstrated appropriate posture	1	2	3	4	5
Was courteous	1	2	3	4	5
Made an attempt to enable candidate to feel at ease	1	2	3	4	5
Delivered good non-verbal feedback	1	2	3	4	5
Stated verbal thanks immediately following interview	1	2	3	4	5
Preparation and Process					
Demonstrated preparation for interview questions asked	1	2	3	4	5
Asked questions relevant to candidate's area(s) of expertise	1	2	3	4	5
Asked insightful follow-up questions	1	2	3	4	5
Gave background information about the school, district, and/or position	1	2	3	4	5
Offered next steps following the interview process	1	2	3	4	5
Total score _____ / 75					

Comments:

Appendix 3. Hiring fair simulation survey questions for teacher candidates

Hiring Fair Simulation Survey Questions
(Teacher Candidates)

Take a few minutes and reflect back on the hiring fair simulation. Please respond to the following questions.

Please circle the most appropriate response:
     1 – Strongly Disagree
     2 – Disagree
     3 – Neutral
     4 – Agree
     5 – Strongly Agree

The interview panel seemed prepared to interview me.	1	2	3	4	5
The interview panel asked relevant questions pertaining to my content area.	1	2	3	4	5
The interview panel seemed familiar with my résumé and asked about my experiences.	1	2	3	4	5
Participating in the hiring fair simulation sets me at ease for future interviews.	1	2	3	4	5
I was able to **give** important feedback to the interview panel that they may not have gotten without this experience.	1	2	3	4	5
I was able to **receive** important feedback from the interview panel that I may not have gotten without this experience.	1	2	3	4	5
Overall, I believe I have become a better interviewee after participating in the hiring fair simulation process.	1	2	3	4	5

As you prepare for "real" interviews, what will you take with you from this experience?

If you were to be involved with this process again, what could be done differently to make it more meaningful?

Appendix 4. Hiring fair simulation survey questions for leadership candidates

Hiring Fair Simulation Survey Questions
(Leadership Candidates)

Take a few minutes and reflect back on the hiring fair simulation. Please respond to the following questions.

Please circle the most appropriate response:
　　　1 – Strongly Disagree
　　　2 – Disagree
　　　3 – Neutral
　　　4 – Agree
　　　5 – Strongly Agree

Did you feel prepared with respect to the candidate's content area of certification during the interview?	1	2	3	4	5
Did you feel knowledgeable with respect to the candidate's experiences, education, etc. during the interview?	1	2	3	4	5
The interview process set me at ease and made it easier for me to improve on my questioning technique.	1	2	3	4	5
I was able to **give** important feedback to the teacher candidate that they may not have gotten without this experience.	1	2	3	4	5
I was able to **receive** important feedback from the teacher candidate that I may not have gotten without this experience.	1	2	3	4	5
Overall, I believe I have become a better interviewer after participating in the hiring fair simulation process.	1	2	3	4	5

As you prepare for "real" interviews, what will you take with you from this experience?

If you were to be involved with this process again, what could be done differently to make it more meaningful?

Appendix 1. Hiring fair simulation teacher candidate evaluation rubric

Hiring Fair Simulation
Teacher Candidate Interview Evaluation Rubric

Interview Panel Members:
Complete one rating form for each teacher candidate interviewed. The candidate receiving the highest total score upon completion of all interviews will receive a certificate awarding them an "employment offer." In the event of a tie, the highest average score for Preparation will determine the winning candidate.

Circle the appropriate rating:

1 – Strongly Disagree 2 – Disagree   3 – Neutral   4 – Agree   5 – Strongly Agree

Introduction					
Arrived on time.	1	2	3	4	5
Delivered a firm handshake.	1	2	3	4	5
Arrived dressed appropriately.	1	2	3	4	5
Greeted interview panel members using proper names.	1	2	3	4	5
Poise					
Demonstrated good eye contact.	1	2	3	4	5
Demonstrated appropriate posture.	1	2	3	4	5
Was courteous.	1	2	3	4	5
Delivered good non-verbal feedback.	1	2	3	4	5
Stated verbal thanks immediately following interview.	1	2	3	4	5
Preparation					
Demonstrated preparation for interview question responses.	1	2	3	4	5
Applied appropriate learning theory to question responses.	1	2	3	4	5
Asked insightful follow-up questions.	1	2	3	4	5
Spoke from "experiences" rather than "what I would do."	1	2	3	4	5
Participating in the hiring fair simulation sets me at ease for future interviews.	1	2	3	4	5
Subtotal: Interview score _____ / 70					

Application Paperwork					
Pre-interview revisions made as recommended by interview team.	1	2	3	4	5
Résumé and cover letter described candidate accurately.	1	2	3	4	5
Résumé and cover letter ready for real-world job market use.	1	2	3	4	5
References with complete contact information provided.	1	2	3	4	5
Evidence of state teaching certification held or in progress.	1	2	3	4	5
Thank-you letter in proper business format included in packet.	1	2	3	4	5
Subtotal: Application score _____ / 30					
TOTAL: Interview and Application _____ / 100					

Comments:

Appendix 2. Hiring fair simulation administrator evaluation rubric

Hiring Fair Simulation
Administrator Interview Evaluation Rubric

Teacher Candidate:
Complete one rating form for each member of your interview panel.

Circle the appropriate rating:

1 – Strongly Disagree 2 – Disagree   3 – Neutral   4 – Agree   5 – Strongly Agree

Introduction					
Began on time.	1	2	3	4	5
Delivered a firm handshake.	1	2	3	4	5
Dressed appropriately.	1	2	3	4	5
Greeted candidate using proper name.	1	2	3	4	5
Poise					
Demonstrated good eye contact.	1	2	3	4	5
Demonstrated appropriate posture.	1	2	3	4	5
Was courteous.	1	2	3	4	5
Made an attempt to enable candidate to feel at ease.	1	2	3	4	5
Delivered good non-verbal feedback.	1	2	3	4	5
Stated verbal thanks immediately following interview.	1	2	3	4	5
Preparation and Process					
Demonstrated preparation for interview questions asked.	1	2	3	4	5
Asked questions relevant to candidate's area(s) of expertise.	1	2	3	4	5
Asked insightful follow-up questions.	1	2	3	4	5
Gave background information about the school, district, and/or position.	1	2	3	4	5
Offered next steps following interview process.	1	2	3	4	5
Total score _____ / 75					

Comments:

Appendix 3. Hiring fair simulation survey questions for teacher candidates

Hiring Fair Simulation Survey Questions
(Teacher Candidates)

Take a few minutes and reflect back on the hiring fair simulation. Please respond to the following questions.

Please circle the most appropriate response:
　　　1 – Strongly Disagree
　　　2 – Disagree
　　　3 – Neutral
　　　4 – Agree
　　　5 – Strongly Agree

The interview panel seemed prepared to interview me.	1	2	3	4	5
The interview panel asked relevant questions pertaining to my content area.	1	2	3	4	5
The interview panel seemed familiar with my résumé and asked about my experiences.	1	2	3	4	5
Participating in the hiring fair simulation sets me at ease for future interviews.	1	2	3	4	5
I was able to **give** important feedback to the interview panel that they may not have gotten without this experience.	1	2	3	4	5
I was able to **receive** important feedback from the interview panel that I may not have gotten without this experience.	1	2	3	4	5
Overall, I believe I have become a better interviewee after participating in the hiring fair simulation process.	1	2	3	4	5

As you prepare for "real" interviews, what will you take with you from this experience?

If you were to be involved with this process again, what could be done differently to make it more meaningful?

Appendix 4. Hiring fair simulation survey questions for leadership candidates

Hiring Fair Simulation Survey Questions
(Leadership Candidates)

Take a few minutes and reflect back on the hiring fair simulation. Please respond to the following questions.

Please circle the most appropriate response:
       1 – Strongly Disagree
       2 – Disagree
       3 – Neutral
       4 – Agree
       5 – Strongly Agree

Did you feel prepared with respect to the candidate's content area of certification during the interview?	1	2	3	4	5
Did you feel knowledgeable with respect to the candidate's experiences, education, etc. during the interview?	1	2	3	4	5
The interview process set me at ease and made it easier for me to improve on my questioning technique.	1	2	3	4	5
I was able to **give** important feedback to the teacher candidate that they may not have gotten without this experience.	1	2	3	4	5
I was able to **receive** important feedback from the teacher candidate that I may not have gotten without this experience.	1	2	3	4	5
Overall, I believe I have become a better interviewer after participating in the hiring fair simulation process.	1	2	3	4	5

As you prepare for "real" interviews, what will you take with you from this experience?

If you were to be involved with this process again, what could be done differently to make it more meaningful?

Development and Embedding of the Horizontal Learning System into the Hungarian Institutional System of Pedagogical Services

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Our research is part of a project aiming to develop and embed the network of reference institutions into the system of pedagogical services. Applying a mixed-method approach in an action research paradigm, the outcome of the project was a diagnostic tool and a practical methodological toolset for public education institutions to help them analyse and develop themselves into professional learning communities (PLC). We based our work on the PLC concept with a social-constructivist approach and workplace learning research. Several studies link participation in PLCs with positive changes in teacher practice and increased student performance. We organized several workshops in six institutions, where building upon the results of the diagnostic tool, the methodological tools were tested and refined. We validated the diagnostic tool and results showed that even the most advanced reference institutions have room for improvement in reflectivity and leadership support, which is a signal for teacher education.

Keywords: professional learning community, horizontal learning, continuous professional development, workplace learning, school-based learning

Context of the research
The Hungarian education system
Our project is embedded in the Hungarian educational system, so therefore it is necessary to give a brief overview on the main aspects of the national educational system. Hungary is similar to other Central European, ex-Socialist countries. Hungary has one of the highest rates of upper-secondary and post-secondary non-tertiary attainment among 25–64 years old among OECD countries, while the total expenditure on educational institutions/GDP for all levels of education is comparatively low (1.4%). The educational system experienced fundamental changes in 2011, when public education institutions got new, a centralized administration (Klebelsberg Institution Maintenance Centre). Nursery schools remained under the local municipalities, vocational education transferred to the Ministry for National Economy, and higher education institutions remained at the Ministry for Human Capacities. The monopolistic, centralised Klebelsberg Institution Maintenance Centre became the sole employer for teachers in public education institutions, and it struggles with financing wages and other basic equipment (OECD 2014).

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Context of the project

The research was conducted under the Hungarian Institute for Educational Research and Development during the Social Renewal Operation Programme: Twenty-First Century School Education (development and coordination). Hierarchically, our project fell under the second sub-project's (called Development of the Institutional System of Pedagogical Services: Results Based) second theme (development of the network or reference institutions [RIs] and its integration into the system of professional services). The main aims of this theme were to establish and develop qualification procedures or RIs and to develop a network of horizontal learning (HL) while integrating RIs into the renewed institutional system of pedagogical services (ISoPS). The ISoPS were under development during the time of our research, but their role was explicit: to enhance the effectiveness of education by supporting teachers, principals, and institutions directly or indirectly and maintaining a knowledge and quality management function. RIs can be characterized as institutions that are unique and exemplary to other institutions. They operate coherently, they are inclusive, they have child-centred pedagogical best practices, and organisational innovations that can be published and shared as a pedagogical professional service (see Figure 1).

Timeline of the research and development

To give an overview of the project, we provide the timeline in Figure 1. We had a limited amount of time to carry out our research, which is why we considered it as a pilot study for the diagnostic tool and the methodological toolset. The first part of our work consisted of professional workshops where we gathered information about the concept and operation of PLCs and, based on this experience and on an extensive literature review, we developed a model for PLCs. This model corresponds to the dimensions of the tool and acts as a methodological toolset to help institutions facilitate their own processes. The second phase of the project was the fieldwork, where we conducted 23 development workshops to 124 teachers in eight institutions. After that, in the third phase, we summarized the results of the diagnoses, document analyses, participant observation, interviews etc., and refined our PLC model and methodological tools. The aim of the fourth and final phase was to disseminate our results.
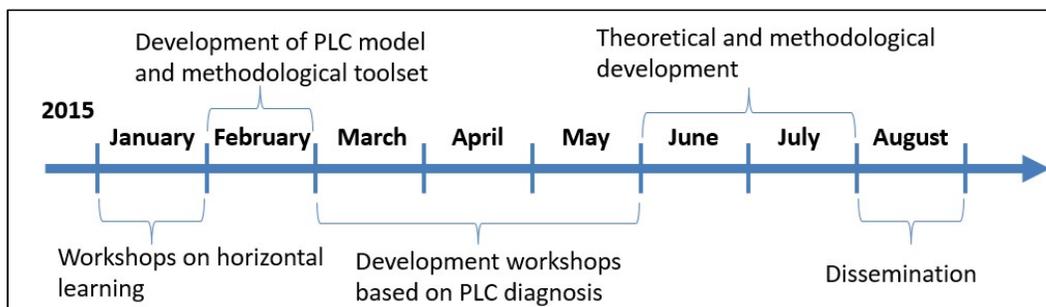

Figure 1. Time frame of the project

Aims of the research

Based on previous research on HL (Szabó, Singer, and Varga 2011), we set four goals for our project. (1) We wanted to create an extensive literature review on the concept of HL and its theory and practice, and then summarise the results in an informative publication for teachers and principals. (2) Based on expert workshops and our literature review, we wanted to develop a model that described the characteristics of a PLC. We created an 80-item tool built around four capacities. (3) The diagnostic tool's purpose was only to identify

possible areas to improve in an organisation; therefore, we wanted to create a methodological toolset (exercises, processes, templates, etc.) to support institutions in the development of PLCs. (4) The main aim of our pilot project was to test the diagnostic tool and the methodological toolset in educational institutions. It is from this that the research approach and methodology of our project stems.

We successfully summarized the findings of our literature review in an informative publication (Horváth, Kovács, and Simon 2015) and we compiled a methodological toolset (3) for teachers to create PLCs in their own institutions (Horváth et al. 2015). This paper will summarize the results of the model development (2) and institutional workshops (4) as an action research project.

Theoretical framework

We based our theoretical framework on the theories of information societies and knowledge economies where information and knowledge are the primary capital, which emphasize the role of lifelong and life-wide learning. We underpinned our research with a sound approach of learning theories, namely HL and network learning, adult learning, and workplace learning, which all take the learners as central to learning and treat them as a partner. Based on these theoretical assumptions, we examined the previous literature on PLCs. The following section will discuss these theoretical elements further.

Information society and knowledge economy

The concept of an information society (Bell 1974) places information and knowledge as important types of capital. This change has occurred as a result of three driving forces (Castells 1996): The revolution of the information-communication technologies in the twentieth century, and the economic crisis and the rise of social and cultural movements. Knowledge is becoming more and more of an asset of societies and organizations. This agenda calls forth the concept of an economy that is based on knowledge, with knowledge-intensive firms. In this context, the optimal use, allocation, and development of skills are pivotal to creating a high-skill equilibrium skill ecosystem (OECD 2011). As Zhang and Liao (2010) state, there should be a new mission for (higher) education institutions in order to be able to compete in this changing environment, and to ensure the competitiveness of the knowledge that they produce, manage, and share. This would require a certain flexibility from organizations and from individuals as well. Flexible work is becoming more and more widespread, and this new form of work will demand adaptability from the employee. If this future is currently not a reality for education institutions, it must be noted that the students who come out of the system will need to adapt to flexible work, which means educational institutions must prepare their students to be able to cope with change. To do so, they must also become learning organizations themselves (Fullan 1993).

Horizontal Learning

In this social and economic context, the notion of lifelong and life-wide learning comes into the forefront by encouraging non-formal and informal learning to be taken more into consideration. HL is a term for a form of learning where the transaction of knowledge (which is created in practice) takes place in a partnership among equal partners (Boshier and Huang 2007; Nilsen 2010; Cowie and Otrel-Cass 2011; Peng-Fei 2014). In non-formal and informal contexts, HL is very common, but we can see examples in formal learning environments as well. If we think about the skills of teachers, they are often not explicit because they usually develop during teaching practice, i.e., the context of workplace

learning (OECD 2005). Learning and documentation of applied learning are the central aspects of HL. In the context of HL, there is an increased responsibility on the community because the foundations of the HL process are self-evaluation and reflexivity. It is characterised by collaborative learning, and empowerment is an important aspect. It is mainly a tool for knowledge management. The development of a HL system means a change in the organizational and pedagogical culture.

Adult learning

Adult learning theory supports the concept of HL and focuses on partnership. The theory states that adults are self-directed learners and they learn only what they feel they need to learn. They are also problem-led, so the learning situation must be realistic. Adult learning theory emphasizes the role of active participation in the learning process, and that adults learn best in informal situations. In an adult learning situation, the prior learning experiences must be taken into consideration for further learning (Knowles, Holton, and Swanson 2005). The characteristics of adult learning reflect the concept of HL and workplace learning. In a HL situation, adults learn form their own experiences and challenges, so it is definitely realistic and problem-oriented.

Workplace learning

We have arrived at the concept of workplace learning, which is also an informal practice-based and experience-based type of learning carried out in collaboration (Beckett and Hager 2002; Brown 2009). In a school context, the following list of informal/workplace learning activities can be identified (McGilchrist, Myers, and Reed 2011):

- demonstration classes
- class observation
- group dialogue
- teaching staff meeting
- group teaching
- co-planning
- follow-up on student performance
- continuous dialogue with students
- asking for the opinion of students
- moderating the work of students
- teaching each other
- case study discussions
- individual e-learning
- task exchange
- action research
- discussion of opinions
- learning from student teachers
- observation of colleagues from another institution

- coaching
- asking for a teacher mentor
- asking senior colleagues for collaboration
- discussion with experts of other disciplines
- mentoring colleagues
- thorough evaluation of completed projects
- reading professional literature
- self-evaluation
- joint projects with colleagues from within and outside of the school

As we can see, there is a rich repertoire for workplace learning in schools. Any of these activities possibly occur on a daily basis in some institutions, but raising awareness is very important in order to utilize the possibilities of workplace learning and maximize the development of human capital. Combining HL, adult learning theory, and workplace learning, the aim of our project is to create a diagnostic tool for assessing the organizational culture of schools based on the mentioned theoretical assumptions and to develop a methodological toolset to facilitate workplace learning and HL in schools for (adult) teachers.

Professional Learning Communities
We can find all the previously mentioned theoretical assumptions in the notion of PLCs. A PLC is a process where teachers constantly collaborate, share their knowledge, and develop themselves in order to serve the interests of their students better. The PLC puts the process of learning in the centre as well by building upon a culture of collaboration using a results-oriented approach, from which results must be measurable (Hord and Sommers 2008; DuFour et al. 2010). The concept of PLC builds upon the socio-cognitivist approach of learning developed by Vygotsky (1978). The PLC, by emphasizing the need for setting measurable goals, ensures that the learning experience is based on current problems and that it is important to the learner. The culture of collaboration assumes the partnership approach in learning and knowledge-sharing as well. Therefore the concept of PLC and the theories of HL, adult learning, and workplace learning all support each other.

Professional Learning Community capacities
Based on this theoretical background and on the results of expert workshops, we developed a theoretical model for a PLC that expands and deepens the capacity framework for the multidimensional and multilevel model for PLCs of Sleegers et al. (2013). In their model, they list three capacities: human, interpersonal, and organizational, which are all needed to develop a PLC. We added a fourth capacity called network capacity. According to the aim of our project, we need to develop the collaboration between RIs, so a network learning function that reaches further then the boundaries of individual organizations must be considered. We deepened the understanding of these capacities by adding sub-dimensions to them. The four capacities and the nine sub-dimensions constitute the static aspect of our model. We added a dynamic aspect as well, which is a development function and means that the whole PLC and the individual sub-dimensions can be described in a process of evolution, i.e., knowing, understanding, believing, and acting, which would define a certain level of a well-functioning PLC. Figure 2 summarizes our model visually.
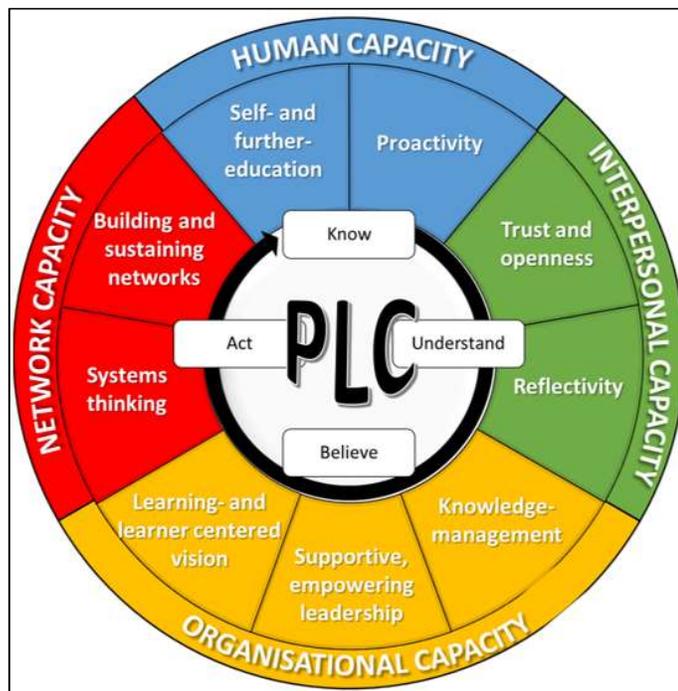
Figure 2. PLC model based on Sleegers et al. (2013)

The sub-dimension of self- and further education encompasses the concept of self-directed learning, thus analysing the gaps and needs for learning and the development of supportive relationships. Along with the sub-dimension of proactivity, which means a sense of initiative, the two sub-dimensions encompass the human capacity. Interpersonal capacity means, on one hand, a climate of trust and openness, where knowledge-sharing and collaboration can thrive, and on the other hand, a culture of reflectivity, which implies a practice of constantly reviewing experiences. Organisational capacity takes the concept of PLC into a more structured and formal level and deals with knowledge management (the gathering, sharing, and applying of information throughout the organization), supportive and empowering leadership, which is the basis for commitment, and a learning- and learner-centred vision for the organization that was developed in collaboration with colleagues. Last but not least, network capacity means a systems-thinking approach, acknowledging the embeddedness of different actors in the system, and also the ability to coordinate and sustain networks, which implies a working network learning skill.

Under each capacity, we developed 20 statements that describe the given capacity and compiled them into a questionnaire, which will be detailed in the next part.

Research approach and methodology
Qualitative aspect
Our project can be characterised as a research and development action research with mixed methodology. Taking our resources (human and time) into consideration, we selected eight schools from the list of RIs and approached them with the concept of our project. We aimed for variance maximisation in selecting the schools (Eisenhardt 1989). The sample consisted of a vocational school, a primary school maintained by a higher education institution, two religious primary schools, a special needs education school, two nursery schools, and a secondary education institution. We conducted one to four workshops in each institution (23 in total, with 124 individual participants). We based the workshops on an initial

diagnosis with the previously introduced PLC self-diagnostic tool. Supplementing the diagnosis with content analysis of documents, interviews, and participant observation of the workshops, we created case studies to create triangulation (data, person, method, and theory) based on Denzin (1988). The workshops can be considered as developmental interventions where we tested the tools in our methodological toolset, building up the development process according to the needs of the organization from the results of the diagnosis. We ensured the participation of the teachers as well, asking constantly for feedback and building upon these opinions. Based on the feedback and other results, we refined our tools, thus concluding the qualitative aspect of our research.

Quantitative aspect

The PLC self-diagnostic tool is an organizational development tool that aims to assess the organizational culture of an educational institution according to an operation of a PLC. It consists of four capacity and nine sub-dimensions, each capacity with 20 statements. These statements can only be subjectively perceived because there are no outside references or standards against which it can be decided whether or not they are true. It is up to the individual to decide from his or her own point of view whether or not the statement applies to the institution. These answers can be summarized as a percentage showing how the given sub-dimension works in the institution. It also allows fine-tuning of the results by comparing the perspectives of different groups, e.g., principals and other employees. This tool can be used to facilitate dialogue on the different perceptions of the organization and foster common sense making by considering the lowest percentage statements or the statements with the largest standard deviation. To validate the tool, we selected 5 RIs with a large amount of participants in the questionnaire and we added 6 non-RIs (NRIs) in order to compare the results, as we expected that RIs would perform better on the PLC scales than NRIs. From 167 participants, we analysed the results with SPSS 21 using an exploratory factor analysis to explore the factors of a PLC, a Mann-Whitney test to compare the means of RIs and NRIs, and linear regression to identify the most dominant characteristics of RIs.

Obviously the sample size limits our ability to draw conclusions, but we can use our results to formulate well-rounded hypotheses on the characteristics of RIs and the scales of PLCs. Due to the fact that our PLC self-diagnostic tool is in Hungarian, we have not provided it in the appendix.

Findings
Exploratory Factor Analysis on the model

Our first task was to use an exploratory factor analysis on the 80 statements of the PLC self-diagnostic tool to get 9 factors. We used alpha factoring in order to maximize the Cronbach's alpha scores for each factor and a varimax rotation to create independent factors. With a Kaiser-Meyer-Olkin measure of sampling adequacy of 0.794 and a significant Bartlett test ($p < 0.001$), we had a 55.036% of the total variance explained with these nine factors. The new factors show only a slight deviation from the original sub-dimensions. The sub-dimensions became mainly focused on the most important aspect of their function. Human capacity got self-directed learning [6.16%] (from self- and further education) and partnership (7.45%) (from proactivity), which emphasized a collaborative effort, while the original focused solely on the individual initiative. The interpersonal capacity retained the trust and openness (6.79%) factor, but focused reflectivity into a culture of feedback (6.68%). The organizational capacity had a more focused PLC vision (7.4%) and a more PLC-oriented approach than the learning- and learner-centred vision. Knowledge-sharing (6.67%)

was extracted from knowledge management, and supportive leadership (5.56%) replaced supportive, empowering leadership. Network capacity converged into one factor of network learning (5.19%) and we had a new, individual factor, which cannot be traced back to any other capacity: continuous professional development (3.14%), with a single statement. This means that a human capacity for lifelong learning, as well as an interpersonal capacity of a culture of learning and an organizational capacity creates this structure, and a network capacity can utilize this factor as well.

Comparison of RIs and NRIs

To compare RIs and NRIs in the new factors, we used the non-parametric Mann-Whitney tests because the results of the Kolmogorov-Smirnov test for normality was significant for all variables. The summary of the results can be seen in Table 1.

Table 1. Comparison of RIs and NRIs alongside the factors of PLCs

Factors	RI means	NRI means	p
Partnership	0.07	-0.12	p=0.699
PLC vision	0.13	-0.22	p=0.014
Trust and openness	0.07	-0.13	p=0.106
Culture of feedback	-0.08	0.14	p=0.099
Knowledge-sharing	0.10	-0.17	p=0.087
Self-directed learning	0.20	-0.34	p=0.006
Supportive leadership	-0.08	0.13	p=0.063
Network learning	0.20	-0.34	p<0.001
Continuous professional development	0.05	-0.08	p=0.634

Only the factors of PLC vision, self-directed learning, and network learning showed significant differences between RIs and NRIs, which means these could be the key aspects of characterizing and developing RIs.

If we look at the original theoretical sub-dimensions of the PLC self-diagnostic tool, we find that every sub-dimension is significantly different in RIs and NRIs. The results of this comparison are shown in Table 2 with the notion that network capacity showed a normal distribution (Kolmogorov-Smirnov p=0.082), so in those cases, a independent sample t-test was used.

Table 2. Comparison of the theoretical capacities and sub-dimensions of PLCs in RIs and NRIs

Capacities and sub-dimensions	RI mean	NRI mean	p
Human capacity	**90.52%**	**71.90%**	p<0.001
Self- and further education	93.49%	77.81%	p<0.001
Proactivity	87.07%	64.90%	p<0.001
Interpersonal capacity	**82.48%**	**69.88%**	p=0.001
Trust and openness	89.67%	77.00%	p<0.001
Reflectivity	79.47%	66.88%	p=0.003
Organizational capacity	**84.81%**	**70.71%**	p<0.001
Knowledge management	88.53%	71.05%	p<0.001
Supportive, empowering leadership	81.53%	72.26%	p<0.001
Learner- and learning-centred vision	85.66%	68.64%	p<0.001
Network capacity	**76.36%**	**66.55%**	p=0.009
Systems thinking	84.33%	76.52%	p=0.026
Building and sustaining networks	71.23%	60.43%	p=0.036
PLC Index	**83.77%**	**69.86%**	p<0.001

As we can see, all the capacities and sub-dimensions show a significant difference between RIs and NRIs, which means that the results of the factor analysis can show a more detailed approach to the operation of RIs and PLCs.

Main characteristics of RIs

In order to discover the main characteristics of RIs, we conducted a linear regression with the dependent variable of RI status (yes/no) and all 80 of the statements of the PLC self-diagnostic tool, using a stepwise method. The first nine items produced an R^2 of 0.503, which means that the variances of the dependent variable can be explained in 50.3% by the variances of this nine items. The nine statements that can be considered as the most important aspects of RIs are as follows:

- Available resources
- High expectations
- Emphasis on student government as a means of learning
- Exemplary leadership
- Frequent and deliberate reflection
- Knowing the individual learning needs of students
- Mentoring
- Collaboration with previous and/or next level of education

The nine statements confirm and validate the recruitment process of RIs, which focused on the same aspects of organizations. In the main characteristics of RIs, we can identify the main characteristics of PLCs as well.

Summary of qualitative results

The paper focuses on the details of the quantitative results, but we also mention and summarize the results of our qualitative inquiries: interviews, participant observations, and content analysis. Principals expressed their concerns regarding the main barriers to creating PLCs: lack of resources, negative attitudes, burnout, poor organisational culture, and uncertain legal environment. Despite the negative context, after the fourth workshop, we experienced a positive shift in attitudes, and after the programme, principals articulated the possible benefits of our workshops, and thus the development of PLCs: a chance to take a conscious look at pedagogical processes, getting to know colleagues in different situations, teambuilding, good input and tools for organisational development, and it develops systems thinking and ownership.

Conclusions

Taking into consideration both the quantitative and qualitative results, we can conclude that the initial PLC self-diagnostic tool can be used as an assessment tool for a PLC-compatible organizational culture. We must note that the precise differences between RIs and NRIs can be interpreted with the new factor model, but that is only a more focused version of the original tool and for diagnostic purposes, the original tool is better. Looking at the results of the comparison of means, we have PLC vision, self-directed learning, and network learning as the main differing factors between RIs and NRIs. These three factors correspond to the definition of a PLC (collaboration, results-oriented, and measurable goals). Building on these results, we can hypothesise that RIs are working as PLCs as they have a collaboratively chosen, measurable vision and they are capable of coordinating their own learning efforts in a collaborative way, which also means there is a knowledge sharing aspect as well.

To fine-tune our understanding of RIs and PLCs, we must consider the nine most important aspects of RIs. The first item is available resources. This does not mean that RIs have more resources than NRIs; it simply implies that RIs do not consider the lack of resources as much of a barrier as NRIs. As the soul of a PLC is the learning-centred approach, we can see in these results that the students' role is pivotal. Further items deal with student government as a means of learning, knowing the individual learning needs of students, and strong collaboration with the previous and/or next level of education. A true PLC must reflect frequently and deliberately on its core processes, which focus on the students, and in doing so, the institution must cooperate with other partners. Regarding the operation of the RIs, principals can express their high expectations to teachers and demonstrate exemplary leadership and mentoring.

We can see that RIs are operating as PLCs (and that there is a definite difference between RIs and NRIs), which means that they are recruited for a reason and which justifies the process and could form a hypothesis for future research. To embed this system into the ISoPS, we are planning to implement our findings and tools into the repertoire of pedagogical service providers and teacher education and training institutions using RIs as facilitators for this process. Our toolset consists of 78 tools aiming at the development of PLC capacities, structured alongside the life-cycle process of a PLC: groundwork, introduction to the process, organising teams, team norms, data analysis, learning plan, successful meetings, sustaining enthusiasm, assessing teamwork, and other tools.

Implications for teacher education

Our results can contribute to the field of teacher education as well. By demonstrating the positive qualities and the concept of RIs, this can be considered as a good practice for

creating PLCs. The concept of a PLC can enrich the conceptualization of teacher education and training, broadening the opportunities for learning and rationalizing organizational learning processes to maximise outcomes.

In Hungary, our results can be implemented into the curriculum of teacher education and teacher training as well, with the learning outcomes of getting to know the theoretical background of PLCs and the ability to create and sustain PLCs.

Notes
1. Hungarian source of the definition: https://sites.google.com/site/referenciaintezmenyek/

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Emotions and power to teach

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The aim of this study is to find out the origins of teacher energy to cope in vocational secondary and tertiary educational contexts. Teachers´ occupational well-being is significant in attaining educational goals and intertwined with the success of their work. Motivated teachers are likely to achieve the best learning outcomes of their students. Emotions play an important part in teachers´ work. They are not only a matter of personality, but make up a fundamental aspect of the job. They have to be acknowledged as part of occupational practices reflecting teachers´ experiences of their work situation, commitment and professionalism. Teachers´ occupational well-being is significant in attaining educational goals. Moreover, motivated teachers are likely to listen to their students´ voices, support their colleagues and take responsibility for workplace culture. Motivation seems to be connected to the ethos of teachers´ work.

Key words: attitude, critical experience, professional identity, teachers´ sociocultural environment

Introduction

Teaching is an emotionally demanding profession. Yet, there is not much experimental research examining how the array of emotions that the teachers confront may affect their evaluations of student work, their own demonstration of competence, their behavior and experienced job-satisfaction. This study aims at providing evidence about secondary and tertiary vocational teachers' sources of energy in their work. Opposite to many today´s research outcomes which explain the negative factors in teachers´ work, this study will take another approach asking about the factors that give positive power to teach. In the following chapters a review on the roles of emotion, motivation, professional ethics, well-being, resilience and goal orientation in teachers´ work is given to create the framework for the research part.

Some features in teachers´ work

Emotion has played an increasingly important role in pedagogy and human sciences since the millennium. Van Manen (2002) defines it as the complexity of the relational personal, moral and emotional aspects that occur when teachers interact with their students. The emotions that the teachers feel in their teaching environments may be studied from educational, social and psychological perspectives.

Today´s challenges in education connected to social changes require adaptive emotional skills (Goleman 1995) in all domains of life. Teachers´ involvement emotionally in

teaching occasions is in the focus of their work: students are more or less persons in development that need strong `emotional energy` from the teacher (Fury 2007). It concerns both children, teenagers and adult students. They are all learning and developing towards their goals. The main claim for the emotional dimension of education is the intense personal interaction and emotional control that influences teaching and shapes the development of students and teachers (Nias 1996). Emotional passion for teaching is translated into enthusiasm and emotional energy towards working as well as commitment to students and knowledge. Educational contexts impose intense and extensive emotional activities demanding e.g. teachers to smile when they are internally sad and to manage the challenges imposed by students who have different motivations, abilities and personal histories of learning. (Day 2004.)

Despite the relevance of the recognition that emotions are inseparable from cognitions (Hargreaves 2000), a more cognitive view ignoring the role of emotions in teaching has dominated for the last century (O´Connor 2008). Still, Nias (1996) argued that emotions are of utmost significance in teaching, since they are socially grounded. Emotions influence cognitions, motivations and behaviors of both teachers and students (Leithwood & Beatty 2008).

Feelings and emotions are often used as synonyms in everyday speech when referring to the systems that enable the constant unconscious and conscious activation of threats that people face daily (Damasio1994). Feelings are mental experience of emotions, whereas emotions are complex sets of chemical and neural reactions, biologically determined and dependent on brain mechanisms. They play a role in the regulation of a flexible body and mental functioning. All emotions originate feelings, but not all feelings come from emotions. (Damasio 1999.) Emotions depend on the cognitive assessment of the events and involve relational, motivational and cognitive aspects (Lazarus 1991). On the other hand, the lack of emotion can destroy rationality. Thus a `cool mind` with no emotion does not necessarily lead to opted behavior. (Damasio 1994.)

Emotions have three distinct functions: emotional *understanding and awareness*, emotional *behavior* and emotional *regulation* (Cummings, Braungart-Rieker & Du Rocher Schudlich 2003). Emotional understanding refers to the knowledge of self-emotions and emotions of others (Saarni 1999; Goleman 1995) and also the recognitions of patterns and their rehearsal. Emotional awareness involves a constant interaction between affective and cognitive processes. Emotional behavior is the demonstration of experienced emotional states. Emotional regulation refers to the processes through which we influence the way we experience and express emotions. The conceptualization of physiological, behavioral and cognitive processes enables individuals to modulate the experience and expression of positive and negative emotions. (Gross & John 2003.) Emotional actions and reactions are mediated by self-understanding, but also by contextual conditions (Kelchtermans 2005).

Personal identity influences the expression of emotions: they are performances within the prevailing power relations and rules through which particular identities may or may not appear and therefore emotions play an important role in teacher identity

(Zembylas 2003). The recognition of teachers' emotions and of the situations that trigger them contributes to a deeper understanding of the pedagogical role involved in pedagogical interaction. Emotional awareness is a skill that can also diminish effects of emotion on cognition.

Motivation is based on emotional attitudes, self-efficacy, cognitive goals and professional ethos. The daily work of teachers is both highly stressful and highly rewarding (Shann 1998). From dealing with lesson preparations and negative interactions with students and administration to watching students´ success academically and enjoying extracurricular activities, teachers' daily experiences are laden with emotion (Sutton & Wheatley 2003). Prominent approaches to the study of motivation today involve the exploration of an individual´s desire to feel or appear competent and avoid feeling or appearing incompetent (Nissilä, Karjalainen, Koukkari & Kepanen, 2015). As early as in 1959 Robert White indicated that a main motivator for individuals was personal competence, defined as the ability and skill to interact effectively with the environment. Competence motivation has been found a critical predictor of success. Still, in recent decades, only a handful of theories have been developed or generalized to explain teachers´ competence motivation, such as teachers´ sense of efficacy and teaching concerns (Fuller & Brown 1975).

In contrast, the interest in teachers´ **professional ethics** is ongoing. Recent studies, however, show that the ethical dimensions of teaching practice have been far from adequately studied (Husu & Tirri 2007). The research has been mainly focused on teachers´ professional, moral and ethical duties to students and has, to a lesser extent, asked questions about what happens to the teacher who is sensitive to these duties. Studies of ethical conflicts experienced and reported by teachers have shown that teachers often act in ways that conflict with their consciences. (Colnerud 1997.) It is unethical for a teacher to conform to prescribed practices that are ultimately harmful to students. `Yet, that is what teachers are required to do by policies that are pedagogically inappropriate for some or all of their students` (ibid.). It is described as double loyalty – concurrent loyalty to both the institution and to the students (Darling- Hammond 1985). It is also an ethical problem.

The pressure may also come from the current school reforms in many countries if characterized by managerialism, marketization and privatization (David & Cuban 2010), perhaps also juridification. Laws and rules exercise control over teachers and often seem to be in competition with their professional commitment and moral judgement. This may cause ethical dilemmas. Researchers observed that loneliness, powerlessness and difficulty in articulating the nature of an ethical problem characterized teachers´ discussions of their work (Colnerud 1997). It is unlikely, however, that all teachers run the same risk of moral stress. Moral sensitivity varies from teacher to teacher as do their commitment, resilience and self-efficacy (Day & Gu 2009). Teachers need support in being encouraged to act according to their consciences. Teaching is an ethical and moral profession, and ethics is connected to observed well-being.

Well-being in work places, teachers` well-being in educational environments is still another view of this research. The dialogue between persons, environments and cultures is

constantly shaping and reshaping personalities, cognitive and metacognitive capacities, emotions, social competences and work identities. Although learning in the workplace is not alone recognised as the primary source of teachers' professional competence, it is highly relevant to students, student teachers and in-service teachers. New aspects can be realised: supporting colleagueship, paying attention to the ethics of teachers' work and looking beyond the walls of classroom. (Nissilä 2015a.) Without a mission, vision and understanding how to reach it well-being in workplaces is not, however, reached. For that reason also the goal must be kept clearly in mind.

Goal- orientations are in strong connection to motivation and emotions. When teachers explain their goals as teachers, they speak of student engagement and performance. Another aspect regards their goals towards teaching, for instance how to improve their teaching, which has a consequential effect on their teaching behavior. Some teachers want to be `good teachers` for performance reasons and avoid activities that might increase appearance of incompetence. Some may want to learn new methods and techniques to enhance their teaching effectiveness, which is in line with a desire of mastery.

Goal orientation has been generally referred to as one´s desire to develop or demonstrate competence at a task (Dweck & Legget, 1988). It has been widely investigated and found to affect achievement and many motivational and performance variables. More recently, goal orientation theory has been investigated in relation to work settings. Similar effects occur between motivational and behavioral patterns (Bell & Kozlowski 2002).

One way of defining goal orientations is thus to name three goal orientations in teaching: *learning* (mastery), *proving* (performance-approach) and *avoiding* (performance-avoidance) (McGregor 2001, Elliot & Conroy 2005, Elliot & Church 1997). Although student learning was a primary focus earlier, wider studies of goal orientation towards work-related performance have also begun to appear. Investigators have found that *learning* orientation has a positive effect on job and training performance as well as on positive self-regulatory work behavior (e.g. higher levels of goal setting, intended effort and intended planning). *Proving* goal orientation can have positive effects on work performance as well. *Avoiding* orientation has been found related to lower work performance and intense negative emotions in reaction to negative performance feedback, which in turn can affect future self-regulatory behavior, such as setting lower subsequent goals. (Cron, Slocum, VandeWalle & Fu 2005.)

Goal orientation seems to appear to mediate the relationship between self-efficacy and performance (Phillips & Gully 1997). Consequently, exploring goal orientation towards teaching may help explain the relationship between teacher efficacy and performance when talking about teachers´ sense of personal efficacy and their general orientation to the educational process (Woolfolk & Hoy 1990). Teachers holding different goal orientations towards teaching may be concerned with different aspects of their instruction, e.g. concerns about self, concerns about the task (situations) and concerns about the impact on student learning. We can assume that a teacher´s learning orientation towards teaching would be associated with concerns for impact on students, whereas the performance orientations

would be more associated with the concerns for self-survival and the nature of the tasks. (Fuller & Bown 1975.)

Since teachers´ desire to appear competent and avoid feeling incompetent is complex, goal orientations are only a rough way of assessing attitudes and motivation. Antecedents and consequences were studied in the student contexts, like self-sense (Covington 1992), self-determination (Deci & Ryan 2000) and causal attributions (Weiner 2000), but they do not paint the whole picture. Teachers´ ability to reflect and recognize their experiences and emotional states as well as assessing social, psychological and pedagogical consequences is vital in clarifying their life world.

Shared learning. Still one viewpoint comes from student learning: do their voices tell unwelcome truths to teachers? Shier (2001) identifies five levels of student participation: students are listened to, they are supported in expressing their opinions, their views are taken into account, they are involved in decision-making and they share power and responsibility. These levels can be formed into three stages of commitment: opening, opportunity and obligation (Shier, 2001, 110). For historical reasons, however, the schools rarely consult their students about what the students really expect from the studies and what are their goal orientations. Bragg and Fielding (2005) asks, who is speaking, who is listening, what skills are available, what are the attitudes and dispositions, what kind of systems and organizational cultures prevail, what actions are possible and how can this contribute to a more desirable future. Still, we have to remember that not all young people have the same participatory capital (Wood 2014).

When high school student voices were listened to, their real issue was a message to the teachers. They listed what their teachers should learn: 1) be more approachable, 2) make learning fun, 3) be more motivating, 4) have more realistic expectations and 5) be less grumpy. (Mockler & Groundwater-Smith 2015, 611). Although teachers may be nervous in front of these wishes, they should try to understand professional practice from the perspective of students. It will undoubtedly lead to contributing a neoliberal agenda of `good schools`, which would lead to a new definition of `good teachers` and be connected to teachers´ goal orientations.

The present research will comprise teachers in secondary and tertiary vocational education in Finland who are intended not only to teach a subject with high pedagogical standards but, especially at secondary level, also identify and help students with emotional and behavioral difficulties, to challenge bullying and to promote communication with family. Caring for students is part of a teacher´s work. The high pedagogical standards of cognitive skills concern knowledge, skills, values, attitudes and capability to be used in certain contexts/ situations. Knowledge dimensions can be expressed by factual, conceptual, procedural and metacognitive knowledge which are to lead to understanding. (Krathwohl 2002.) Teachers also need active work life contacts and a wide orientation in their trades and professions.

The teachers interviewed for this research have at least master level academic education in the respective fields of sciences. They teach either secondary or tertiary

vocational students. Teachers' professional and pedagogical issues, i.e. emotions, motivation, ethics, well-being, goal orientations and shared learning were chosen after the preliminary analysis of the research material.

Research questions, participants, data collection and analysis
This case study aims at gaining better understanding of vocational teachers´ pedagogical well-being, especially their experiences of joy, happiness and satisfaction in their job and work communities. These experiences are seen as critical incidents. To find out which factors lie behind positive feelings concerning their teaching, educational contexts, work place and working community the study tries to clarify, if it is personal, communal, student oriented or cognitive reasons that explain their coping at work.

The research questions were:

1) What critical experiences of joy, happiness and satisfaction at work were identified by the respondents?

2) How could they promote empowerment personally and communally?

The respondents are experienced (n=9) and newly qualified or pre-service (n=15) multi-subject vocational teachers in Oulu University of Applied Sciences, in Vocational Teacher Education (N=24). Experienced teachers represent teachers' peer group mentors and newly qualified are the ones who graduated recently from teacher education and work as teachers. From the group of pre-service teachers were chosen the ones who already have experience of teaching and who study to gain formal qualifications. The respondents work in different school organizations. In this way the research group was made to represent a multi-voiced profession.

The material was collected through recorded open-ended group discussions conducted by the authors in a highly informal atmosphere. The discussions lasted about 45 minutes. The participants were divided into small groups. Each of the participants gave a pseudonym to the researchers, leaving their identity unknown in the recordings. The participants were given sheets with prompting questions and statements. They were advised to talk freely and not to follow the given questions literally.

The audio-recorded interviews were transcribed word for word as a Word document which amounted to 30 pages (1, 5 line spacing) from experienced teachers, the corresponding amount from the less experienced teachers was 10 pages. The researchers (4) read the texts independently and identified meaningful phrases pertaining to the experiences of energy, joy and satisfaction and the opposite ones as well. The analysis was carried out according to qualitative content analysis. All statements of experiences (N=269) were extracted from the interviews. The preliminary categories of the results were: 1) Physical and mental health, supportive family background, 2) Sharing and caring workplace culture, 3) Teamwork and collaboration in the workplace, 4) The success of students during or after study years, 5) Good student – teacher relationships, 6) Possibility to influence on

one´s work load and/ or timing, 7) Possibility to link teaching to community events or student experiences, and 8) Possibility to participate in professional continuing education and recreational events organized by the employer. The utterances concerning national administrative reforms in the near future were excluded.

The extractions were compared in order to find common themes, and keywords were given to the groups of extractions. Three categories of meaningful experiences were thus formed: 1. sociocultural environment of the workplace, 2. teacher as a professional, and 3. negotiations on intra- and extracurricular matters. The first preliminary category (physical and mental health, family background), 12 expressions out of 262, were left out and will not be dealt in the next chapters, as they describe the background factors. Only mental health could have a connection to the workplace culture, but there were only 4 expressions concerning it. There were practically no negative critical incidents mentioned in the material, probably because of the aim to find energizing factors.

A retrospective study looks back in time. It is obvious that teachers´ memories and recollections can change over years. The analysis of this research is based on the meanings that the respondents assign to their past experiences. The crucial point is that many of the teachers have pursued sustained careers in education, and it is in the light of that fact that the study tries to understand the relevance of the recollected experiences and the reflections on them.

Findings

The findings were grouped thematically and according to the frequency of statements. They are here presented in the order of the frequency of the expressions. **First** the teachers´ student-oriented attitude and student-teacher relationships are introduced. The category produced 135/262 comments, sentences or descriptions, altogether 51% of all comments. They refer to professional ethics, motivation, goal-orientation and shared learning which all include learning and proving orientations leading to general well-being and self-efficacy. In other words this category concerns mainly inner satisfaction and feelings of being rewarded.

The inner satisfaction comes often when a teacher´s help is rewarded after tricky situations:

> Perhaps the flow comes often after the situations when a student has had learning difficulties and s/he comes to ask for help, and although it´s not my duty, I have explained the matter to him/ her about half an hour. And then s/he says that "Now I understand", and I thought that I could help in a tricky situation, because s/he had thought of various alternatives, even of quitting school or what else to do, and then I can help and we come to the common conclusion of continuing studies in any case.

> The daily joy can come from very small things: a student succeeds… or graduates. Especially if we have had a stony path with that student, then there

are tears in eyes when we have worked hard together for three years, and this happiness and joy may come many times a day, from small things.

When you see that your students succeed, those moments energize you at work, you remember them and they feel good.

The reward can come from outside the school, sometimes when the school is over:

… parents came to give feedback on later success in life, and it encouraged us to take all "challenging" cases seriously. They may be the most important things in life and, as my colleague here says, it can be a tiny incident which decides the fate of the guy.

It sometimes happens that students themselves understand the value of instruction and tell it to the teacher. A teacher says:

And then about 20 students came to tell me how they had liked my teaching, and they said to me that I was in the right profession. And they understood in retrospect some issues and why the teacher had sometimes been strict.

Also at the moments of genuine communication and contacts with students the teacher can feel energized:

When you stop and are present with the student. When you have had a talk, either serious or joyful, you will be energized after it. Because even two minutes can be the highlight of the day to the student also.

The experiences of professional agency in vocational education were common among experienced and novice teachers with the difference that experienced teachers were totally student–centered, concentrating on the student success or experiences and seeing themselves as by-persons, not in the central roles. Novices had always the mutual relationship in the descriptions: the events took place "between you and me". They were in the communicative role evenly with the students. Their own role and behavior was important to them. This is explained by the different ways of outlining the situations. Novices concentrate more on themselves as teachers asking "Can I do what is expected?", "Am I taken as a competent teacher?", "Do I appear as a good teacher?" Experienced teachers are more concentrated on the values of the aims and contents of teaching, and on the students with their diversities as well. Goal-orientation is strongly present in their choices. Both groups show high levels of ethical commitment: their aim is to act for the best of the students, whether they are challenging or not. The aim of pursuing the student´s best is thoroughgoing in the material.

Secondly, teachers´ work community, work organization and collegial collaboration were much talked about in the research material (76/262, 34% of the statements). Teachers´ pre-service and in-service pedagogical education imply that cognitive academic and vocational knowledge are insufficient to support a vocational teacher´s work. Within this framework both workplace and on-the-job learning play an important role. To achieve the mastery of their trades the teachers need ongoing work place learning and the support of colleagues, work life and interest groups.

All respondents expressed that in their work communities there were actions and attitudes typical of the culture of sharing, but cooperation could not be taken for granted. The teachers felt happy that sharing and collaboration were seen very important and central especially in their work places. All respondents said that helping colleagues is one of the teacher´s duties, and being able to do so gave energy to both partners. A positive working context promotes open and trusted relationships between colleagues. It is also the glue of togetherness and creator of energy. In other words the respondents emphasized workplace culture as the factor of promoting well-being and the source of positive motivational and emotional attitudes. They require reflection for emotional understanding and awareness as well as emotional regulation. Ethical aspects are also necessary to be involved in workplace communication, especially in the culture of sharing. Some respondents said:

> If the team game is such as makes all stick together, it will make wonders.

> When you have good talks with your workmates, it gives energy to go and start a lesson again.
> My sources of energy are good company and, above all, intelligent persons just as today here.

> You will again and again get surprised that `wau´, what a company. Where all the good workmates have come from? Having a support near is something that you can appreciate.

The importance of colleagueship is not only in feeling joy and getting energy, it is more practical, e.g. in sharing responsibilities:

> Working together with colleagues, sharing with them is very important for feeling joy. And when a team mate or somebody else takes part in the responsibility, the enthusiasm grows.

In creating good atmosphere wider in the work community including the students and other staff the teachers can use humor and situational sensitivity:

> I get much joy from humor. I like to throw humorous comments to students and they appreciate it. Sometimes the situations grow into shared happenings and all laugh even when going out of the class. The colleagues usually share my sense of humor.

Team teaching was either a normal practice or temporary method in all work places. Nearly all respondents underlined that team teaching requires preplanning, unless it is decided at the last minutes. No one is an expert in the beginning, but over the course of time, in dialogical interaction with others the expertise will develop. The dialogue will also develop team teaching in appreciating the exchange of thoughts and measures.

Sharing with colleagues occurred through discussions, observations or joint activities, i.e. by sharing experiences and materials or collaborating in a project. Teachers can improve pedagogical competencies by becoming consciously aware of the consequences of their own actions and by adjusting their practices. Interaction with colleagues in informal contexts is also a major learning mode to gain access to practical knowledge.

Professional and personal development is a contextualized process that depends on personal experiences and also upon school culture and school management. The above described outcomes (categories 1 and 2) answer the first research question: *What critical experiences of joy, happiness and satisfaction at work were identified by the respondents?*

Teacher identity was understood to develop also in the negotiations concerning intra- and extracurricular activities. It appeared in the third category (content knowledge, possibility to influence on one´s work, to link teaching to outside-school events and to participate in continuing education and recreational events, 39/262, 15%). It answered the second research question: *How to promote empowerment personally and communally*

So, **thirdly**, in order to make learning with colleagues (category 2) and collaboration with students (category 1) an effective learning mode, the teachers should be provided with diverse collaboration opportunities. Besides students, the teachers will benefit from receptivity, relatedness and responsiveness concerning their needs. In other words schools should try to nurture integrated professional culture. Employers are important in creating the conditions for the school and its teachers, also giving sufficient autonomy to them. Successful heads of schools share common features such as: providing opportunities for teachers to develop a shared vision of the school´s mission and goals, strengthening the sense of self-efficacy of teachers, developing a close working relationship with staff members (Flores, 2004) and securing adequate resources both for learning institution and on-the-job learning of students and teachers as well as teachers´ access to continuing education. These policies are connected to teachers´ motivational and emotional statuses as signs of outer appreciation creating inner well-being and the feeling of competence. Competence motivation is found to be a critical predictor of teacher success (Nissilä et al, 2015).

Of the employer´s attitude to teachers´ professional competence and knowledge some teachers wrote:

Positive feedback of my competence creates top feelings in work.

Feeling of being appreciated as a teacher encourages to work.

Teacher autonomy, to a certain extent, was valued highly:

> That one can define one´s work in one way or another. So that one need not go literally according to some strict rule. Why I enjoy a teacher´s work is that the students change every fourth year.

> There are not two similar days. You can plan your own work and lessons. You can make lessons that are like you.

> I get energy from being able to develop and change my work. That I do not look at the rear-view mirror.

> If you have a possibility to choose your work tasks and how much to teach, it will support coping at work and keeping your energy level high. We plan together on Monday for the week, we share together and this is how we can adjust to the tasks.

The relations with people and situations outside the school offered change for the routines both to teachers and students in the following way:

> And we also have customers and work life representatives, and they bring their own flavor to the work."

> Sometimes you have to find the flow somewhere outside your work … the curriculum reform will maybe bring energy by moving us to a more global system.

> And we can benefit from various events in our town, and they make students enthusiastic, and we go outside school, since you can also learn outside the classroom. A flexible curriculum makes it possible.

> The young had a genuine chance to demonstrate their skills in a thematic event offered to outside interest groups, and each student had his/her role in it. When they succeeded, they felt grown-ups, and the teacher was very happy.

The mode of speaking of the matters expressed above was considered important, being generally based on the teachers´ experiences of teaching communities:

> Conscious positive thinking is important, not whisking negative ideas.

> Common coffee breaks of all the staff during which we talk of issues outside work and school, of life situations and what people want to bring to others (are important).

The possibility to negotiate about continuing education, which was considered important by many respondents, and about the daily arrangements of their work either temporally or for a longer period were appreciated:

> Being allowed to participate in continuing professional courses; and luckily in our organization it is possible, and sharing with the participants shows that we are not alone in meeting our challenges, and it gives energy.

> If teachers of different ages could influence on working hours according to their life situation (the ones with small kids or aged teachers), it would help them cope. Or they could change their work contents for some time or something.

Thus the whole community can be engaged in the sharing of knowledge that enhances the creation of professional competence. The reciprocal dynamics create an environment larger than the task and the individual. It creates a web of relationships and constructs individual and organizational identities. They emerge from a variety of sources depending on the issues or the individuals´ expertise and creativity and energize the participants. Personal strength goes hand-in-hand with effective collaboration. Personal and group mastery thrive on each other in learning organizations.

Summary of findings: Professional agency from three perspectives.

The categories that emerged concerned teacher´s professional agency, sociocultural conditions of the workplace and negotiation & subject knowledge. The contents of the categories were the following:

2. SOCIOCULTURAL ENVIRONMENT AT WORKPLACE (34%)
Power relations, work cultures, discourses, subject positions, Professional competence and knowledge, ethics emotional attitudes, shared experiences, material circumstances, well-being

1. PROFESSIONAL AGENCY (51%)
Professional work, goal orientation, ethics, motivation, well-being, communication, shared learning, teachers make choices and take stances, develop competences and professional identities

3. NEGOTIATION & SOCIETY AROUND (15%)
intra- and extra-curricular negotiations for students´& teachers` experiences of life in-& outside school, competence motivation, teachers´ freedom of choice, sense of trust

Figure 1. The categories of the outcomes of the research.

Professional agency is practiced and manifested when professionals and/or communities exert influence, make choices and take stances in ways that affect the teachers´ work and/or their professional identities. The practice of professional agency is closely intertwined with the professionals´ work-related identities, concerning the teachers´ professional and ethical commitments, ideals, motivations, interests and goals. Professional work experience, knowledge and competences function as individual developmental resources for the practice of professional agency at work. Professional agency is always exercised for certain purposes and within certain sociocultural, administrative and material circumstances. It is needed especially in developing one´s work and work communities as well as for professional learning and renegotiation of work identities in changing practices (Eteläpelto, Vähäsantanen, Hökkä & Paloniemi 2013).

Professional identity is closely connected to professional agency encompassing the teacher´s current professional ideals, goals, interests and values, including their view on teaching and students´ learning, their ethical standards and commitments and their future prospects (cf. Nissilä et al, 2015; Beijaard, Meijer & Verloop, 2004;).

Various **sociocultural aspects** are intertwined with the practice of agency. The social aspects which frame teachers´ professional agency are in particular the curriculum, the learners and the material and social resources available (cf. Priestley, Edwards & Priestley 2012). The practice is also understood as encompassing the influence exerted on the work community and organizations. This kind of agency can be practiced, e.g., through influencing and negotiating the contents and conditions of one´s work at community and organizational levels. Sociocultural conditions and practices do not unilaterally influence professional identities and their negotiation.

All experienced teachers and less experienced novices of the present research were committed to their work, felt responsibility, not only for themselves and their feelings, but also for their colleagues and work community. Although they had a personally challenging work, they often felt joy and success in it as well as the feeling of being appreciated. They had a dialogical interaction with their colleagues and interest groups. Moreover, they sometimes found it possible for individual readjustment in work.

Teachers´ readjustment, **negotiation and society around,** professional subjects, interests, competences and work experiences seem to direct their practices. Professional identity can also be looked at in terms of professional content knowledge, pedagogical knowledge and didactical knowledge which develop along with the career to suit to the level of students. They are strengthened and widened through work life contacts in particular during vocational students´ learning-at-work periods. Intra- and extra-curricular events in schools, again, are often sources of joy to teachers. Extracurricular activities can be suggested either by school leadership, teachers or students. They can be benefited in teaching afterwards. Also the possibility to influence on one´s workload, work contents and timing of working hours make teachers feel appreciated.

Experienced teachers are not worried about their subject knowledge status. It is self-evident that they master their subjects. Novices often noticed that they had enough knowledge and competence in teaching. It brought joy to them. This shows how experience changes teachers: they grow to pay attention to the issues outside them not trying to mirror themselves and check "if I seem to be a good teacher". Novices need support in their self-efficacy.

When **assessing the outcomes** of this research we notice that it was the experienced teachers´ conceptions that dominated the material. They had a long perspective and wide view on the matters in question. This fact had a self-evident connection to the results, partly due to the material collected. Although the novices` material was scanty, their views were mainly in line with those of experienced teachers. Thus the material can be considered as one multi-voiced unity.

Another point of view is the choice of the analyzing method. If discourse analysis had been used, it would have given more variations to the outcomes. For instance it was difficult to give attention to slightly different tones of multi-voiced discussions. The next step is to make another analysis using a discourse analysis method. The last aspect to be brought up here is that the main question of discussion was "What gives energy to a teacher?" It directed the speeches to a positive direction.

Discussion and conclusion
Since work is an increasingly more important environment for teacher learning, new methods for supporting personal development and feeling of satisfaction at work places are needed among teachers. A mere experience does not develop, but a reflected experience will do that. In addition, by verbalizing the experiences and reflecting on them, a teacher will have an integrated, holistic conception of his/ her work, develop his/ her situational sensitivity, ability to problematize the unproblematic, look for challenges, engage in experimentation and exploration, theorize the practical knowledge and interpret the theoretical knowledge in practice. If acting in a reflective way, a teacher will engage in the kind of learning that extends one´s competence. (Tsui 2009, Nissilä 2015a.)

 Empathy and self-esteem are intertwined. Usually the persons with sound self-esteem can adopt the other's role and see the situation from the other's point of view. Emotion, especially empathy is the natural habitat of moral and ethics. Only the teacher who is conscious of him/herself and has sound self-esteem can stand for diversity, insecurity and get along with contradictions. Thus teaching as an ethical practice presupposes self-respect, respect of the others, empathy and ethics. Without empathy ethics can change into moralism.

Physical and mental well-being, motivation and positive emotions are concerned with resilience in work contexts. Resilience is not only an individual characteristic but is connected to work-related stress (Griffiths 1999). It has been proposed to originate in the personalities and abilities of individuals, as well as in environmental influences and resources available to them (Schetter & Dolbier 2011). Healthy workplaces allow individual

adaptation to different forms of adversity at different points of life course and thus support resilience. Physical and emotional well-being can enhance employees´ performance quality and productivity as well as reduce absence-related costs. (BITC 2009.)

Promoting resilience and emotional well-being requires safe and healthy physical and psychological work environment, encouragement of healthy behaviors at work, promoting communication and social cohesion and providing specialist support to manage mental health issues (ibid.). It is suggested that resilient schools are likely to be those that provide well-designed work environments, nurture skilled managers and offer energizing development opportunities for their teachers. (Monaghan, Pawson & Wicker 2012). They are also committed to various measures to promote the teachers´ professional development and well-being, such as teachers´ mentoring programs (Nissilä 2015b).

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Attitudes towards immigrants among student teachers

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The increasing number of immigrant children in European schools represents a significant challenge for teachers and educational authorities. In order to develop successful strategies in multicultural education, it is vital that teacher educators become familiar with student teachers' experiences, attitudes and viewpoints. One among a number of interesting questions in this respect is how student teachers view immigrants. In the present article we address student teachers' views on immigrants; to what degree they think immigrants contribute to economic and cultural life in Norway, and whether immigrants should strive to become similar to Norwegians. The findings are based on a quantitative study of 388 student teachers.

Keywords: multicultural awareness; diversity; teacher education; kindergarten teacher education

Context of the research

The increasing number of immigrant children in European schools represents a significant challenge for teachers and educational authorities. Schools and kindergartens are less monocultural than they used to be; diversity has become a part of everyday life. In 2015 13% of the Norwegian population is immigrant (Statistics Norway 2015). In order to develop successful strategies in multicultural education, it is vital that teacher educators become familiar with student teachers' experiences, attitudes and viewpoints. One among a number of interesting questions in this respect, and the topic of the article, is how student teachers view immigrants.

In the United States, with a different history of immigration and cultural diversity than European countries, scholars have focused on intercultural relations in education for many decades. A number of studies have highlighted a cultural distance and a lack of familiarity between white, middle-class teachers and student teachers on the one hand, and students of minority backgrounds on the other (Dee and Henkin 2002; Benton-Borghi and Chang 2012). Castro (2010) has explored research published in peer-reviewed journals between 1985 and 2007 relating to how preservice teachers' view cultural diversity. He pointed out that various studies portray the generation entering the stage from the very end of the last millenium (the millennial generation) as "more demographically diverse and accepting of cultural diversity" (p. 206) than earlier generations. He also suggested, however, that many aspects of millennial students' lives were unclear, for example the extent to which experiences of living in diverse neighboorhood or attending diverse high schools had increased contact between people of different cultural backgrounds. Furthermore, he indicated that there was a "lack of complexity associated with preservice teachers' view on cultural diversity" (p. 206), relating in particular to their limited

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understanding of the structural and institutional barriers that minorities face in their daily lives

Our point of departure is that development of intercultural competence among teachers and within the education system in general is vital for a successful integration of minority students.

Research aim

This paper is based on a quantitative study carried out among student teachers at a Norwegian university college. In this paper we address student teachers' views on immigrants; to what degree they think immigrants contribute to economic and cultural life in Norway, and whether immigrants should strive to become similar to Norwegians. The students' points of view regarding three statements will be discussed. These statements are: a) "Most immigrants make an important contribution to Norwegian working life." b) "Most immigrants enrich cultural life in Norway." c) "Immigrants in Norway should strive to become as similar as possible to Norwegians." The respondents were given the following answering alternatives: "Agree completely," "agree to a certain degree," "both [yes] and [no]," "disagree to a certain degree," and "disagree completely". A high degree of agreement with the first two statements will be interpreted as indicating positive attitudes towards immigrants, while a high degree of agreement with the third statement will be interpreted as indicating a positive attitude to assimilation, but not to integration. Integration is understood here as a process by which individuals and groups become parts of a new society through adaption without renouncing what they consider to be central elements of their own identities. A high degree of agreement with the third statement will be interpreted as a negative attitude towards immigrants because it signals a hope that immigrants will strive to replace identities considered to originate in their home societies with "Norwegian" identities.

Theoretical framework

Many relevant theories and models have been presented with respect to intercultural competence (Spitzberg and Changnon 2009). One interesting model has been created by Deardorrf (2006) on the basis of a Delphi study among experts on intercultural competence. There is no room for more than a very short and abbreviated outline of this model here. It has the form of a visual pyramid model: "Requisite attitudes" at the bottom of the construct, like "Respect;" "Openness;" and "Curiosity and discovery" constitute the basis for developing the qualities of the next "floor", consisting of "Knowledge & Comprehension" and "Skills". In the field of "Knowledge & Comprehension" she includes "Cultural self-awareness; Deep understanding and knowledge of culture; Culture-specific information; Sociolinguistic awareness." In the field of skills she includes "To listen, observe, and interpret," and "To analyze, evaluate, and relate." Development of knowledge and comprehension on the one hand, and skills on the other, are expected to reciprocally influence each other. The development and conjugation of these qualities then may - on the second "floor" - lead to the "desired internal outcome," understood as "Adaptability (to different communication styles & behaviors; adjustment to new cultural environments); Flexibility (selecting and using appropriate communication styles and behaviours; cognitive flexibility); Ethnorelative view; Empathy." The attitudes, knowledge, comprehension and skills, in addition to the desired internal outcome just mentioned, may - on the third and top

"floor" - lead to the "desired external outcome," which involves "Behaving and communicating effectively and appropriately . . . to achieve one's goal to some degree" (Deardorff 2006, 254, figure 3). What is worthwhile to note in this context is the supposition that attitudes constitute the very basis for developing intercultural competence.

As society becomes more multicultural, intercultural communication competency at the individual level is demanded (Fritz, Möllenberg, and Chen 2002). There is a notable difference between general open-mindedness and a deeper understanding of cultural diversity. The varieties and complexities of interaction in multicultural settings should not be underestimated. In order to develop a deeper intercultural understanding, student teachers need to reflect on their own experiences. They also need to relate their reflections to theoretical frameworks. At the institutional level measures have to be taken to secure intercultural education. According to Tarozzi (2014, 129) "multi/intercultural education is not pervasive in the normal routines of schools." In European teacher education structural actions have been lacking. The consequence has been insufficient competencies when it comes to working effectively in heterogeneous and culturally diverse contexts (Tarozzi 2014; Allemann-Ghionda 2009).

We conducted a study on multicultural awareness among Norwegian student teachers (Bugge and Løtveit 2015; Løtveit and Bugge 2015). In the Norwegian National Curriculum Regulations for Teacher Education as well as for Kindergarten Teacher Education, the development of cultural awareness is an important objective (Ministry of Education and Research 2014). In The National Guidelines for Kindergarten Teacher Education it is underlined that kindergarten teachers must have knowledge about the development of children in a society characterised by linguistic, social, religious and cultural diversity (Ministry of Education and Research 2012). The corresponding guidelines for teacher education state that "Teachers must have knowledge about and an understanding of the multicultural society. This entails awareness of cultural differences, and skills in treating these as positive resources." (Ministry of Education and Research 2010, 9, our translation). The Ministry of Education and Research concludes that primary and lower secondary teacher education programmes must be characterised by a global, international and multicultural orientation.

In studies of student teachers' attitudes regarding cultural diversity, one may find a number of different observations, not least related to the students' background variables. However, before looking into this question it is helpful to explore how people in general view immigrants. There are various studies which indicate the attitudes from different perspectives of inhabitants of European and other developed countries towards immigrants. In the Gallup World Poll (OECD 2014, 136) respondents are asked whether they consider their country to be a good place for immigrants to live. There are considerable differences between how people from different countries in the OECD area respond to this statement. In some countries, at least 90% answered positively, while in other countries; less than the half of the people believe their country to be a good place for immigrants to live. According to the Eurobarometer of 2014 (European Commission 2014, 33), immigration of people from one EU member state to another evokes a positive feeling for slightly more than half of the European respondents (52%), while it evokes a negative feeling for 41%. In 21 member states a majority of the population is positively disposed to immigration from other EU member states. The picture is different when it comes to immigration from outside of the EU. This only evokes a positive feeling for a third of the European respondents.

According to Blom (2014), who examined attitudes towards immigrants among Norwegians, "the 25-44 age group is the most 'immigrant friendly'. The youngest groups

(16-24) are the most tolerant in some areas - such as acceptance of inter-ethnic marriage and rejection of demands for assimilation" (p. 5). Many of the student teachers in our study are in the 19-24 age group, and there are also quite a few in the 25-44 age group. In terms of their average age, thus, we expect student teachers to be relatively open-minded towards immigrants.

In terms of main economic activity, Blom (2014) writes: "employed persons and pupils/students appear to be the most open minded towards immigrants and immigration, while people receiving social welfare or pensions are the most critical" (p. 5).

Blom (2014) underlines that individuals with many years of education have more liberal or tolerant attitudes towards immigrants than individuals with fewer years of education. However, as Blom himself points out, this correlation is not straightforward in every case. If we see novice student teachers as a group that has fulfilled upper secondary education and are about to begin their college education, we may expect them to have slightly more positive views on immigrants than the population in general.

Research methodology

Quantitative data were gathered using structured questionnaires. All first year student teachers at a Norwegian University College were invited to participate. The questionnaire was administrated in September 2014. Thus the respondents were in the beginning of their first semester of teacher education. This is important; we wanted to get an overview of the respondents' understandings of multicultural issues before they were influenced by the institution of teacher education. Questionnaires were administered during compulsory lecture time. Nearly all students present completed the questionnaires, which were collected immediately. The researchers administered the data collections.

The respondents are students at Faculty of Education and Natural Sciences. They attend the School Teacher Education Programme (181 students) or Kindergarten Teacher Education Programme (207 students); hence in total 388 students completed the questionnaire.

The total response rate is 90% (88% for School Teacher students and 92% for Kindergarten Teacher students). The response rates are high compared to other studies, and the significance of the findings is strengthened correspondingly. As nearly all students present have completed the questionnaire the consequences of missing students are regarded as being small. Even if those who were not present when the questionnaires were administered, or chose not to fill in, differ systematically from the others in some way relevant to the research topic, this may – as they were so few - not influence the results significantly.

Female students are in majority in both teacher education programmes. In our study, 83% of the kindergarten teacher students and 75% of the school teacher students are female. This reflects the national female dominance in these study programmes.

When designing a questionnaire it is imperative to assure its validity. In the present study the core concept is attitudes towards immigrants. The importance of finding good indicators is obvious. In this respect, we have chosen partly to draw from a representative national survey conducted every year measuring Norwegians' attitudes towards immigrants and immigration (Blom 2014). Inspired by this study we ask (see "Research aim" above) the respondents to judge statements about immigrants and working life, immigrants and cultural life in Norway and whether immigrants should strive to become as like Norwegians as possible. In these areas we will be able to compare our data with national findings.

Attitudes towards immigrants may be related to education. Acceptance of immigrants tends to be greatest among highly educated people (Blom 2014). Our respondents have just started higher education. Hence, at the moment of data collection their highest level of education is upper secondary.

Attitudes towards immigrants may also be related to sex and age. In general women tend to be more open-minded than men, this also goes for younger people compared to elder (Blom 2014). Whether the respondents differ according to sex and age will be examined.

Findings

As already outlined we examine respondents' answers about immigrants' contribution to Norwegian working life and cultural life, and whether immigrants should strive to become similar to Norwegians. Among the students it is far more common to agree that most immigrants make an important contribution to Norwegian working life, than to disagree. The proportion agreeing is 44%, while only a small proportion, 7%, disagree (Table 1). However, even if there are far more positive than negative responses, the proportion of positive responses are still lower than 50%. Strikingly, almost half of the respondents (49%) are neither agreeing, nor disagreeing. This is an interesting finding. Why are so many students "neutral" with regard to immigrants' contribution to working life? Before examining this question we will present other findings.

As regards the respondents' viewpoints about immigrants' impact on cultural life in Norway, the data show a similar picture as above. Nearly half of the students (47%) agree that most immigrants enrich cultural life in Norway, 42% are "neutral" and 11% disagree (Table 1). As above, the number of respondents who chose the "neutral" category is also high. Many perhaps regard it difficult to evaluate exactly what contribution immigrants make to cultural life. Besides, some may find the term 'cultural lifè' unclear.

The third question is of a somewhat different type. Here the students are asked if they think that immigrants should strive to become 'as like Norwegians' as possible. As shown in Table 1, 36% respond positively, while only 16% of the respondents think that immigrants do not have to strive to become as like Norwegians as possible. Also here we find a large proportion, 48% of the students, answering "both [yes] and [no]". This finding is not easy to explain. Is it a sign of multicultural awareness to mean that immigrants do not have to take after the majority? What is encompassed in the notion of "as possible"? Could it be that some students who agree that immigrants should strive to become as like Norwegians as possible have in mind things like participating in working life, let the children attend kindergartens, join local initiatives, or take part in community work?

These three questions have also been posed to a representative sample of the Norwegian population in a study conducted by Statistics Norway (Blom 2014). The findings from this national study differ significantly from our study. The main difference seems to be that the percentage of the respondents answering "both [yes] and [no]" is much lower in the Statistics Norway's study than in ours. In our study, as shown above, the percentage of respondents ticking off the middle category is 49, 42 and 48 respectively, while in the study carried out by Statistics Norway the corresponding numbers are 10, 12 and 13. Hence the percentages of respondents choosing the other categories of response are also different in the national compared to our study. According to Blom (2014), 78% agree that most immigrants make an important contribution to Norwegian working life, 70% agree that most immigrants' enrich cultural life in Norway and 47% think that immigrants should strive to

become as like Norwegians as possible. How can the differences between the responses in the two studies be explained? One possibility could be that the national sample is representative with respect to for example sex, age and education. In our sample, to the contrary, there is a majority of women, 80% are under 30 years old and they have all completed upper secondary school. However; when we control for sex, age and education, these variables do not have such an impact as to explain the huge difference between the two studies. Therefore we decided to take a closer look at details in the data collection procedures of the studies.

In our study we use a structured questionnaire, hence the respondents are presented with all the response alternatives before ticking their choice of answer. In the study conducted by Statistics Norway, the data are collected by telephone interviews. When asking the respondents to judge statements about immigrants and working life, immigrants and cultural life in Norway, and whether immigrants should strive to become as like Norwegians as possible, the alternative "both [yes] and [no]" is communicated to the respondent only if he/she reveals a need for a middle category (Blom 2014). Here the disparity is obvious, in the national survey we can assume that the respondents were more likely to choose alternative 1 and 3, as they are not automatically presented with the middle category.

Do the responding student teachers' views differ according to sex and age? There seems in general not to be noticeable differences between men and women in their judgements of the selected statements (Table 1), except with regard to whether most immigrants make an important contribution to Norwegian working life. On this question, a higher percentage of men agree (57%) than women (41%). Blom (2014) reports a small difference between men and women, but in the opposite direction than in our study: Women are slightly more positive to immigrants than men. It is not easy to suggest why the respondents in our study deviate in this respect.

When it comes to age, the difference in our study is small as regards the question concerning immigrants' contribution to working life. However; in judging whether most immigrants' enrich cultural life in Norway, respondents 25 years old and over tend to agree more than the youngest respondents. This finding concurs with national results. Blom (2014) finds that respondents 25-44 years old are slightly more in agreement (73%) than the youngest group, 16-24 years old (69%). In general, 25-44 year olds are the most immigrant-friendly age group (Blom 2014). As regards the statement whether immigrants should strive to become as like Norwegians as possible, the youngest age group agrees most in our study. Among respondents under the age of 25, 41% agree with this statement, while among respondents 25 years old and over the corresponding percentage is 28%. This, though, is not in line with national data, Blom (2014) finds that 36% of 16-24 years old and 43% of 25-44 years old agree. To what extent the findings above have to do with the fact that our respondents are first-year students, is hard to tell. When analysing the data further this nevertheless has to be kept in mind.

Table 1. Attitudes towards immigrants according to sex and age. Percentages (*N* = 388).

	Agreeing strongly or on the whole	Both [yes] and [no]	Disagreeing strongly or on the whole
Most immigrants make an important contribution to Norwegian working life			
All	44%	49%	7%
Men	57%	36%	7%
Women	41%	52%	7%
<25 years	45%	45%	9%
25 years and older	42%	54%	4%
Most immigrants enrich cultural life in Norway			
All	47%	42%	11%
Men	47%	40%	14%
Women	47%	42%	10%
<25 years	43%	44%	13%
25 years and older	55%	37%	8%
Immigrants in Norway should strive to become as similar as possible to Norwegians			
All	36%	48%	16%
Men	32%	53%	15%
Women	38%	46%	16%
<25 years	41%	44%	15%
25 years and older	28%	54%	42%

When we look at how the students answer our questionnaire, they demonstrate relatively positive views on immigrants' contribution to Norwegian working life and to immigrants' impact on cultural life in Norway. An equally notable outcome is that many respondents would not commit themselves to either a positive or a negative view in this respect. Thus, besides a relatively clear positive tendency we also find a clear ambiguity towards immigrants among the students.

We have already discussed one possible reason why a higher percentage of our respondents prefer the alternative "both [yes] and [no]" to the statements, compared to the national survey (Blom 2014). In principle, there may be a number of reasons why respondents prefer to both agree and disagree with statements like "most immigrants make an important contribution to Norwegian working life," "most immigrants enrich cultural life in Norway," or "immigrants in Norway should strive to become as similar as possible to Norwegians." The first two statements are descriptive in character, although not, we will argue, in function. Students who critically consider the first two statements from an

epistemological point of view may very well ask themselves: "How can I know whether most immigrants make a useful contribution to Norwegian economic activity or whether most immigrants enrich cultural life in Norway?" Obviously, research is necessary to answer such questions in an intellectually convincing way. Some students may have been sensitive to such considerations. To the extent that students understand our questions as verifiable factual questions it is entirely understandable that they prefer not to commit themselves to one clear response alternative. Still, we believe, that from the context of our questionnaire most students probably sense that our questions have more to do with their thoughts and beliefs than with factual knowledge.

The students' ambiguity is apparently highlighted when we look at their view on whether or not "immigrants in Norway should strive to become as similar as possible to Norwegians." This statement is normative both in form and in function. As seen in table 1, 36% agree, 48% agree and disagree, while 16% disagree with the statement. This, implicitly, means that only a relatively small minority among the students regard it as important that immigrants maintain the identities they developed in their countries of origin. What is the relationship between the students' viewpoints in this regard and their opinions regarding immigrants' contribution to working life and cultural life in Norway? From Table 2 we see that the overall pattern is quite similar when we compare the correlation between the variable 'should strive to become as similar' with 'contribution to working life' and 'enrich the cultural life' respectively. This could be interpreted as if the two questions about immigrants' contribution to working life and their enrichment of the cultural life in some ways are viewed as interconnected.

The majority of respondents (71%) who disagree that "most immigrants make an important contribution to Norwegian working life" also state that "immigrants in Norway should strive to become as similar as possible to Norwegians." (mind the small number of respondents). This could be seen as logical; if a respondent doesn't think immigrants contribute positively to Norwegian economic life, then he or she might conclude that the immigrants should try to become more like Norwegians.

It is interesting to note that 23% of the students who agree that "most immigrants enrich cultural life in Norway", also agree with the statement that immigrants ought to try to become as like Norwegians as possible (Table 2). We might suspect a contradiction here: If immigrants enrich cultural life in Norway, why should they become as like Norwegians as possible? If they are able to enrich cultural life in Norway because they are culturally different, why should it be an aim to reduce or attenuate these differences? Perhaps many students think that immigrants bring new and interesting cultural impulses into the country, but that they over time, for a number of possible reasons, nevertheless should seek to assimilate into the majority culture? This is an issue which is worthwhile following up in the interviews we are going to conduct with a group of the students. Still, the findings mentioned here underline the ambiguity of students' views on immigrants, or, to put it differently, the limits of their positive attitudes towards immigrants.

It is also worthwhile to notice the relatively high proportion of respondents who disagree that "most immigrants enrich cultural life in Norway" also agree with the statement that immigrants ought to try to become as like Norwegians as possible (72%). This seems logical, if immigrants' cultures are regarded to have few or no positive values, the immigrants should strive to become like the Norwegians. To sum up: Both among respondents who do not believe that immigrants enrich cultural life or who do not think that immigrants make a useful contribution to Norwegian working life, the majority think that immigrants should try to become as like Norwegians as possible.

Table 2. Contribution to working life, enrichment of cultural life and strive to become similar to Norwegians. Percentages.

	Immigrants in Norway should strive to become as similar as possible to Norwegians		
	Agreeing strongly or on the whole	Both [yes] and [no]	Disagreeing strongly or on the whole
Most immigrants make an important contribution to Norwegian working life			
Agreeing strongly or on the whole	25	59	16	(N = 172)
Both [yes] and [no]	42	40	18	(N = 188)
Disagreeing strongly or on the whole	71	29	0	(N = 28)
Most immigrants enrich cultural life in Norway			
Agreeing strongly or on the whole	23	58	19	(N = 183)
Both [yes] and [no]	42	44	15	(N = 161)
Disagreeing strongly or on the whole	72	21	7	(N = 43)

Conclusions and implications for teacher education

What relevance may these findings have for teacher education? It is possible to consider various possibilities in this regard. We believe that one important implication is that teacher educators could seek to involve student teachers in continuous and thorough conversations about attitudes regarding immigrants and multicultural society. In these conversations it would be useful to explore, in an open and non-confrontational way, how attitudes that students and teacher educators like to present as our first or principal attitudes on the subject may be shaken when confronted with a number of specific, perhaps difficult questions. One subtitle in one of Hoffman's articles is called "Hallway Multiculturalism." Beneath she describes a number of posters in a graduate school hallway, and she writes: "Key words such as: 'DIVERSITY,' DIFFERENCES,' 'INDIVIDUALITY,' 'RESPECT' were printed in large block letters on many of the posters." In spite of her wish to foster multicultural education, Hoffman felt uneasy about the atmosphere:

I was not sure exactly what bothered me, but it seemed somehow that the overall effect was one of ideological conformity - as if the students had all been programmed to think in exactly the same way, with the same images and the same words. The very fact that the "lessons" of multiculturalism were so codified seemed to undermine the essential multicultural theme - an inherent openness and flexibility. Instead, there was a cant, a correct vocabulary, a proper way to think and

be "aware." It seemed to me all too pre-packaged, a parroting of the "right" themes - a lesson, in a sense, too well learned (Hoffman 1996, 547).

We may seek to explore whether or the extent to which attitudes or opinions which students believe are fundamental to them may be "pre-packaged", influenced by social expectations and uttered in a "correct vocabulary". Such explorations may serve to induce more frank and open conversations about multicultural society, and perhaps influence the students more profoundly than many other forms of teaching about multicultural society.

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The writing buddy scheme at two teacher education institutions – (how) does it work?

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The purpose of this study was to gain insight into the extent to which, and how, a writing buddy scheme at two teacher education institutions influences students' experience of learning and mastery. The target group for the study comprised students at the two teacher education institutions. The methodological strategy was based on action research with a phenomenological approach to the research material. By conducting interviews with individual students, focus group interviews and reading student logs, we have uncovered categories that are related to the students' experiences of participating in the writing buddy scheme. The main findings indicate that students who participate, both those who are mentored and those who mentor, learn and develop in areas that are meaningful to them as students and future teachers.

Keywords
Writing buddy scheme, action learning, visiting, writing.

Background

A writing buddy scheme was introduced at the Norwegian University of Life Sciences (NMBU) in 2010. The intention was that student teachers who had Norwegian as their second language, and who wanted help to write their compulsory assignments in comprehensible Norwegian, would receive assistance with their writing. The teacher education program at NMBU wished to enable these students to write and develop their texts in a way that was meaningful both for the students themselves and for those who read the texts. In the 2013–2014 academic year the teacher educators at Østfold University College (HiØ) became interested in the writing buddy scheme and introduced it from the start of the 2014 academic year. At both of these teacher education institutions, the writing buddy scheme was expanded to also include students with Norwegian as their first language, who, in their own view, found writing challenging. The teacher educators at the two institutions have collaborated on both the implementation of the scheme and on research into it.

Today, much higher education in Norway is dominated by a sociocultural view of learning. As Jonsmoen points out, this means, among other things, that 'The student is not just expected to be responsible for his or her own learning, but also to participate in fellow students' learning processes through student collaboration, discussions, mentoring and teaching each other' (Jonsmoen, 2008, p. 49). This is also highly characteristic of Norwegian teacher education, where work methods and the way teaching is designed often require collaboration, group work and collective learning processes of various kinds.

Such an approach to learning thus requires students to be active participants in their own and other students' learning. These learning processes assume that the students have a linguistic competence that makes it possible for them to participate. For students who have

Norwegian as their second language and for students who have various kinds of linguistic challenges, the emphasis on this view of learning and learning processes can prove particularly demanding. In several studies, Jonsmoen and Greek have examined how students with Norwegian as their second language experience their day-to-day studies in different programmes of professional study (Greek, 2002; Jonsmoen, 2015). Among other things, they find that 'Many students who use Norwegian as their second language are perceived as and perceive themselves as difficult' (Jonsmoen, 2008, p. 49). One consequence of this is that these students keep to themselves and have less contact with fellow students and teachers than other students (Greek, 2002). This experience of being 'difficult' and the isolation that can follow from it can make it especially challenging for students with Norwegian as their second language, or who have other linguistic challenges, to succeed in Norwegian programmes of professional study.

This is a serious situation for Norwegian teacher education programmes given that there is a great need for teachers from minority language backgrounds in Norwegian schools. Norway has become a more heterogeneous society, and this is reflected in the pupil population in schools, but to a lesser extent among teachers (Ministry of Children, Equality and Social Inclusion, 2012−2013). The Ministry of Education and Research (2007) has stated that more minority language students must be recruited to the teaching profession, and OECD (Taguma et al., 2009, p. 7) has urged Norway to increase opportunities for 'teachers and school leaders to be more responsive to linguistic and cultural diversity'.

If students from minority language backgrounds are to succeed in Norwegian teacher education, it will therefore be important that teacher education programmes develop and implement educational practices that take linguistic and cultural diversity into account. To put it briefly, how can we as teacher educators work to develop such educational practices?

The aim of this article is to present findings and reflections from a project whose ambition was to create such awareness both among students and among teacher educators. In this article, we present our analyses of a writing buddy scheme that was introduced to offer extra help to students who feel a need for more writing support, and to promote a learning environment that encourages interaction across different cultural and linguistic experiences. This has inspired our work, and our research question is:

What contribution can the writing buddy scheme make to our students' experience of learning and mastery from a diversity perspective?

Our theoretical framework

The theoretical foundation on which our study rests has to do with relations and with learning and interacting with others and their otherness.

Diversity and 'visiting' as the basis for bridging the gap to others

Gert Biesta (2006) has addressed Hanna Arendt's philosophical and political texts (Arendt,

1998) and takes them as his point of departure when discussing plurality so that we can 'enter into the world' and be able to express ourselves and interact in it. Plurality can be understood as 'the state of being plural' or as variations with an identical background. There are not just many of us in this world, we are also different. To further understand otherness and differences, the concept of *diversity* is introduced. According to Biesta, it is important how we as individuals 'break into a world' of plurality and diversity and interact through taking responsibility for someone other than ourselves. Together with Arendt, Biesta asks the questions:

> How, to put it differently, can we act "in concert" (Arendt) without erasing plurality and difference? And how on the other hand, is common action possible, given the simultaneous presence of innumerable perspectives and aspects in which the common world presents itself and for which no common measurement or denominator can ever be devised? (Biesta, 2006, p. 89)

As an approach to developing a pluralistic consciousness in relation to this fundamental dilemma, Biesta refers to Disch's (1994) understanding of Arendt's concept of *visiting*. Arendt defines *visiting* as 'being and thinking in my own identity where actually I am not' (Biesta, 2006, p. 91). According to Disch, we need imagination in order to be able to 'place things' at the right distance and to be able to bridge the gaps to others. She elaborates further on the concept of *visiting* and maintains that 'It is to think your own thoughts but in a story very different from one`s own thereby permitting yourself the disorientation that is necessary to understanding just how the world looks different to someone else' (Disch, 1994, p.159).

Disch distinguishes between *visiting* and being a *tourist* in someone else's world. The tourist makes sure that she also has access to all the comforts of home on her 'journey'. *Visiting* is also different from empathy, which is described as giving up one's identity in order to avoid the discomfort of being 'in a place that is not your home by appropriating its customs' (Disch, 1994, p.159). The concept of *visiting* gives us validity with respect to having diversity as a starting point and guideline in our relationships with others (Biesta, 2006).

Getting to know oneself by meeting others

The relationship to others is also important in Martin Buber's presentation of the concept pair You and It in his book *I and Thou* (Buber, 2007). Buber emphasises the importance of us relating holistically to others. In an I-you relationship, we meet the other, who is quite different from ourselves and who must be recognised precisely for his or her differentness. This requires us to participate and be involved. Kristiansen (2008) relates Buber's ideas to mentoring and points to listening as a fundamental phenomenon in the meeting with 'the you': 'By listening attentively, one is able to answer. And in the answer to the unique other, one will define oneself − not just who one is here and now, but also who one becomes in the concrete meeting' (Kristiansen, 2008, p. 68). She also refers to the fact that 'answering or having an answer within oneself' (p. 69) is to remain independent in the relationship, while at the same time relating to the otherness of 'the you'.

We can relate this reflection on mentoring to *visiting*, and the same applies to Løvlie-Schibbye's (2004) concept of *delimitation of the self,* which refers to our ability to distinguish between our own and others' experiences, views or representations. Delimitation of the self is closely associated with *self-reflectivity,* which can be understood as the ability to stand outside oneself, to delimit and regard oneself.

Mastery expectations, the importance of the model and the feedback

We have been concerned with what has motivated the students to participate in the writing buddy scheme seen in light of the concepts of mastery expectations and model learning (Bandura, 1965, 1997). Expectations of mastery refer to the individual's ability to set him or herself concrete goals and the expectation of being able to achieve these goals, and to the choice of activity, efforts and perseverance when faced with challenging tasks.

Model learning requires the learner to be aware of the model and how the model behaves (Bandura, 1977). To be able to copy a way of acting, for example writing, it is important that individuals are alert and also adjust their behaviour by reflecting on and thinking through what they have observed. Moreover, it is a precondition that the action leads to a desired consequence (Bandura, 1986). The desired consequence can be that the student will become a better writer or that required coursework will be approved. What characterises a good model is that the person in question has good skills in the area concerned, is credible and has high status.

The writing buddy scheme at both the teacher education programmes facilitates process-based writing based on a sociocultural view of learning (Vygotsky, 1986). Meetings between students constitute a social arena for thinking and reflection, where language is used as a tool and where fellow students and mentors can be models. More emphasis is placed on process-based writing in the teacher education programmes than in more scientific study programmes (Hoel, 2008), which is the background several of our students come from. Their writing experience is characterised more by informative than by reflective writing (Dysthe, 1993) and they can be described as *isolated writers* (Hoel, 2000). In our experience, this also applies to our bilingual students. Writing is a demanding process and feedback from fellow students can have a major effect on students' learning (Dysthe & Samara, 2006). Feedback on written assignments promotes learning if the feedback is given during the writing process. Students feel vulnerable when showing unfinished work to others, and a clear and respectful response takes account of the principles for how such responses should be given (Hoel, 2000). Constructive feedback is characterised by highlighting the positive and by pointing out what should be kept. Moreover, it is important to point out what is unclear and that criticism indicates a direction that can be taken in work on what is yet unfinished. Finally, it is important that the feedback gives the recipient energy and a desire to work on what remains to be done (Handal og Lauås, 2014). Students are introduced to these principles and the criteria for what characterises a good text in the introduction to the writing buddy scheme.

The feedback the writers get from their writing buddies is largely of a visual nature, i.e.

the writing buddy receives the text by email and gives a written response to the text. The collaboration between the students is less characterised by auditive feedback, i.e. feedback given orally. There is a qualitative difference between these two different types of feedback on texts. The visual approach gives the writing buddy an opportunity to comment on text elements on a higher level, such as coherence and structure, and thereby to delve deeper into the text. The auditive approach may be more superficial and be related to a lower textual level (Hoel, 2008). At the same time, however, it promotes learning if the feedback is followed up with a conversation, although this depends on the nature of the conversation. Superficial conversations appear to result in limited rewriting, while more in-depth conversations result in more extensive rewriting.

Research strategy, methodology and methods

The work on and in the writing buddy scheme is based on the action research spiral (Carr and Kemmis, 1986). The spiral's elementary plan, action, observation and reflection take place through discourse and practice, in reconstructive and constructive phases, respectively.

Fig. 1. The phases in the action research spiral (Carr and Kemmis, 1986)
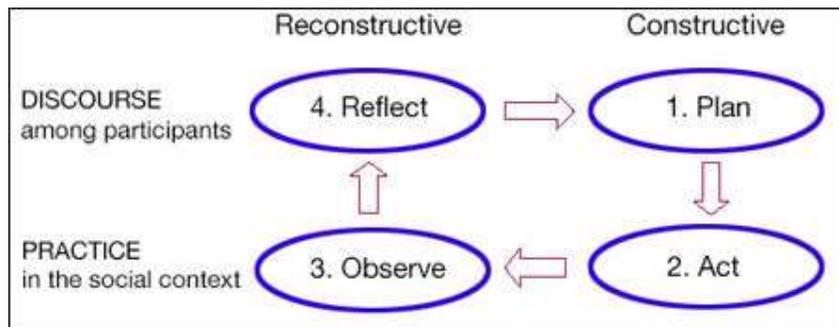
We have used the action learning spiral in our work and our research on the writing buddy scheme in the following way. In phase 1, at the start of the academic year, we discussed with the students concerned how the scheme was to be initiated, what it was important to emphasise, what characterises good feedback. In phase 2, the students then started their practical collaboration on writing and texts relating to required coursework. As researchers, we 'observed' the work in phase 3 in the writing buddy scheme by interviewing and talking to students and by reading student logs. In phase 4, as teacher educators, we discussed and reflected on what we had observed, partly together with the students. Correspondingly, we have held summing up conversations/sessions with students, with the emphasis on any changes. The planning of a new round of the spiral has taken place in connection with and in extension of the discussion and reflection. The planning and any changes have been carried out in cooperation with the students.

We have chosen to adopt a phenomenological approach to the students' statements about their own work in the writing buddy scheme. The concrete work done in the writing buddy scheme was thus a phenomenon we wished to generate knowledge about. In the

work on the analysis, we have looked for units of meaning that can be related to the research question. The results were grouped under different topics and then organised into textual descriptions of the phenomena (Giorgi, 1997).

From August 2010 to October 2015, the students who have participated and are participating in the writing buddy scheme break down as follows: 47 writing buddies, 40 writers with Norwegian as their second language and 9 writers with Norwegian as their first language.

The empirical data on which this article is based were collected during the period from spring 2011 to autumn 2015. In methodological terms, we have used qualitative research interviews of individual students at NMBU (2011/2012 and 2014/2015) and focus group interviews of students at HiØ (2014/2015), and we have read student logs from NMBU (2011/2012) and HiØ (2015/2016).

The qualitative research interview. We used what Kvale designates a semi-structured research interview (Brinkmann and Kvale, 2015), where the purpose was to collect qualitative descriptions from the informants' lifeworlds. While we knew what topics we wished to cover and what questions we wanted to ask the students who were interviewed, we were open to changing the sequence of the questions and how we would follow them up.
Focus group interviews. In addition to acquiring important qualitative information from the students by using focus group interviews, emphasis was also placed on the interaction between the participants in the interview, which can help to clarify attitudes and experiences in a specific context (Madriz, 2000).

Reading student logs. One method we found productive was to read and analyse logs written by the participating students. Writing a log is a structured, methodical approach to sorting and reworking experiences (Tveiten, 2008), and it can produce extensive narratives about the phenomenon described (Bjørndal, 2002).

Findings and discussion of findings

We denote the writers from NMBU as S1, S2 and so on, and the writing buddies from NMBU as K1, K2 and so on. The writer from HiØ is denoted Sa and the writing buddies from HiØ as Ka, Kb and Kc.

Going visiting and meeting what is different

In our project, *visiting*, or *going visiting,*is about how the writers and writing buddies relate to the texts they work on. Several of the writing buddies express the view that giving a response is like *being on a visit*. One student states: 'Yes, I learn to see things from several points of view and I learn different ways of structuring the same assignment.' (Kb) Another

student puts it as follows: 'And I expect to gain insight into the inside of someone else's mind.' (K1) The students' statements show that they are able to relate to the other as different from themselves and to learn from this. Biesta's (2006) understanding of the concept of diversity gives meaning to the students' statements. Biesta stresses the innovative nature of such visits. Research from Australia also emphasises the writing buddies or writing mentors' learning outcome from reading and relating to others' texts. Guerin et al. (2013) investigated how PhD students in groups consisting of students with English as their second language and students with English as their first language supported each other's writing. The study showed that students with English as their second language improved their grammar skills and vocabulary, but an unexpected result was that the students whose first language was English also found that they benefited from the collaboration. They became more aware of language and more concerned with making themselves understood in a multicultural society.

   The writing buddies show respect for the other's text. The reciprocal relationship between the students contributes to the development of several types of knowledge on the part of both the writer and writing buddy. One writing buddy has the following to say about learning: 'I think of it as a learning process for me, we have something to learn from each other.' (K2) Another writing buddy says in the interview, 'I become more aware of my own way of writing when I read others' texts.' (Ka) This statement can be related to Kristiansen's (2008) view of the act of listening as the beginning of being responsible. This student confirms that, to her, listening entails also taking responsibility for the other. She elaborates on this when she goes on to describe how 'scary' it is to be a significant person for her writers. She also displays the ability to delimit the self when describing and regarding herself and her way of writing when faced with other students' texts (Løvlie-Schibbye, 2004).

   In his understanding of *dialogism*, Bakhtin (1981) emphasises precisely that the experience of differences is mutual and simultaneous, at the same time as it expands our understanding. The students also describe how the different texts and reading of texts mutually influence each other. One writing buddy says: 'What motivates me is that I learn a lot from seeing how others write' (Kb), and a writer says about written feedback: 'I learned from what it said.' (Sa) Bakhtin claims that when *the voices* in a dialogical interaction are placed in opposition to each, other contradict each other or mutually supplement each other, this leads to conceptual change.

   Going visiting is closely intertwined with the ability to listen, something Arendt also points out. 'Visiting involves carefully listening to the perspectives of others because the more people`s standpoints I have present in my mind while I am pondering a given issue… the better I can judge' (Arendt, 1968, 241, in Greene, 2005). One writing buddy says: 'I am learning to enter into a text and to be critical, while at the same time being open and looking for distinctive things.' (Kb) The student has an eye out for what is distinctive about the other's text, at the same time as she listens attentively. We find an echo of this openness in Buber's (2007) description of relating to a 'you'. He regards 'the you' as an independent and unique existence that demands to be treated as exactly that.

The student's emphasis on entering into a text 'and being critical' means distancing herself from the role of *'yes-man'*, someone 'who just says what the mentee wants to hear and complies with the type of conversation the mentee wants' (Kristiansen, 2008, p. 69). The above quotes from the student and from several writing buddies capture the act of relating to the otherness of the you, while at the same time remaining independent of the student who has written the text. Another writing buddy writes in her log about getting to know her writer better and how this will affect the way in which she gives feedback:

> 'I look forward to mentoring on the next text; I plan to be firm about what must be changed, because I now know what my writer can accept. We have talked about why she is a writer, and this gave me a better understanding of what I need to look out for next time.' (Kc)

One student adopted the position of *tourist*, i.e. of being on a 'journey' based on one's own perspectives and reflections (Biesta, 2006): 'I am interested in text, so I didn't think about much other than that', and a bit later in the interview, 'If I were to take another subject, it would have to be Norwegian.' (Ka) Similarly, another writing buddy expresses a biased and prejudiced attitude towards a student from a different cultural and linguistic background: 'She uses the language incorrectly, she mixes up the present and past tenses and it's just punctuated words. When you hear minorities speaking, you can hear that they punctuate the sentences in the text because they don't know what conjugation and that kind of thing is...' (Kb). The student mixes up two different grammatical categories, conjugation and punctuation. Our experience is that students whose second language is Norwegian tend to mix the present and past tenses, but not that they make more mistakes in punctuation than students with Norwegian as their first language. This writing buddy's statement closely resembles what Biesta calls *parochialism*, which means not *visiting* in any way, but being at home at your own place (Biesta, 2006).

Motivation and feedback in the meeting with the writing buddy

Both writers and writing buddies are concerned with the motivation for participating in the scheme. 'Feedback can also have a positive effect on writing because I see something positive in your text that you don't see (to Sa) − it's not as bad as you say − you just need to improve your self-confidence.' (Kb) The writing buddy gives positive feedback to her writer. Bandura (1997) calls this *social persuasion* and points out that it can lead to higher expectations of mastery. The writer who is the subject of attention reveals her fragile self-confidence when she assesses herself as a writer: 'It has always been my weakness; when I wrote my bachelor's thesis, I could spend a whole day writing half a page and then I deleted it in the evening − I was so self-critical.' (Sa) At the same time, this student reveals her vulnerability as a writer. She shows this even more clearly in the following statement: '... the fact that it was a fellow student who was going to read my assignment − I almost suffered from performance anxiety.' (Sa) This student's perception of her writing skills and her feeling of being 'exposed' by a fellow student who is a significant other can have led to the emotional reaction she describes.

Not all bilingual students were motivated or wished to participate in the writing buddy

scheme. The students come from different subject areas and different writing traditions. Some students are used to being isolated writers (Hoel, 2000). One student who did not sign up for the writing buddy scheme in its first year, stated that the reason was that he wanted to manage by himself: '... I hear an inner voice saying that I must manage by myself.' (S3) Afterwards, this student said that he should have participated. Hoel (2000) says that people feel vulnerable showing someone an unfinished text, and that the students who register for the scheme show that they have the courage to enter into a new writing situation and at the same time admit their difficulties to others.

Writers and writing buddies are concerned with the utility value of the writing buddy scheme. 'I have read other people's texts in order to give scholarly feedback, and that is always useful, it's almost a luxury.' (K3) Another is fairly down-to-earth and concerned with the here and now: 'And when you can get the submission deadline extended ...' (S2). This refers to the fact that writing buddies are granted a few days extension of the deadline for submitting required coursework. Wigfield and Eccles (1992) point out that our assessment of the utility value of an activity is decided by what advantages we can gain by performing a task or activity. Various forms of recognition and the students' assessment of the utility value of the activity appear to contribute to their commitment. The following statement from a student who was a writing buddy illustrates this perspective:

> I also mentored two students in Norwegian, which I found very useful. I not only had to look at the content and language, but I also got to read two other courses that were different from my own, which I found very educational. Both students were from a completely different background and upbringing than my own, and this had a positive influence on their assignments, I think. It also serves as a reminder to me that there are many people in this country who do not have a traditional Norwegian background and upbringing and that schools also have to adapt to this. I did not come across this in my own teaching practice, but it is an important part of our education. (S3)

This is also an example of how the writing buddy scheme can be an important part of teacher education because knowledge about other cultures is relevant in the teaching profession. This concurs with findings from the Australian study (Guerin et al., 2013), where it is pointed out that student groups that are culturally and linguistically diverse reflect the diversity that exists outside academia, which creates an arena where students can be prepared for future work situations. This can serve as an example of 'the ability to make use of the possibilities inherent in a more complex and diverse society' (Ministry of Education and Research, 2012–2013). Another writing buddy is even clearer about what motivated her to take part in the writing buddy scheme: 'to learn to give feedback because giving feedback is a large part of being a teacher' (Kb). She views participation in the writing buddy scheme as important preparation for a teaching career. One important element of teacher education is to prepare students for their role as mentors for their pupils (Hoel, 2008).

Several of the students describe factors that can be associated with model learning. One writing buddy recommends model learning as a good method for mentoring her writer. 'I had to write a long text to her in order to explain what I meant. I included example texts and I suggested that we sit down together.' (Kb) Bandura (1977) is concerned with the student

perceiving the model as not unlike him or herself and with the model having competence that the student wants to acquire.

The use of example texts and the fact that they would 'sit down together' can also shed light on writers' different needs as regards visual and auditive feedback. We believe that we can see two tendencies in the students' statements that indicate that the writers had different needs, depending on whether the writer had Norwegian as her first or second language. Writers whose first language is Norwegian seem to be satisfied with receiving visual feedback on their texts once or several times, while some writers with Norwegian as their second language were in some cases given auditive feedback in the form of a face-to-face conversation in addition to, and as an elaboration on, the visual feedback. The writing buddy in the example above 'sat down with' her writer, and another writing buddy (Kc) said: 'We have had a conversation about her text.' A third writing buddy says the following about her writer, who had Norwegian as her second language: ''I was given a draft that I gave feedback on and then I received another, and I didn't see much difference. So I asked her whether she had reading difficulties, and she did. She should have been given oral feedback.' (Kb) This indicates that our students with Norwegian as their second language need a follow-up conversation in addition to the written feedback and that, depending on the quality of the conversation, those who have such a conversation have a better basis on which to rewrite their text. Moreover, students with Norwegian as their first language appear to receive more feedback on structure and coherence in their texts: 'She wrote about variation in the vocabulary used and the flow of the text.' (Ka) Another writer with Norwegian as her second language said: 'It is very difficult. Grammar is really important when I write.' These students' statements may indicate that they are at different levels as regards writing texts (Hoel, 2000).

Conclusions

Our research question was: *What contribution can the writing buddy scheme make to our students' experience of learning and mastery from a diversity perspective?*

Our studies of the students' experience of the writing buddy scheme have made an important contribution to our thinking about how *diversity* can manifest itself in teacher education. Arendt's (1998) concept of *visiting* has played a major role in this context. The students state that the scheme has meant a great deal to both writers and writing buddies. The writers are satisfied. They have been given good support and they have gained experience of daring to ask for help. They have given their buddy new ideas and have also glimpsed a possible future strategy of asking colleagues for help with the language once they are in a job.

The benefits experienced by buddies have also surprised us by not 'just' being confined to having proof read. They have *gone visiting* in the text and mind of another person and listened, been open, looked for something distinctive, been critical, looked for positive things, explained and been models. They have gained new ideas by looking at texts with a different form and content, and they have become more aware of their own writing and mentoring. In this way, the writers are also a resource for their buddies. The relations between the students are reciprocal and are not just based on help. Both the writer and the

buddy have got to know the other and themselves better by entering into 'the world of plurality and difference' (Biesta, 2006). At the same time, our material reveals that students' biases and prejudices can be confirmed and perhaps reinforced in the meeting with the other and what they experience as different. They take on the role of *tourist* or display *parochialism* and lapse into describing their fellow students in clichéd and categorical terms.

The collaboration between the students in the writing buddy scheme shows that the writers benefit from the scheme in different ways and to a varying degree, at the same time as they state that it can be 'scary' and that they feel vulnerable. For the writing buddies, the perceived utility value is expressed in several ways: some think it is good that their deadline for submitting assignments is extended, while others see it from a different, profession-oriented perspective, realising that participation in the scheme prepares them for their teaching careers.

The findings in our material could indicate that the writers with Norwegian as their second language and the writers with Norwegian as their first language have different needs and that different practices have developed as regards what form of mentoring they are given: visual, or visual and auditive. Moreover, it appears that writers with Norwegian as their first language are given feedback on coherence and structure, while the bilingual writers are mentored on more fundamental aspects, such as grammar.

So far, the experience we have gained in the project group is 'ours', and the challenge will be to view and implement the writing buddy scheme in a meaningful way in our teacher education programmes, so that it contributes to learning and creates opportunities for development in the diversity field. The writing buddy scheme is a special measure that only applies to a few. It seems clear to us that we should link the writing buddy scheme more closely to our work on writing and response groups, and that we, as meta-mentors for students who participate in the scheme, can play a more prominent role as persons with a professional insight who, in addition to our role as facilitators, also follow up our students more closely in their writing and mentoring processes.

Our material indicates that such a scheme can both contribute to greater awareness of linguistic and cultural diversity and thereby contribute to going beyond one-dimensional conceptions of 'the others', and also contribute to segmenting such conceptions. As such, this project has succeeded in creating greater awareness among us as teacher educators, although it does not necessarily mean that our practices will ensure that students from minority language backgrounds or with other linguistic challenges succeed better. We believe, however, that such trials and such awareness-raising can represent the start of educational practices that both facilitate and appreciate cultural and linguistic diversity.

Eva Martinsen Dyrnes et al. (2015) have carried out research on how teacher education institutions prepare student teachers for multicultural classrooms, i.e. research targeting the whole student body and not just those involved in the writing buddy scheme. They point to three areas that can show the way from the particular to the general in our teacher education programmes. The first area they point to is the analytical vagueness in the

multicultural field that prevails in our teacher education programmes, for example the failure to address the fact that cultural background and ethnicity prevent pupils in schools from participating in learning work and that this results in systematic differences between the pupils. The second area they point to is the tension that can arise when cultural reference frameworks are given little importance, at the same time as deviant pupil behaviour is explained by cultural background. The last area they emphasise is that more attention is devoted to explanations at the individual level than to explanations at system level. For us as teacher educators, the challenges will be: 'to work more thoroughly on analytical concepts, precisely formulated issues and an exploratory approach to teaching practice' (Dyrnes et al., 2015, p. 230). We see this as valuable input to a possible new, different and well-thought-through practice in the field of diversity in our teacher education programmes in extension of our work on the writing buddy scheme.

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