Student Teachers Learning Through Inquiry: International Perspectives

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Language correction: Pete Boyd

Publisher: Wydawnictwo Attyka, Kraków 2016; www.attyka.net.pl

Publication financed by The Jan Kochanowski University, Kielce, Poland
(project numbers: 613505 and 613527)

ISBN 978-83-65644-07-7

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Prologue

Pete Boyd and Agnieszka Szplit

There is currently a tension around the professional status of teachers that centres on the place of knowledge within their expertise. This tension is most apparent in nations, including the USA and England, where Neoliberalism has strongly influenced educational systems so that they are driven by parent choice, measurement of success by test and examination results, school league tables, high stakes inspection systems and performativity of individual teachers. This tension around professional knowledge and the status of professionals is found across a wide range of professionals and is a feature of social and historical change related perhaps as much to technology and the knowledge-based economy as it is to the rise of Neoliberalism. In this period of challenge professionalism is positioned by Freidson (2004) as an ideal type that is involved in a power struggle with the other two logics of rational-legal bureaucracy, and a free market model.

Across most nations of the world there is strong political desire to improve education systems and an acknowledgement that high quality teachers are central to that project. There is also a broad assumption that, despite the vagaries of individual ministers for education, the development of the education system should be based on research evidence. The tension around research evidence arises as to the role of individual teachers and teaching teams within this grand project of improving educational systems. It may be expressed by considering a choice between 'teachers as technicians who must deliver evidence-based practice' and 'teachers as professionals who must lead the development of research-informed practice through practitioner inquiry'.

Within this bigger picture the meaning of the term 'inquiry', often specified as 'teacher inquiry' or 'professional inquiry' is crucial but contested. Teacher inquiry as a term is used widely to include a range of professional learning approaches including reflective learning, self-study, lesson study and action research. It is an approach to professional learning whose characteristics match the requirements of effective continuing professional development interventions for teachers (Teacher Development Trust http://tdtrust.org/about/dgt). These characteristics include collaboration and trust, sustained engagement with opportunities for classroom experimentation and evaluation, critical engagement with external knowledge, and support from school leaders. Teacher inquiry would add some of the characteristics of action research to this list including an ethical framework, systematic collection

and analysis of data, engagement with a theoretical framework, and some kind of peer reviewed dissemination (Baumfield, Hall & Wall, 2013). There are some threats to teacher inquiry within the Neoliberal context including that teacher inquiry might become 'domesticated' within managerialist institutional contexts, communities and discourses of the 'learning organisation' (Kemmis, 2006; Watson, 2014; Fenwick, 2001). Such domestication might mean that teacher inquiry was merely evaluating the techniques of schooling rather than asking tough critical questions that might arrive at uncomfortable truths (Kemmis, 2006; Cochran-Smith & Lytle, 2009). In the chapters that follow authors from a wide range of national contexts reveal their own interpretations of 'teacher inquiry' and of 'inquiry-based learning'. This variety goes beyond issues of language and reveals aspects of agency by individuals and teams of teacher educators but it also provides some insight into social and cultural historical influences on the development of teacher education systems and pedagogies in different national contexts.

In chapter 1 Pete Boyd makes a provocative proposal, that teacher education should adopt an explicit pedagogy entitled 'realistic clinical practice'. Such a move would represent strategic compliance in the sense that the clinical practice model has been put forward by Neoliberal leaning governments as a suitable way by which education might move towards 'evidence-based' practice. Adding 'realistic' to the proposed pedagogy acknowledges that education as a field is closer to the complexities of 'healthcare' or of 'mental health' than it is of medicine and it is argued that this allows acknowledgement of the practical wisdom of teachers and the ambition to co-create mode 2 knowledge (Nowotny, Scott & Gibbons, 2001) through collaboration between researchers and teachers. The subsequent 12 chapters illustrate the range of strategies by which inquiry is embedded in teacher education programmes in a wide range of European nations as well as examples from the Caribbean, the Middle East and Australia.

At an early stage of an initial teacher education programme student teachers do not have much school-based experience and may not have key educational research skills, so it may not be wise to let them loose collecting data in classrooms. In chapter 2 Zoe Martínez-de-la-Hidalga and Lourdes Villardón-Gallego, based in Spain, evaluate such an early stage inquiry which focused on teacher identity and used data collected from a previous cohort of student teachers. This structured inquiry enables the new student teachers to critically engage with useful theory and research evidence around teacher identity whilst developing research skills that will be useful at a later stage of their programme when they will be completing classroom and school based research.

Teacher education programmes often include formal sessions away from classrooms and schools. The pedagogy employed during these sessions may provide powerful experiential learning and an opportunity for teacher educators to model values and strategies. In chapter 3 Harri Kukkonen, working in the context of vocational teacher

education in Finland, explains how an approach entitled 'participatory pedagogy' involves student teachers in designing and managing their own programme of learning. This flexible approach is designed to expand the possibilities of knowing, acting and being and contribute powerfully to teacher identity construction.

In the right context short video clips can be a powerful media to support learning, for example classroom video helps to capture the complexity of teaching and provides a useful stimulus for evaluation and debate with student teachers. In chapter 4 Rita Szaszkó from Hungary proposes that online video clips provide an opportunity for inquiry-based learning by student teachers. In their case study student teachers engaged with online video clips in blended learning courses with viewing often completed individually online discussion mainly in face to face sessions.

A blended learning teacher education programme requires careful design of the online learning activities. In chapter 5 Rebecca Miles, Scott Alterator and Sarah Lord use a social practice theoretical framework to analyse their practice on a teacher education programme in Australia. They use two concrete examples, a reading group and a collaborative authentic teacher planning task, to illustrate some of the design features of effective inquiry-based online learning activities. In this teacher education programme the online learning activities allow best use of the limited time for face to face sessions on campus.

Oral story-telling is a long-standing form of cultural education and chapter 6 by Annamaria Sinka based in Hungary considers digital story-telling as an innovative development of the tradition. This is a teacher educator inquiry that fully involves students in the tutor's inquiry and evaluates the impact of digital story-telling on student teacher learning. Digital stories as teacher strategy are considered as exemplars of key concepts, as problem cases for students to solve, or as advice for students. The authors argue that digital stories provide an effective strategy for teacher education.

Contemporary teacher education programmes include a strong focus on student learning through enactment in practice. Chapter 7 by Serafina Pastore and Monica Pentassuglia from Italy focuses on the role of 'body' within that. The authors argue that developing body awareness or body literacy should be an explicit element of teacher education. The use of sketches, photos, and video together with portraits and interviews are considered as tools for student teacher inquiry that engages with the corporeal dimension of becoming a teacher.

Continuing to focus on bodies but from a different tangent in England chapter 8 by Karen Blackmore investigates how student teachers are able to develop curriculum subject knowledge (in Science) through inquiry. These student teachers reconstructed a teaching strategy initially modelled by the teacher educators involving drawing a human body and labelling it. Applying and developing this strategy in their classrooms took the form of an inquiry by students and the author argues that this provides a level of autonomy that is motivating and appropriate for

adult learning. Through this approach the student teachers may develop Shulman's idea of a signature pedagogy for the curriculum subject discipline.

Developing critical thinking of student teachers seems important, especially as they may be focused on classroom survival and tend towards a pragmatic acceptance of ways of working within their placement school. There is a determination to develop critical thinking of student teachers in the Netherlands and this is reflected in the inclusion of inquiry-based learning in their initial teacher education programmes. However, chapter 9 by Femke Timmermans and Gerda Geerdink working in the Netherlands uses pre and post-test of critical attitude around one of these inquiry-based activities based on 'observation' and finds only limited impact on the thinking of student teachers. From their review of the literature the authors point out that developing research inquiry skills does not always mean that student teachers will develop inquiry as stance and they raise the importance of modelling by teacher educators of an inquiry-based stance.

Metaphors are useful linguistic devices that are able to capture conceptions of a teacher and of learning. In Chapter 10 Renáta Kisné Bernhardt, Marietta Molnár and Laura Furcsa based in Hungary focus on student conceptions of learning and use a metaphor method to investigate this. The authors helpfully review the literature on the use of metaphors and show how these may be used to reveal the learning theories held by student teachers and how these may, or may not change, during the process of becoming a teacher. In addition to demonstrating the potential of metaphors for insightful research this chapter also stakes a claim for use of metaphors as a teaching strategy within teacher education programmes.

In chapter 11 Béatrice Boufoy-Bastick from Trinidad and Tobago proposes that teacher education is provided in the form of 'teachers' professional identity development programmes'. She argues that such programmes would have 'identity inquiry-based learning' at their core and explains that this includes three dimensions of evidence-based reflection, collaboration and management. Beatrice positions her proposal within a Culturometric perspective in which the teacher commits to affirm their own identity but also that of their learners. The proposed approach highlights the significance of teacher identity, values and relationships in the process of becoming a teacher.

Inquiry-based learning takes many forms and probably the most widespread within teacher education is the idea or approach of reflective learning. In chapter 12 Anat Moshe, Sharon Raz, Pnina Shavit, and Gilada Avissar from Israel evaluate a self-study module on a teacher education programme that involves keeping a pedagogic diary and culminates in a research paper assignment. They focus on student teachers with disabilities and this adds a distinctive element to their study. Within the limitations of the study design the authors identify differences between student teachers with and without learning disabilities and argue for more teacher educator awareness and flexibility in terms of providing support.

The wide range of inquiry-based strategies considered in the chapters of this text reveals the creativity and commitment of teacher educators and their belief in the centrality of inquiry. The 'research-teaching nexus' is an idea developed within the higher education sector about how to link research to teaching so that students more clearly benefit from the research activities of academic tutors (Griffiths, 2004). Griffiths identified four characteristics that may describe the links between research and teaching in higher education. Very concise definitions of the RT nexus and of the terminology associated with it are presented in Table 1.

The Research-Teaching Nexus (RT Nexus) in Higher Education	
RT nexus	The links or relationships between research and teaching
Which may include a mixture of four characteristics of teaching and learning:	
Research-led	Critical engagement with published research, inc. research by academics on the team
Research-oriented	Students developing research skills
Research-based	Students doing research
Research-informed	Systematic collaborative inquiry used to develop effective teaching

Table 1. Terminology for the Research Teaching nexus, based on Griffiths (2004).

As you engage with the subsequent chapters in this text it might be worth considering to which of the characteristics in figure 1 the proposed inquiry-based strategy most clearly relates.

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Realistic Clinical Practice: Proposing an inquiry-based pedagogy for teacher education

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Abstract

There is a broad international consensus that quality of teaching is fundamental for the development of high quality schools and educational systems. In this chapter I will argue that teacher education as a sector, particularly in England, would be strengthened considerably by adopting an explicit pedagogy. The meaning of the term 'pedagogy' varies considerably between languages and cultures and for the purposes of this chapter and locating my argument primarily within England I will adopt Alexander's definition:

> 'Pedagogy is the act of teaching together with its attendant discourse. It is what one needs to know, and the skills one needs to command, in order to make and justify the many different kinds of decisions of which teaching is constituted.' (Alexander 2004: 11)

Working within this definition it is important to note that Alexander positions 'curriculum' as subsidiary to pedagogy but as one of its central domains. I propose that teacher education providers should adopt and work towards implementing an explicit pedagogy for initial teacher education based on the 'Clinical Practice' model but that is adapted to become the 'Realistic Clinical Practice' model. This proposed pedagogy for teacher education resolves some of the misunderstandings that policy makers and other stakeholders have held when applying the 'Clinical Practice' model to the field of teacher education.

Key words: Teacher education pedagogy, Teacher learning, Enactment, Research-informed practice, Evidence-based practice

Context

In recent times in England the structures for initial teacher education have been changed considerably with a shift towards a school-led system. To some varying extent this shift is also occurring internationally. But sometimes the claims to rapid and radical policy change say more about the fragile egos and career development ambitions of superficial and careless policy makers than they

do about change in practice. Considering recent changes in England from the perspective of the student teachers, then to some extent perhaps the changes might seem superficial. In this chapter I will argue that it is more important to focus on the pedagogy for teacher education than to imagine that a change in the structure of initial teacher education will provide a magic bullet that recruits, educates and prepares new teachers to become high quality professionals who are retained within the state school system to become lifelong professional learners and educational leaders.

One of the political reasons why the English system for initial teacher education has been vulnerable to radical change in structure by policymakers, particularly since 2010, is that despite strong evidence from research and even from government inspectors in favour of existing university-school partnership programmes, there was no explicit and widely held pedagogy for teacher education. This lack of an explicit pedagogy allowed a simplistic view, expressed by the then minister for education in England, that teaching is simply learned by 'doing' so that increasing the time spent by student teachers on work-based learning, observing and teaching in school, will be sufficient to increase quality of teacher preparation. An additional issue was that the existing teacher education partnerships seemed unbalanced, at least to school-based participants, in terms of the share of resources, the share of control and the share of professional learning outcomes (Boyd, 2002). In this chapter I am proposing adoption of an explicit pedagogy for teacher education that will help us to refocus away from concerns about changes in structure towards the primary shared purpose of all those involved in initial teacher education, which is to develop a sufficient supply of beginners who are able to provide high quality lessons and become professional career teachers.

Most student teachers, often currently referred to as 'trainees' in England to reflect the emphasis on work-based learning, still experience a mixture of two broad learning activities. First they experience work-based learning through observing, supporting learning and teaching in classrooms and schools, and second they experience formal professional development workshop sessions that introduce elements of learning theory, research evidence and professional guidance. The shift towards a school-led system mainly appears to have shifted the balance of time spent on these two kinds of learning activity towards more work-based learning, although most one-year post-graduate partnership programmes already involved at least 50% of time on work-based learning. The shift to a school-led system also appears to have reduced the amount of contact that some student teachers spend in contact with university-based teacher educators, they now have more of their formal sessions facilitated by school-based practitioners. A third key characteristic of teacher education within the school-led system is that it has fragmented provision into smaller local units based in schools or alliances of schools which makes it more difficult to generalise about the nature of provision.

Having provided some context and established that adopting some kind of explicit pedagogy for teacher education would be politically useful in the future, there are four further steps in the argument presented here. First, that adopting 'clinical practice' as an explicit pedagogical approach is an ambitious but pragmatic choice for teacher education. Second that there are weaknesses in the clinical practice model and in its interpretation by some stakeholders so that it requires some modification. Third, that it is possible to specify these required modifications and capture them by adopting the title of 'realistic clinical practice' for a proposed pedagogical approach. Fourthly and finally, the practical implications are outlined for further development of school-led initial teacher education that adopts 'realistic clinical practice' as a pedagogy, in terms of the teacher educator team, the organisation of programmes and the issue of partnership between schools and a university department.

The characteristics and weaknesses of the clinical practice model

The clinical practice model highlights clinical reasoning based on 'research evidence' (Kriewaldt & Turnidge, 2013). A clinical practice pedagogical approach recognises schools and classrooms as key sites for work-based learning through 'enactment' of the core practices of a teacher, meaning that student teachers need to teach in order to learn to teach (Grossman, Hammerness & McDonald, 2009). A clinical practice approach therefore places high value on teacher judgment and practical wisdom and this means that as a pedagogy for teacher education it respects the knowledge of practitioners. Such an approach focuses on the core practices of teachers, these are the high leverage practices that are proposed as the central spine of the teacher education curriculum. High leverage practices are those that are essential for effective teaching. Focusing on high leverage practices means judgment and action become central: 'Such a curriculum would not settle for developing teachers' beliefs and commitments. Because the knowledge that matters most is that which is used in practice' (Ball & Forzani, 2011: 19).

Student teachers are likely to value this approach because they are understandably focused on practical advice and how to survive in the classroom. A clinical practice approach however goes beyond 'tips for teachers' and creates a focus on children's learning by requiring student teachers to question these core practices in depth, in order to understand 'why' they lead to learning. Enactment, in a clinical practice model, is judged by impact on learning (Hattie, 2012) and on learners (Boyd, Hymer & Lockney, 2015). This in-depth inquiry provides the depth of knowledge and professional inquiry skills required so that student teachers can judge new situations and strategies in the future and in different schools, make sound professional choices and be able to evaluate their classroom experimentation. Such professional inquiry involves critical engagement with learning theory and

educational research evidence. Student teachers need to experience coherent sequences of professional inquiry built around enactment.

The clinical practice model positions teachers as researchers and it is worth noting that this proposition was articulated by Lawrence Stenhouse based on his work with teachers leading curriculum development in UK schools more than 40 years ago (Stenhouse, 1975). In their comprehensive review of clinical practice models in teacher education Katharine Burn and Trevor Mutton position the Oxford Internship scheme as an early example of a clinical practice model (McIntyre, 1980; 1997). Unfortunately some of the key principles and practical arrangements identified within this small-scale university-schools partnership were not embedded more widely in the development of the systems for teacher education across the UK although recent developments in Scotland have adopted the model explicitly (Livingston & Shiach, 2010; Conroy, Hulme & Menter, 2013). Internationally there are well-established examples of teacher education based on a clinical practice model although arguably the only example of a national system of teacher education and development aligned to a clinical practice model with 'teachers as researchers' is Finland (Sahlberg & Hargeaves, 2011). Development of teacher education in the Netherlands has contributed significantly to wider international understanding of clinical practice based teacher education (Hammerness et al., 2012) and recent developments in Australia also provide strong examples (McLean Davies et al., 2013). Development of a range of innovative schemes in the USA led eventually to the publication of a national strategy for teacher education based on a clinical practice model (NCATE, 2010; Darling-Hammond, 2010). It is perhaps the strategic scaling-up of clinical practice models across national teacher education systems that has proven to be a challenging next step following its establishment in innovative individual university-school partnerships.

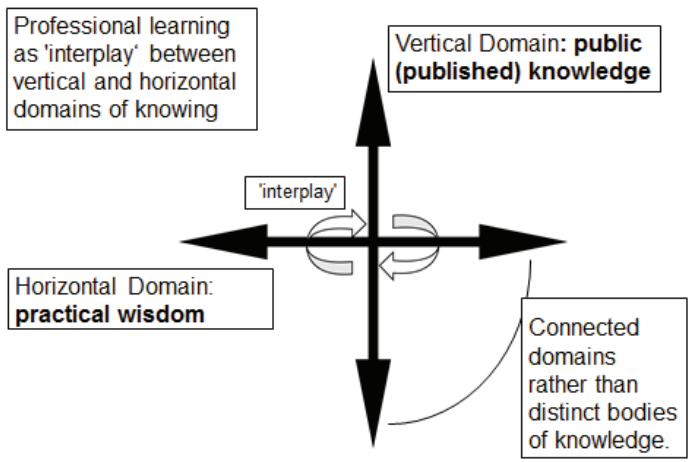
There are some weaknesses in the way that a clinical practice model for teacher education has been understood by some observers and policy makers. A very useful overview and critique is provided by Philpott (2014) and he identifies some key challenges to adoption of the model. I am perhaps more optimistic about the possibilities for resolving the key issues. To some extent the term 'clinical practice' itself is now somewhat unhelpful because it is associated with naive assumptions about 'evidence-based' practice both in the field of medicine itself, as well more importantly for our purposes in the field of teaching. A helpful way to understand the key issue is to distinguish between the field of 'Medicine' in which evidence-based practice based on good science seems a reasonable ambition and the field of 'Healthcare' which is a complex, multi-paradigm professional field in which striving towards research-informed practice is a more realistic aim. A Clinical Practice approach in teacher education places value on theory and research evidence, but has previously been too strongly associated with a simplistic, top-down 'evidence-based' understanding of educational research and of change in practice. This

view of clinical practice places too much weight on large scale quasi-experimental intervention studies, underestimates the complexity, varied contexts and relationships involved in effective education and the interdisciplinary and multi-paradigm nature of educational research. It does not capture the significance of workplace learning and teachers' practical wisdom and neglects the possibility for knowledge creation by teacher researchers in schools. In the next section I propose that a more 'realistic' clinical practice model is appropriate for the field of teaching, and by extension perhaps also for the field of healthcare.

Realistic views of teachers' professional knowledge

A strong and explicit drive to develop 'research-informed' practice is required to counter the 'evidence-based' bias within clinical practice discourses. All participants need to critically engage with this debate and have a reasonable understanding of different ways of knowing in education.

Traditional conceptualisations of top-down views of professional learning (learn theory then apply it) and bottom-up views (socialisation and apprenticeship) may both suffer from positioning themselves solely on a vertical dimension of professional knowledge (Engestrom et al., 1995). This ignores the significance of the horizontal dimension of practical wisdom, the situated, socially held knowledge of practitioners about 'ways of working' within their particular workplace. The conception of 'interplay' between these two vertical and horizontal dimensions of knowledge provides a useful metaphor for teachers' professional learning and is illustrated in figure 1 (Boyd & Bloxham, 2014; Boyd, Hymer & Lockney, 2015).



(Boyd, Hymer & Lockney 2015; Boyd 2014; Boyd & Bloxham 2014)

Adopting a metaphor for professional learning as interplay between vertical and horizontal knowledge domains challenges teacher educator teams to develop more powerful inquiry-based learning activities in place ofthe rather weak 'reflective learning' approaches that currently dominate some programmes. Interplay requires student teachers to identify and critically evaluate relevant public knowledge (theoretical frameworks and bodies of research evidence) as part of their analysis of classroom evidence of children's learning and of the impact they are having as a teacher both on learning and on learners.

In addition to the consideration of the horizontal domain of teacher knowledge it is also important that a 'realistic' clinical practice approach acknowledges the complexity of the vertical knowledge domain in the field of teaching. Education as a field is interdisciplinary (involving elements of philosophy, history, psychology and sociology) but it is also multi-paradigm. The term multi-paradigm applied to the professional field of teaching is in contrast for example to the natural sciences which are much easier to consider as single paradigm disciplines. A student teacher might consider a typical classroom problem that they encounter, such as frequent low level off-task 'misbehaviour' of children, from a range of different perspectives, all with their own supporting research 'evidence base'. Also within the evidence base there will be quantitative and qualitative research to be considered as well as the possibility of co-creation of knowledge through practitioner research. This complex context means that for teachers or other school leaders to depend too heavily on randomised control trial evidence alone is a naive and very limiting engagement with public knowledge, and yet this is sometimes the impression that advocates of a 'clinical practice model' seem to imply. Adopting the term 'realistic' is in part a reminder of this need to move from the assumptions suggesting that teachers might 'deliver evidence-based practice' to the approach that teachers are expected to 'develop research-informed practice'.

There are at least two additional complexities around teacher knowledge and expertise that require us to adapt a basic clinical practice model to become 'realistic' teacher education pedagogy. Teachers need to develop curriculum subject knowledge as part of their initial teacher education and of their continuing professional development. They need to develop pedagogical content knowledge, meaning how best to teach key concepts and skills within a curriculum subject discipline (Shulman, 1986). We know that enthusiasm and commitment to a curriculum subject discipline forms an important element of the identity, commitment and resilience of many successful career teachers (Day & Gu, 2014). A more contested area of teacher knowledge development is that beginning teachers should develop some understanding of the wider social context in which they are working including the community, their workplace and the relevant policy framework. Beginning teachers need to critically consider and articulate the purposes of education (Biesta, 2010).

And so we should briefly consider the implications of this discussion of teacher knowledge. A realistic clinical practice approach to teacher education requires teacher educators who have ongoing involvement and credibility in both practical wisdom (school and classroom competence and contribution to curriculum development) AND public knowledge development (scholarly and research contribution to publication). All teacher educators would need to be boundary-crossing agents between the over-lapping fields of school-teaching and educational research and be able to produce boundary-crossing objects (such as a professional guidance session or learning resource for student teachers that includes elements of practical wisdom and public knowledge). A Clinical Practice approach requires a teacher educator who is an effective school classroom teacher and is able to provide classroom coaching of student teachers informed by practical wisdom within a particular school context. It also requires a teacher educator who is able to support student teacher investigation of their enactment using inquiry approaches that include critical engagement with theory, research evidence, professional guidance and policy. A few teacher educators currently manage to sustain identities and work as both expert school teacher and research active academic, but this is rare and extremely challenging. An alternative is for student teachers to be supported by a *team* of teacher educators with varying areas and levels of expertise. This team approach is also useful because it allows for teacher educators to follow a trajectory of professional development with more or less emphasis on practical wisdom and public knowledge at different stages of their career. For school-based teacher educators the challenges include time, access to resources, and access to a research mentor. For university-based teacher educators the challenges include time, the value placed by research audit on published outputs of collaborative practitioner research projects, and access to expert school-based teachers and their classroom practice.

In this section I have argued for the adoption of the term 'realistic' clinical practice from the perspective of current understanding of the complexity of teacher knowledge and identified the implications for teacher educator teams. The next section will support the adoption of realistic clinical practice from the related perspective of teacher education programme design.

Realistic views of professional learning sequences

There are some well-established examples of teacher education programmes informed by a clinical practice model and some important lessons have been learned. Primarily, that school-based and university-based teacher educators need to co-operate closely to plan and facilitate the experience of student teachers. There needs to be a carefully planned sequence of inquiry-based learning activities for

beginning teachers so that they are not overwhelmed by the complexity of the role. The student teachers need a regular sequence of opportunities for enactment in the classroom but also for stepping back to analyse their experiences and develop their practice in relation to public knowledge (Burn & Mutton, 2013; McIntyre, 1997; Brouwer & Korthagen, 2005). Each professional inquiry sequence might involve negotiation of a focus, planning (informed by critical engagement), enactment (supported by coaching), collection of evidence, analysis (informed by critical engagement), and action planning for further enactment. Professional inquiry sequences will often overlap or run in parallel but the student must experience them as distinctive but inter-related. Such a programme should build around the agreed core practices of a teacher which would need to be agreed by teacher educators across a teacher training partnership (Grossman et al., 2009; Ball & Forzani 2009; 2010). It is important that these core practices are learned through enactment within specific curriculum subject areas. 'It may be that sequencing the study of disciplinary knowledge with the study of learning and teaching may be more fruitful than treating these subjects separately' (Ball & Forzani, 2010: 11). Within the framework of core practices however, a programme needs to be sufficiently flexible to allow beginning teachers to bring their own experiences of enactment to the table. One element of the rationale for adopting the term 'realistic' clinical practice is to also allow some element of student teacher choice of focus at different times on the programme (Korthagen, 2011).

A programme using realistic clinical practice as a pedagogy for teacher education needs to provide graded sequences of learning activity involving student teachers in enactment in their school and classroom with associated time for collaborative inquiry work within a 'third space' that allows explicit and critical consideration of tensions between practical wisdom and public knowledge (Jackson & Burch, 2016). The development across the teacher educator team and student teachers of a common language for discussion of issues and a shared understanding of a realistic clinical practice approach needs to be developed. It is important to note that within such a programme the teacher educator team and the student teachers should not expect any kind of easy consensus to be reached and that all ideas will be evaluated against criteria valued in both school and university contexts (Mcintyre, 1990: 32). School-based programmes offer considerable opportunities for such learning sequences to be constructed, excepting that the busy and child-focused intensity of work means that other priorities may take precedence (Boyd & Tibke, 2012). There is limited research evidence at this early stage of policy implementation, but the fragmentation of school-led teacher education in England (small numbers in student groups, multiple providers and multiple geographical sites) appears to create considerable practical and perhaps funding challenges that need to be resolved.

An advantage of school-led initial teacher education is that it more clearly locates student teachers within a particular school setting so that their informal work-based learning is more likely to include becoming a recognised member of a teaching team and of a professional learning community. This has advantages for schools because they more clearly experience the continuity of gaining a member of staff as a resource, even if the student teacher carries an entitlement to support and training. The common university-based programme approach of sending student teachers on block placements of several weeks is potentially more disruptive for schools and may be experienced by them more as a cost rather than as any kind of benefit. Block placements in school do not lend themselves to a realistic clinical practice approach because the student teacher does not experience coherent sequences of enactment with built-in time for inquiry. Perhaps a compromise would be for students to be paired as a job share, with student A and B based in a school. On a one year programme they would start in school on day one of the school year as a job share with the position of untrained teaching assistant. As they progress through the programme their status would become trained teaching assistant, and subsequently change to that of 'unqualified teacher'. Student A would be working in school on Monday, Tuesday and Wednesday with Thursday and Friday as time for their formal sessions in a third space. Student B would also work in school on Wednesday allowing paired collaborative working and hand over and then work Thursday and Friday. An arrangement of this kind allows the school to experience an additional trainee member of staff and for the student teachers to experience the sequences of enactment and inquiry required by a realistic clinical practice pedagogical approach. This kind of arrangement aligns with thinking around higher level apprenticeships.

The reality of work-based learning for student teachers is that the culture and routines of workplaces varies considerably and schools responsible for teacher education need to develop expansive workplace learning environments in which the everyday informal learning of teachers is valued and nurtured alongside the learning of pupils (Hodkinson & Hodkinson, 2005). Whatever a programme offers in terms of sophisticated planned sequences of learning activity it will also need to respond to the individual and collective experiences of the student teachers as adult learners and to the variation in schools as workplaces. This need for flexibility, recognised by Korthagen and colleagues (2011) is an additional justification for adopting the term 'realistic' clinical practice to capture a pedagogical approach that acknowledges the variation in workplace experiences and individual needs of student teachers.

No matter what solution to timing and creation of third space is adopted by an initial teacher education programme, the key issue is for the student teacher to experience supported learning activity sequences of enactment and inquiry, with some allowance for inclusion of student teacher selected focus, leading to overall progression.

Conclusion

Adopting a 'realistic clinical practice' approach offers an explicit pedagogy for teacher education that focuses on interplay between practical wisdom and public knowledge, that recognises the value of workplace learning but prepares student teachers to contribute to that during their career through the development of research-informed practice. A 'realistic clinical practice' approach offers a feasible strategic direction for school-led initial teacher education. The practical implications of such an approach suggest that continued forms of equitable partnership by schools with university departments is likely to be essential if teacher educators are to be supported in their own continuing professional development and if programmes are to achieve sustained high quality.

In making this proposal for explicit adoption of 'realistic clinical practice', I would argue that the next time a 'wannabe radical' minister for education decides to rearrange the deck chairs in teacher education, the sector will be in a stronger political position to steer the enthusiasm of the minister in more useful and meaningful directions by having a widely accepted and clearly labelled, through still dynamic and contested, pedagogy for teacher education. Meanwhile, in England as elsewhere, those of us with a long term commitment to the sector, will focus on strengthening the school-led system to ensure that it is not part of a dumbing down of teacher education and avoids contributing to the reduction of the crucial and challenging role of professional school teacher to become a technician who merely 'delivers' the curriculum in compliance with centrally controlled 'evidence-based' guidance.

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Using a structured inquiry to develop student teachers' professional identity

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Abstract

This chapter focuses on an inquiry-based learning experience conducted with a group of 17 students of the Master's Degree for Secondary Education Teacher Training with two key objectives: (a) to start the process of developing their own professional identity and (b) to develop research competences. Two questions guide the inquiry process: Which professional image do the students of the Master's have? How does their professional image evolve through Initial Teacher Training? Therefore, this is a structured inquiry (Staver & Bay, 1987) in which the teacher provides students with the research topic and the collected data. The empirical information originated from a group of students who had previously completed the Master's program and answered a questionnaire of open-ended questions twice: once at the beginning (N= 59) and once at the end of the training (N = 52). The review of previous studies and the analysis and interpretation of empirical information allowed the current group of students to develop a professional profile that includes competences, knowledge, attributes and attitudes.

Key words: Inquiry-based learning, Initial teacher training, teacher professional identity.

Introduction

Professional identity in initial training

Teaching is not a mere technical or cognitive activity, but rather a series of complex processes and practices that affect each person as a whole in the personal and the social dimensions (Olsen, 2008a). Therefore, initial teacher training must not be circumscribed solely to the learning of teaching procedures and techniques, but must also work on the development of a professional identity. Thus, the acquisition of knowledge and skills for professional practice is not enough; professional identity plays a crucial role in the process of becoming a teacher (Sutherland & Markauskaite, 2012).

The acquisition of a professional identity is an essential part of professional development, as it provides a framework for people to build their ideas regarding how to be, how to act, how to understand their work and place in society (Sachs, 2005). Professional development is holistic, dynamic and contextualized. In this regard, Olsen (2008b) states that many aspects of the teachers themselves interact in the construct of professional identity: the past, present, and future; personal and professional areas; and, finally, interaction with the context, as well as the context itself. Furthermore, professional identity is a dynamic construct, which develops throughout life, and it changes according to performance, as well as vital and work experiences (Beijaard, Meijer & Verloop, 2004).

The concept, image or idea of the profession is an essential part of professional identity. Sexton (2008) labels it "teacher role", and defines it as "the set of understandings of what it means to be a teacher in a given context" (p. 75). This idea of teacher is heavily influenced by context and experience. In fact, it starts to form even before the future teacher has begun the relevant university studies. Students have a personal, family, school and academic history, during which they start shaping an image of teacher and a conception of teaching (Martínez-de-la-Hidalga and Villardón-Gallego, 2014). Subsequently, during initial training and professional practice, the image of teacher is reshaped as the teacher learns, experiments and interacts (Olsen, 2008b) in a continuous, lifelong process (Sexton, 2008).

Inquiry-based learning

Inquiry-based learning is an approach that seeks to foster learning through inquiry and research. Posing a research question requires observation and reflection on reality. In order to answer the questions proposed, it is necessary to gather, organize and interpret information in a systematic manner. Findings can lead to a new line of inquiry, which in turn give way to a new research cycle.

Therefore, 'inquiry-based learning' can be said to facilitate the development of an experiential learning cycle (Kolb, 1984). According to Kolb, learning can be conceptualized as encompassing four stages. Concrete experience (Phase 1. Concrete Experience) is the basis for observation and reflection from which questions arise (Phase 2. Reflective Observation), and, in order to answer these questions, it is necessary to inquire, search for information and subsequently analyze it, which enables the building of knowledge (Phase 3. Abstract Conceptualization) that can be applied to different situations (Phase 4. Active Experimentation). In this cycle, the interaction between students and teacher facilitates the construction of knowledge.

'Inquiry-based learning' seeks to encourage students' involvement in the research, implementing activities that assign students a more participative role (Healey & Jeakins, 2009), stimulating the construction of knowledge through

responsible and active learning in which the teacher is a facilitator (Spronken-Smith & Walker, 2010).

The investigative process supports the advancement in discipline-related knowledge, while, at the same time, reinforcing the development of attitudes and skills for research. Furthermore, inquiry-based learning is an effective tool to foster learning during initial training, as it allows students to build their own ideas and develop skills such as reflection and critical thinking, maturity and intellectual growth (Al Musawi, Asan, Abdelraheen, Osman, 2012; Willcoxon, Manning, Johnston & Gething, 2011).

Moreover, this approach has a positive impact on affective aspects related to the learning process: students show greater involvement (Harris & Tweed, 2010), are more open to different learning situations (Abd-El-Khalic et al., 2004), assume greater responsibility (Plevyak, 2007) and show a higher level of satisfaction regarding the learning process (Al Musawi et al., 2012).

Structured inquiry-based learning experience and identity development

The experience described in this chapter was designed on the basis of several theories or practical approaches, all backed by research that attests to their validity and effectiveness for learning.

Inquiry-based learning has a great potential as an approach to advance the construction of knowledge, and especially that of professional identity, as it encourages people to examine the meaning of the profession itself, and the place of the individual as a professional, in a shared process of seeking answers. In truth, professional development and action research are two inseparable processes.

Inquiry-based learning allows for the development of Kolb's (1984) learning cycle, which has provided the basis for the active methodologies implemented in diverse educational levels. Three crucial elements should be highlighted as fostering learning: the connection to one's own experience, the activity, and reflection. Freedman and Appleman (2008) determined that the cycle of reflection, practice and feedback provide new teachers with spaces to develop common aspects of professional identity linked to the role, but also unique aspects of their own identities.

Cooperative learning (Johnson & Johnson, 1994) is a methodology based on interdependence. When team members share the goal of learning all components, and they all commit to reaching said goal, their achievements are greater.

The collaborative context for learning relates to sociocultural theories, rooted on ideas proposed by Vigotsky (1978, 1986), and which are essential for the understanding of the development of professional identity. According to this outlook, identities develop in dialogue filtered by the identity that each person brings to the community. Wenger (1998) posits that the construction of identities is fundamentally

social and is directly related to communities of practice. According to research carried out by Freedman and Appleman (2008), new teachers consider their identities as teachers to be closely linked to their colleagues' emergent identities.

This chapter will present the experience, first describing the context in which it has been implemented, then listing the intended learning outcomes and delineating its implementation, and finally detailing the evaluation and results.

Context

This experience has been carried out in the University of Deusto, founded in 1886 by the Society of Jesus. The University is headquartered in both coastal Basque capitals: Bilbao and San Sebastian.

The activity was implemented during the second semester of the 2015-2016 course of the Master's Degree in Compulsory Secondary Education, Upper Secondary Education, Vocational Training and Language Teaching, taught by the Faculty of Psychology and Education at the University of Deusto (Biscay, Spain), in the subject entitled Educational Innovation and Research, corresponding to 6 ECTS credits. The curriculum for the Master's is governed by Order ECI/3858/2007, from December 27. The students entering these postgraduate studies have all graduated from university in disciplines unrelated to teaching.

Training objectives for the Master's include the acquisition of strategies to stimulate effort and autonomy in students, the development of social skills to foster learning and social harmony, skills for the collaborative performance of tutoring and orientation, and knowledge of the teaching profession from a historical viewpoint and as related to the current social reality (Martínez-de-la-Hidalga and Villardón-Gallego, 2015).

In order to achieve these goals, the Master's has a duration of 60 ECTS credits, structured in general subjects (16 ECTS credits) that seek to develop the competences related to psycho-pedagogical processes, such as planning, development and assessment of the teaching-learning process; and area-specific subjects (26 ECTS credits), which provide training more related to the subjects that the Master's students will be teaching in the future. In our university, the following specialist fields are offered: Science-Technology (Mathematics, Computing, Technology), Humanities (History and Philosophy), Spanish Language and Literature (Spanish), Basque Language and Literature (Basque), Modern Languages (English), Training and Job Counselling.

Objectives

The goal of this experience is twofold. On the one hand, it seeks to promote the development of the professional identity of students that intend to become Secondary School teachers. On the other hand, it also strives to foster the development of research skills. Additionally, it aims to further teamwork, providing opportunities for students to collaborate actively when performing tasks, and

increasing their motivation and commitment to their own process of learning and development.

Development

Participants

Seventeen Master's students took part in this experience, of which 15 were women and 2 were men; 11 of them were students in the Bilbao campus, whereas 6 were students in the San Sebastian campus. Their average age was 25.8 years.

Students pursued diverse specialisms: 5 belonged to Science-Technology field (Sc-T), 2 to Humanities (Hum), 5 to Modern Languages (ML), 4 to Spanish Language and Literature (SLL) and 1 to Basque Language and Literature (BLL).

For the subject Educational Innovation and Research, students were asked to carry out research on teacher identity. The professors had previously gathered data through a questionnaire completed by students from the 2013-2014 class of the same Master's.

In order to carry out the research, students were organized in three collaborative groups. Through inter-group and intra-group collaboration, they had to provide answers to the research questions, organizing and analyzing the available information and interpreting the results. Finally, they had to write a report and disseminate their research.

Phases

The structure for this research activity follows the experiential learning cycle (Kolb, 1984) (See Figure 1).

Phase 1 corresponds to the Concrete Experience. It stems from the personal, academic or social context and from preconceptions, ideas or experiences of students. Thus, learning makes sense for the learner, which arouses their interest and motivation. Furthermore, it facilitates learning, because it provides a starting point and meaning to the content (Yániz and Villardón, 2015).

For this experience, in this phase students had to perform the following tasks:

- Proposal and presentation of the research on teacher identity. Initial reflection on the concept and its importance.
- Completing the questionnaire on their conception of the teaching profession.

Phase 2 corresponds to the stage of Reflective Observation in the learning cycle. The reflection carried out regarding diverse aspects of experience and context leads to questioning, which in turn helps advance knowledge.

The issue of teacher identity, introduced in Phase 1 through the questionnaire on the concept of teaching, leads students to propose research questions; the search for answers to these questions will guide the whole experience. The students submitted the following questions:

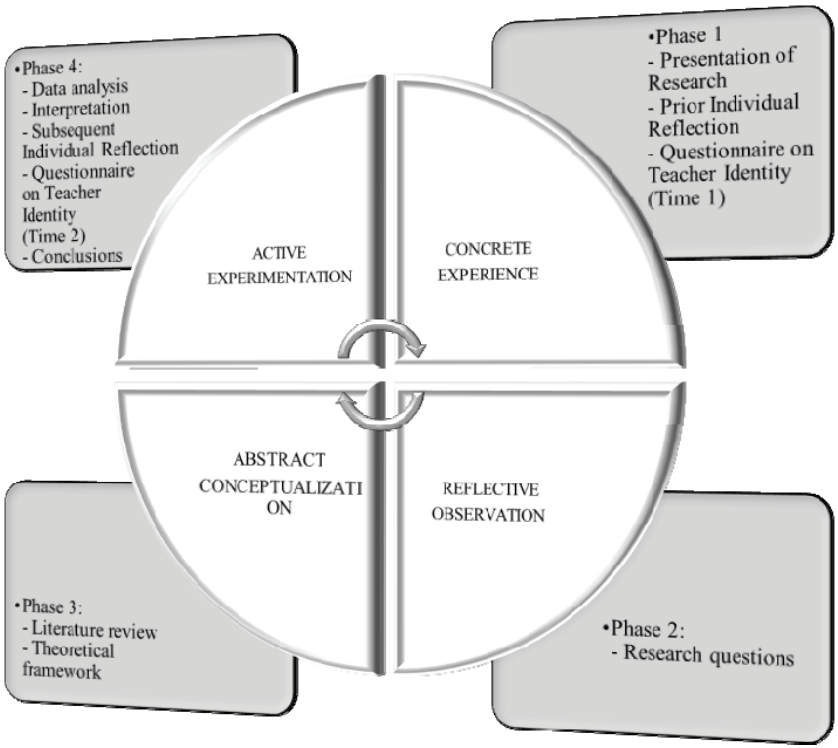

FIGURE 1. Phases of the experience, adapted to the learning cycle.
Source: Adapted from Kolb, D. (1984). *Experience as the Source of learning and Development.* Englewood Cliffs, NJ: Prentice-Hall.

- What professional image do Secondary School Teaching students have?
- How does said professional image evolve throughout their initial training?

Phase 3 is the stage of Abstract Conceptualization. In this stage, contents are deepened and theoretical positions on the subject are studied. Participants carried out a literature review on teachers' professional identity, and subsequently wrote the theoretical part of the research.

Phase 4 corresponds to the stage of Active Experimentation in the learning cycle. The theoretical knowledge has been acquired and is now applied to practical situations. The participants, Master's students from the 2015-2016 course, organized, analyzed and interpreted the information acquired through the questionnaire on teacher identity that Master's students from the 2013-2014 course had answered at the beginning and at the end of their teacher training.

Each of the three groups of students focused on some of the questions in the questionnaire, and would then answer the research questions from Phase 2 through inter-group collaboration.

The questions were distributed in the following manner:

- Group 1:
  - State the main difficulties teachers face in their professional practice
  - What aspects help teachers carry out their duties?
- Group 2:
  - Choose a metaphor to describe the figure of teacher.
  - In your opinion, what features do good teachers have?
  - Remember a good teacher in your academic life.
- Group 3:
  - What duties do teachers have?
  - What skills must teachers have?

Each group wrote a report including the following sections: theoretical introduction, research objectives, methodology, results, discussion and findings.

Once all three groups finished their reports, a Final Seminar was held during which each group communicated their process and findings to the other groups. After the expositions, all participants discussed and reached an agreement on the answers to the research questions. They then created a consensus teacher profile, based on the findings of the three groups.

Resources

The following resources were made available to the students for this activity in the ALUD learning platform of the University of Deusto (https://alud.deusto.es) in a space entitled "Investigando la Identidad del Profesor" ("Researching Teacher Identity"):

- Planning for the activity, featuring objectives, tasks, deliverables, deadlines and assessment criteria.
- Bibliography on the subject.
- Database of difficulties and support in professional performance (start and finish) (Group 1).
- Database of features of good teachers, memories of good teachers and metaphors for teachers (start and finish) (Group 2).
- Database of the duties and skills of teachers (start and finish) (Group 3).

Methodology

The assessment focused on the level of achievement of the intended learning outcomes for the experience; namely, whether students had advanced on the development of their professional identity, adjusting their concept of the teaching

profession, whether they had developed interest and skills regarding research, and whether they had improved their teamwork competence. Additionally, emotional aspects of the learning process were also analyzed, such as motivation and interest, as well as the most satisfying aspects of the completed experience.

The experience was evaluated with a fundamentally qualitative approach, through an analysis of the contents of answers to the open-ended questions from the questionnaire on professional identity, as well as those from the subsequent reflection.

Thus, in order to evaluate the shift in *one's own identity as a teacher*, the question "What does being a teacher mean to you?" was used; it had been answered by the participants in Time 1 (at the beginning of the experience) and in Time 2 (when the experience had ended). This question was part of the questionnaire on Teacher Identity, a tool with 12 open-ended questions. The content analysis focused on comparing the answers provided by each student in those two moments, and were categorized according to the inductive method.

Additionally, the development of *research skills* was assessed in the following manner:

- During the process, a formative evaluation was carried out through face-to-face and on-line tutoring sessions. As a result of this evaluation, students' needs and difficulties were identified, which in turn facilitated the provision of guidance to students regarding their task and learning process.
- When the course subject finished, a summative evaluation was made of the students' learning achievements. The following evidence was considered for the final grade: final research report, and the oral presentation of the research during the Final Seminar.

The evaluation of the *degree of collaboration and participation* of the students was performed based on a group reflection on the operation of the team and its components, collected through a Group Evaluation Sheet. In this sheet students were asked to answer the following two questions:

- Difficulties to complete the task, inner workings of the group and performance of each of its members.
- Score from 1 to 10 for each team member, based on the following criteria:
  - Responsible execution of the assigned tasks
  - Meeting attendance and punctuality
  - Contribution to the group assignment (providing ideas, questions, explaining, clarifying information…)
  - Contribution to a good atmosphere in the group
  - Other

Students' *perceived learnings* were identified through the opinions gathered with one of the three questions in the Individual Reflection Sheet: "What have I learned with this project?"

The *emotional states* linked to the learning process were detected through another question in the Individual Reflection Sheet: "How have I felt during this process?"

Finally, in order to determine the level of satisfaction with the different aspects of the experience, the answers to the third question in the Individual Reflection Sheet were used: "What has helped me learn the most?"

Results

The evolution of identity

The data obtained through the question "What does being a teacher mean to you?" which students answered at the beginning (Time 1) and at the end (Time 2) of the study, enabled us to analyze the evolution of identity in students.

Results (Figure 2) obtained when comparing the answers to this question at the two aforementioned times indicate that 13 out of 17 students (76%) modified their concept of the teaching profession, providing a more complete, detailed and elaborate answer at Time 2.

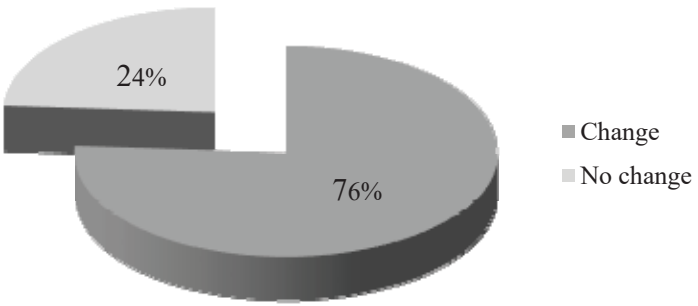

FIGURE 2. Change in identity

According to the comparative analysis, there has been a shift in the concept of teaching and education, which has in turn impacted the identification of the roles of teachers and of the competences needed to fulfill said roles.

In this regard, in lieu of a traditional concept of teaching with teachers as protagonists, some participants have evolved into a student-centered concept of teaching. Thus, some student teachers have become more aware of the need to tend to students' individuality and to focus teaching on the students themselves: "Teachers need to be people who guide students along the most suitable path for each of them, tending to their interests, motivations and needs, providing them with as much knowledge and skills as students can acquire within a set timeframe and according to their learning pace" (NMSR6).

Similarly, other students have linked the role of teachers with the ultimate goal of education, that of developing the full potential of people so that they become autonomous individuals. Consequently, students began to grant more importance to student autonomy and individual thinking: "Being a teacher means teaching someone how to be self-reliant, how to be critical. Giving them the key so they can achieve their goals" (EJAT22).

In this regard, students have understood that education –and, consequently, teachers– have a great social importance because their goal is to educate future adults, among other reasons: "Being a teacher means being aware that those people being educated are the future and, therefore, must be encouraged to give their best, teaching them the best things about the world they are going to live in and in which they are going to have to function in the future" (YJSJ6).

Having ascertained that the teaching profession has a great influence on students and society as a whole, student teachers have realized that they need to be references and role models for their students: "Being an example and a guide for the new generations" (MVDJ26).

The reflection on the importance of the profession for the lives of people and the future of society has made them recognize the importance of teachers and the skills required for their adequate performance: "It's much more than teaching. The profession requires great interpersonal skills, because students need guidance and help beyond the course subject" (MSMA9).

Grasping the great social repercussion of the teaching profession, along with its great inherent difficulty, could have led teacher students to despair and fear. However, their answers show that the opposite effect has taken place: their teaching vocation is now higher, because the power to influence students and their future, and to travel alongside students, is viewed as a privilege: "Being a teacher is, obviously, a job; however, is one of the most beautiful and important for society. This might be one of the most time-consuming jobs, but it's also one of the most gratifying" (YJSJ6).

In their answers on perceived learning, 13 out of 17 participants mentioned the topic of professional identity. They are now conscious of the importance of identity in their professional development. "The awareness developed on teacher identity. Until now I wasn't aware of the importance of professional identity for me as a future teacher nor of the manner in which this concept was gradually formed. Thanks to his research I have realized how important some aspects are for teacher identity and, thus, how important these aspects will have to be for me from now on" (YJSJ6).

Among them, some referenced the construct itself. They have learned that the teacher identity is multidimensional, complex, and bearing a great weight on teaching performance. Furthermore, they have become aware of professional identity as inextricable from the interaction with the educational center and the social environment. A student defined it as "the opinion teachers have of themselves, of their profession, of the difficulties and the areas for improvement" (RCIE24).

Some have come to understand the dynamic nature of professional identity and the importance of training on its development: "The topic itself was very interesting and it has taught me how pursuing this Master's transforms students' mindsets and I have been aware of the fact that mine has changed too" (JERA16).

Several students recognized that their perception of themselves as teachers had changed: they acknowledged the importance of motivation, selected the aspects they wanted to focus on during their future career, and identified the resources at their disposal, most notably an efficient communication that ensures a good classroom atmosphere.

This research has caused students to not only change their professional identity, but also to become aware of the shift that has taken place. Reflection and dialogue activities carried out in this experience have facilitated this process, which will undoubtedly extend the permanence of the learning: "It makes me reflect on what kind of teacher I want to be and how I want to be perceived and especially that I wish that in the future, if one of my former students were to be asked, their memory of a good teacher would be of me" (JERA16).

In summary: through this structured research on professional identity, student teachers have learned about the construct, have modified their concepts of teaching and teachers, and have become aware of the change they themselves have undergone in the process.

Research skills

Research skills were evaluated throughout the process and at the end of the course subject, based on two items: the final research report and the oral communication of the findings. The main criteria for the evaluation of the written report were the following: depth and recentness of the theoretical introduction, correctness in the organization and analysis of the information, clarity in the presentation of the findings, degree of elaboration of the interpretation and the discussion of the findings. The main criteria for the assessment of the oral presentation were the following: clarity of exposition, quality of the audiovisual support for the exposition, structure and organization of the discourse.

According to the established achievement criteria, all 17 students obtained an excellent grade ($M=9.17$; $\sigma=0.99$) from a minimum of 0 and a maximum of 10, which shows that all students amply achieved the intended learning and satisfactorily engaged in the experience, although there were some differences in learning among students regarding their level of involvement and motivation throughout the process.

Concerning the question of perceived learning, 11 out of 17 students mentioned aspects related to research, mainly referring to procedural aspects, such as collecting data from surveys, working with open-ended questions and categorizing the answers, going through the phases of research, performing analyses, and interpreting data.

Some students also mentioned acquisitions more linked to an understanding of the essence of research, such as the importance of having clear objectives when researching, or becoming aware of the difficulties inherent to research.

Teamwork

The degree of collaboration and participation were evaluated through the Group Evaluation Sheet regarding each team member's contribution. The mean grade for teammates was 8.90 (σ=1.22) from a minimum of 0 and a maximum of 10. This result shows that the students' level of contribution to their group's atmosphere and task was very high.

Furthermore, in the question regarding perceived learning "What have I learned from this experience", 7 answers mentioned teamwork skills. Some specified the elements of collaboration that fostered learning: "It has been useful for me as a teamwork experience in order to get to know my peers and also get to know myself" (EJAT22). This statement explicitly conveys that the research carried out in groups has helped in the development of one's own identity.

Students have also become aware of another essential element of teamwork, which is the process of adapting to the different characteristics of each person working in a team, so that all team members can feel comfortable.

Several students specified having become aware of the importance of collaboration when researching: "I am now aware of the importance of a good work atmosphere within the team and the coordination between team members in order to carry out research" (YJSJ6). Essentially, teamwork helps improve quality because "the high personal standards of the members of a research team determines the standards of the team as a whole and, consequently, the quality of the final result" (PRIE10)

Emotional states in the learning process

The answers to the Individual Reflection Sheet "How did you feel during the process?" indicate that most emotions related to the experience are positive.

Several students alluded to their motivation and interest for research. Some of the aspects of the experience that have fostered these emotions were the interesting nature of the topic, closely linked to their future career; and carrying out a complete study, including the presentation of the results, which have made them feel important, like real researchers: "Throughout the research process and as we started shaping our report, I have felt increasingly comfortable and not as 'lost' as I was in the beginning. The report was taking shape and I was looking forward to seeing the final results. That's why, when we finished the report I felt very satisfied and happy with the research we had carried out" (RCIE24).

Some mentioned the good work atmosphere in the team and the importance of feeling valued as team members, as a key element of wellbeing during the learning

process: "I have felt really well. The group was very good and, thanks to the good work atmosphere, working was a pleasure. Every time I had any doubt or idea, I haven't been afraid to put it forward. The team was tight-knit and I have never felt left out" (BJIJ20).

Several students valued positively the support provided by the teachers, furnishing students with work guidelines, supplying resources, and supervising the learning process: "I have also felt encouraged- by the teachers, who were always available to help us" (AMAB20).

Satisfaction

In the Individual Reflection Sheet students were asked about the aspects of the experience that had been most helpful for their learning. The answers indicated the importance of the literature review, the teamwork and the final pooling seminar.

The *literature review* has helped students come into contact with other studies on the subject, as well as the subject itself.

Additionally, *teamwork meetings* have fostered the development of personal and academic skills. They have allowed them to combine knowledge and skills in order to successfully complete tasks, share ideas and personal progress, and clarify doubts. Teamwork has allowed them to develop qualities essentials to teachers, such as patience, tolerance, respect, flexibility and self-awareness: "I consider it has mainly provided me with a deeper knowledge and sense of what collaborative work means, carried out in a coordinated way and collaborating with all group members. I have been aware of my own limitations and strengths when working in a team, and that has made it possible for me to boost my positive aspects and give the group my best. I have also felt how my teammates and myself complemented each other in a way that allowed one person's deficiencies to be compensated by another's abilities, and vice versa" (MSMA9)

The *final pooling seminar* to share the results of the experience has facilitated the creation of a more complete concept of what teacher identity means: "understanding what peers had worked on and realizing the relation that existed between their findings and ours" (YJSJ6)

Conclusions

The experience shown here demonstrates, on the one hand, that initial teacher training is the ideal starting point to develop identity through the identification of roles, tasks, performance quality criteria, factors that influence professional development, and collegiality, among others (Beauchamp & Thomas, 2009) and, on the other hand, that 'inquiry-based learning' (IBL) is an effective tool for initial teacher education because it allows students to develop their own ideas, while

also fostering skills such as reflection and critical thinking, maturity and intellectual growth (Al Musawi, Asan, Abdelraheen, & Osman, 2012; Willcoxon, Manning, Johnston & Gething, 2011).

The students carried out a structured inquiry on Teacher Identity with the aim of promoting the development of a professional identity and the acquisition of research skills. The experience was structured because student teachers were presented with the research topic and the information to analyze and interpret in order to answer the research questions. The phases of the activity allowed them to follow a learning cycle, which in turn helped them reflect on their own concept of teacher; delve deeper into the theoretical approaches to professional identity; become familiar with the existing research on the subject; organize and analyze the available information; interpret said information through collaborative work and reflection; and finally share the results, promoting dialogue and interaction.

This formative proposal considers several factors that have been scientifically proven to be effective for learning, such as bringing the subject matter to the students' reality and to a topic of their interest (Connell, Donovan & Chambers, 2016) and building knowledge through action (Harnowo, Calhoun & Monteiro, 2016) and reflection (Rokenes & Krumsvik, 2016). Furthermore, collaboration among peers (Cen, Ruta, Powell et al., 2016) and interaction (Genlott & Gronlund, 2016) improve the learning potential of the experiential learning cycle (Tomkins & Ulus, 2016). It is also important to use valid methodologies for the achievements to be attained; in this case, carrying out research in order to develop competences for research (Villardón-Gallego, 2016; Cepanec, Humphries, Rieger et al., 2016) or working in teams in order to learn teamwork (Palomares-Montero & Chisvert-Tarazona, 2016) and authentic assessment (Wu, Heng & Wang, 2015).

So as to obtain the full benefits of this approach, it is important that students have clear guidelines that include learning objectives, tasks to be carried out, deadlines and performance criteria. Students must have at their disposal the necessary supporting documentation to carry out the task; alternatively, they must have a way of obtaining such documentation. That is to say, giving students the responsibility over their own learning must always be followed by a tutoring plan that guides them throughout the whole process in order to facilitate success and foster self-confidence.

Therefore, the implementation of inquiry-based learning requires great planning by the teachers and great flexibility in its implementation, as well as technical knowledge on research methodology.

Ultimately, the results of the experience lead to the conclusion that structured inquiry-based learning, with questions and topic carefully chosen in accordance with the learning goals and taking into account students' reality; with valid tasks, including collaboration, interaction, activity and reflection in a learning cycle that fosters learning; with an authentic assessment system; and implemented with

adequate supervision and support from the teacher throughout the process, is suitable to encourage students to reach the intended learning goals. In this case, the goals were the development of students' identity as teaching professionals; the development of competences linked to research; teamwork; and, finally, their motivation and involvement in the learning process.

Due to the moment in which this initial training experience is carried out, with scarce real-life practice by students, on one hand, and time limits, on the other, it was deemed more appropriate to focus on the concept of the teaching profession and its evolution; this is only one dimension of professional identity, which is a broader construct that is strongly impacted by context and professional practice.

This experience of structured inquiry, although carried out in a short period of time, has led to an observable shift in the concept of teacher; this attests to the efficacy of this course of action for identity development. It is worth mentioning that, in some ways, the use in this study of prior data from a previous group of students acted as a kind of proxy for practitioner self-study research and allowed the student teachers to rehearse such an approach at this stage of their training program. Consequently, this approach might be useful to other student teacher programs. It can be argued that research carried out for a longer period of time and focused on professional action –that is, action research– could be very effective in the process of professional identity formation.

The results show the formative and transformative power of Teacher Education and, therefore, contradict certain skepticism regarding its effectiveness (Britzman, 2003, cited by Horn, Nolen, Ward & Campbell, 2008). However, it is important to reinforce the transformative power of training, planning strategies that advance the development of a professional identity, such as inquiry and the reflection on one's own conceptions of key aspects such as learning, teaching, and the teaching profession. Furthermore, it is essential for teacher education programs to connect the practicum and university courses, fostering reflection and dialogue among different actors (Merset, Sommer and Dickstein, 2008).

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Identity construction in vocational teacher education based on participatory pedagogy

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Abstract

In my article I will present the key principles of participatory pedagogy and describe the identity construction process in vocational teacher education based on teacher students' narratives. Identity affects how teachers see themselves in relation to students, to the contents to be learned, to colleagues and to educational culture. Teacher identity includes teaching-related beliefs, interests, values, ethical commitments, objectives, future goals, and views on what they belong to. (Eteläpelto & Vähäsantanen 2006.) The empirical data is produced by one group of teacher students during the studies in vocational teacher education. The results of my study indicate that taking responsibility for personal learning starts a process which lead teacher students to the fringes of their own competency. As a consequence, the teacher students start to see teaching and what it means to be a teacher in a more diversified way. Along with the changing understanding, new possibilities for development of pedagogical practices open and the interaction with students and co-workers change.

Key words: identity construction, participatory pedagogy, narrative, vocational teacher education, liminal state

Introduction

"Learning to become a professional involves not only what we know and do, but also who we are (becoming)" (Dall'Alba, 2009).

Views of teaching have evolved from a focus on teacher characteristics to more recent cognitive perspectives of teachers as decision-makers and reflective practitioners. Of course both knowledge and reflection are essential to the work of teaching. However in recent years the study of teacher identity has become an important aspect of teaching and teacher education. Grossman and McDonald (2008) argue that teacher education should move away from a curriculum focused on what teachers need to know to a curriculum organized around core practices, in which knowledge, skills, and professional identity are developed in the process

of learning to practice. Learning to become a professional entails integrating what professionals know and can do with who they are (becoming), including the challenges, risk, commitment and resistance that are involved (Dall'Alba, 2009). The importance of a concept of professional identity lies in the assumption that who we think we are influences what we do. So there is a link between professional identity and professional action (Wenger,1998).

Teacher education has to prepare the becoming teacher to continuously face new situations, develop new courses of action and, where appropriate, move beyond dominant practices. In teacher's work, it is not enough to apply the once learnt skills on a routine basis and minimise problems; the teacher has to continually deepen and revise his/her skills and knowledge.

Traditional curriculum thinking has assumed that starting points for learning and learning objectives are somewhere outside the learner, independent of the learner. Due to this, the curriculum and teaching have been understood as clearly separate systems, i.e. the planner and implementer have been separated from one another (Pinar & al. 1995; Kukkonen, 2007; Barnett & Coate, 2010). At Tampere University of Applied Sciences, the basis of vocational teacher education is a conception of knowledge and learning which emphasises teacher students' activeness, joint knowledge production and evaluation, as well as development of new operational practices. This approach, where reflective, investigative, developing and entrepreneurial work are emphasized is referred to as 'participatory pedagogy'.

Focusing on a personal process of constructing professional identity means reconsidering the roles and tasks of the teacher students and the teacher educator. Participatory pedagogy is a pedagogical approach which gives the student an active position in planning, conducting and assessing one's own learning. The starting points of participatory pedagogy based curricula are personal meanings given to teachership, i.e. teacher student's knowledge, thoughts and experiences of being a teacher. It is essential that everything has not been planned or decided in advance. Understanding of the curriculum as being constructed in practice refers to a process in which a curriculum framework directs activity. The orientation emphasises experience, student activeness, and contextuality of learning and competency (Pinar & al. 1995; Kukkonen, 2014a: see also Korthagen, 2001; 2011). Instead of a stuffed curriculum (Cousin, 2006) or fragmented curriculum or assimilation of separate knowledge and skill components, the participatory curriculum aims at offering students the possibility to have new kinds of experiences of themselves, of teachership and of the world.

In this article I will present and justify the key principles of participatory pedagogy. The purpose of my study is to inquire into the process of identity construction in vocational teacher education based on participatory pedagogy. Through analysis of the empirical data I will answer the question: 'How do teacher students in vocational teacher education experience participatory pedagogy?'

The process of identity construction

Teacher identity stands for teachers' life history based conception of themselves as professionals. It includes teaching-related beliefs, interests, values, ethical commitments, objectives, future goals, and views on what they belong to. (Eteläpelto & Vähäsantanen, 2006) Beijaard, Verloop and Vermunt (2000) define identity as who or what someone is, the various meanings people can attach to themselves, or the meanings attributed to them by others. The process of individual construction of professional identity can be seen as a process of positioning and negotiating between the different possible identities emerging in each discursive context (Harré & van Langenhove, 1999).

From the viewpoint of supporting professional growth an interesting viewpoint is that a persons' identity and conceptions about his/her knowledge and skills are formed (at least in part) narratively (Bruner, 1986; Ricoeur, 1992; Conle, 2002; Rodgers & Scott, 2008). The concept of narrative identity refers to stories or narratives we build and tell and use to define who we are to ourselves and others (McAdams et al. 2006). The importance of narration for identity construction is based on the fact that interpretations of situations and events determine experiential meanings which are expressed verbally in stories people tell (Yrjänäinen & Ropo, 2013). Telling brings out the subjective viewpoint and gives room to the individual's voice. It is thus possible to recognise in teachers' narratives how they understand themselves and their work as a teacher in different contexts.

Identity construction, i.e. the person's conception of who he or she is and where he or she belongs to, requires a conception of where he or she is coming from and going to (Taylor, 1989). It is thus important that teacher students understand their own history and starting points and have a future vision in order to engage in their studies and form their teacher identity. Images of what might be ahead are important in decreasing uncertainty. Markus and Nurius (1986) use the expression 'possible selves' to describe a person's ideas of what they assume they can become. The possible selves form the basis for evaluating current selves and encourage action. Possible future is a term used in socio-dynamic counselling. It suggests that the future is not predetermined and just waiting there but is created and constructed in human action. What we think about our future influences what we do today (Peavy, 2006).

During teacher education teacher students face situations where their prior understanding, knowledge and competency do not apply anymore, but they do not yet have a new basis for understanding and action. From the narrative viewpoint it means that their teachership narrative has breaks and they drift into a so-called liminal state. Liminal state is an unstable state where the person hesitates and oscillates between old and emergent understandings (Meyer & Land, 2003; Cousin, 2006; Kukkonen, 2007). Cracking of conceptions provokes a space for transformation in which the transition from an earlier understanding or practice to

what is required is effected (Land, Rattray & Vivian, 2014). This state of transformation entails a reformulation of the teacher student's meaning frame. Being in a liminal state is like having left the old comfort zone but not having found new answers or procedures for action. Liminal is derived from the Latin word 'limina' meaning the threshold. Being in liminal state is like being on a threshold, in the space between.

The difficulties experienced during the learning process should not be simply put aside. An essential element of identity work is to resist the change because changing one's own thinking and habits is uncomfortable. But resistance of change does not mean its rejection (Britzman, 1994). The movement through liminal states does not happen in a straight line but instead in iterative and recursive stages. First, learner's tacit views are interrupted as he or she is introduced to new perspectives and gains new experiences. In a liminal state, the learner becomes aware of the limitations and contradictions in his/her own thinking and action. This arouses different kinds of unpleasant emotions, for example insecurity and confusion. After the process has been undergone successfully the learner becomes transformed, the notion about oneself has changed and he or she begins to think and act differently and use new kind of vocabulary. Metacognitive awareness has deepened and notions about oneself and own skills have changed. (Land, Meyer & Baillie, 2010.)

Gadamer's (1979) conception of two kinds of experiences can be used to illustrate the meaning of the liminal state. There are experiences which strengthen personal conceptions and there are new hermeneutic experiences. Hermeneutic experiences include something new and unexpected, something we have not thought about before. Hermeneutic experiences are uncomfortable as they disrupt our typical way of seeing and understanding matters. These experiences feel unpleasant and painful as they challenge our conception of ourselves and our personal competency and knowledge is challenged. However, these experiences make identity work productive by enabling seeing and understanding matters in a different way. It is important to lead the teacher students to hermeneutic experiences as through these experiences they start to gain new insight into familiar things.

The negative nature of hermeneutic experiences may have an influence on a person's self-confidence or self-efficacy. Bandura (1997) defined self-efficacy as 'beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments'. Self-efficacy beliefs are major mediators of behavior, and more importantly, behavioral change. Teacher's self-efficacy can be defined as a teacher's judgment of his or her capabilities to bring about desired outcomes of student engagement and learning, even among those students who may be difficult or unmotivated (Tschannen-Moran & Woolfolk Hoy, 2001). Teachers with a strong sense of self-efficacy are open to new ideas and more willing to experiment with new strategies, seek improved teaching methods, and experiment with instructional materials (Sang & al., 2009).

Principles of participatory pedagogy in vocational teacher education

Participatory pedagogy is an extensive approach which combines different pedagogical strategies. It is thus not a separate method but enables use of many activating, investigative, problem and phenomenon based pedagogical models and methods. Supporting students' activeness and participation, consideration of personal learning objectives and starting points, as well as continuous use of reflection and evaluation are essential in participatory pedagogy (Kukkonen, 2014b).

Participation is related to the experience of being able to influence expectations and demands and create new expectations. This refers to teacher students' agency. Agency stands for teacher students' ability to plan, direct, implement and evaluate their learning and studying processes (Kukkonen, 2014b). It is important that a teacher student's personal ways of conceiving, explaining and understanding phenomena related to being a teacher are considered in planning, implementation and evaluation of learning. Conle (2002) argues that giving room to the student's personal viewpoint helps in making the curriculum socially relevant and personally significant to the student.

In participatory pedagogy, participation, agency and identity construction are supported and strengthened by giving teacher students a possibility to construct their own learning objectives. Teacher students' identity work is an interaction process between themselves and the communities where they work. Consequently, different working life specialists, peers and teacher educators participate in learning processes and evaluation. Vocational teachers' identity can be seen to be in continuous change, to be rebuilding in social activity determined by the existing values and sanctions in the community and society.

Participatory pedagogy is based on the reflective, investigative, developing and entrepreneurial work approach. I will explain these concepts in turn:

Reflective work approach. People are social by nature as they create their reality through interaction. The reality is reflected on conceptions, beliefs, images and feelings through which people try to understand what is happening in the external world. At the same time, they also try to understand themselves based on [the] received feedback. In teachers' work reflectivity means consideration of personal professional practice from different viewpoints and related development of practice. The key factors are social perception, interaction, and meanings given to events and situations (Tiuraniemi, 2002). Reflection enables evaluation of personal routines, everyday activities, social and cultural conceptions, and truisms (Crawley, 2005).

Investigative work approach. The investigative work approach is based on teacher students defining their work and practice by themselves and together with others. The investigative work approach comprises asking questions, challenging and problematizing. It stands for adoption of a questioning approach to educational practices, objectives and processes. It creates the basis for reflection. In teachers'

investigative work approach it is essential to question personal teaching practices, teacher identity, and communal, social and global phenomena which determine and direct teachers' work.

The development of different forms of personal knowledge calls for an investigative approach (Bereiter, 2002). The investigative work approach requires transfer from complete teacher control to a supportive and facilitative teacher role, which means that learners have to take responsibility for their own learning (Bolhuis & Voeten, 2004).

Developing work approach. Identity can be understood as a multilevel narrative of the self. In the narrative identity conception it is possible to distinguish the self as a person, self as a member, and self in the world. The respective narratives are individual narrative, communal narrative, and cultural narrative. (Yrjänäinen & Ropo, 2013).

Learning is not just a consequence of a specific activity but people learn by developing new ideas and things together with other people. Recognition of narratives concerning teachers' work based on personal experience and narratives maintained in the work community and social discussion give new perspectives and approaches to teacher students. By recognising and understanding narratives maintained in different groups, communities and society, teacher students can understand themselves as a part of teachership narratives. Either as their maintainers, developers or reformers.

Entrepreneurial work approach. The entrepreneurial work approach is related to the ability to understand, work and take initiatives [also] in uncertain conditions. It is based on the ability to be dynamic, flexible, developing and creative in changing and uncertain environments (McGrath & MacMillan, 2000; Ireland et al., 2003; Haynie et al., 2010). The entrepreneurial work approach is closely aligned to the reflective, investigative and developing approaches outlined previously. It is important to consider the dynamics between the actor and context. Identity construction is about defining the self in relation to something external. This is related to narrative identity (Ricoeur, 1992). Teachers are working in continuously changing contexts and thus implementation of the entrepreneurial approach also calls for the reflective, investigative and developing approaches. The entrepreneurial approach emphasises independence and solution orientation. In teachers' work target-oriented cooperation is an essential part of the entrepreneurial approach.

Vocational teacher education supports the reflective, investigative, developing and entrepreneurial work approaches in many concrete ways. Teachership is considered for example by searching for and producing answers to the questions: What am I like as a teacher and facilitator? What am I like as a work community member? and What am I like as a representative of the teaching profession? Thus personal competencies as a teacher and relations to students, colleagues, community memberships and teaching-related social and global phenomena are considered, reflected on and evaluated. These different viewpoints are referred to as 'frameworks of teachership'. Identity construction

in teacher education can be understood as building of new frameworks through reframing (cf. liminal state and hermeneutic experiences). Participatory pedagogy supports reframing of teachership by facilitating teacher students to set their own learning objectives, think critically, understand holistically, consider their thinking and work practices, and build knowledge in a communal manner.

Participatory pedagogy includes uncertainty as all has not been given in the curriculum. Naturally there are learning objectives mandatory to everybody but they can be modified and teacher students can set and develop their own learning objectives. In addition to student-specific objectives and questions, learning assignments are also open-ended in such a way that the teacher students participate in final formulation of the learning assignments. This represents a new kind of curriculum culture. The curriculum has traditionally been understood as a given manual made by experts and to be followed by the teacher and students. The curriculum is a text defining the courses and study modules. This kind of ready-made and norm-based document leaves no room for teacher and student to participate in the formulation of learning objectives (Kukkonen, 2014a).

Another way to understand curriculum is where curriculum is seen to be constructed in action. This refers to a process in which a curriculum framework works as an outline for the action. It emphasises experience, student activeness, personal images, emotions, needs, meanings and behavioural tendencies (Pinar & al., 1995; Korthagen, 2001; 2011; Kukkonen, 2014a). As participatory curriculum is understood as constructed in action, it cannot be precisely standardised in advance. Unique situations demand action and reactions from teachers and students which cannot be fully prepared in advance. This kind of thinking breaks the traditional assumption of student and teacher positions in planning, cooperation and assessment (Kukkonen, 2014a).

There are two important principles to enhance identity work in participatory pedagogy: zone of proximal development and scaffolding. The zone of proximal development is defined as the range of tasks that a person can perform with the help and guidance of others but cannot yet perform independently. It is the area where the most sensitive instruction or guidance should occur (Vygotsky, 1986). Scaffolding is directly related to zone of proximal development in that it is the support mechanism that helps a learner successfully perform a task within his or her zone of proximal development. Typically, this process is completed by a more competent individual supporting the learning of a less competent individual. So, for example, there could be a teacher assisting a student, or a higher-level peer assisting a younger peer (McLeod, 2012).

In vocational teacher education in Tampere University of Applied Sciences teacher students study together and joint knowledge construction and creation takes place in small teams. Collaborative learning includes the idea that team members can have different levels of skills, knowledge and ability so more advanced peers can help less advanced members operate within their zone of proximal development.

Empirical data – production and analysis

Narrative research has become an important means for understanding teachers' culture; that is, teachers as knowers of themselves, of their situations, of students, of subject matter, of teaching, and of learning (Clandinin & Connelly, 1998). If we are to understand teacher identity, then narrative research is a powerful tool to document the construction of teacher identity. A narrative viewpoint of teacher identity refers to stories, which we construct and tell to define who we are as a teacher (Bruner, 1986; Ricoeur, 1992; McAdams & al., 2006).

The teacher students were invited into the process of inquiring into the construction of teacher identity. The empirical data of this study comprise the narratives of 16 teacher students relating their experiences and thoughts during their teacher studies. At the beginning of the [studies] program the principles of participatory pedagogy were introduced to the teacher students. A few days after that I sent a letter in which I asked the teacher students to write about their feelings, expectations and thoughts. These answers were used later as a basis for discussions and reflections. After seven months I wrote another letter with same questions as in the first letter and the teacher students answered again but this time based on their experiences of studying by the principles of participatory pedagogy.

Usually interviews are used as the method of surveying teacher students' experiences because during the interview it is possible to make additional questions and specifications. However, I chose writing because it involves stopping and allows thinking and reproduction of one's own text. The writer thus has the possibility to return to his/her text, evaluate it and make changes.

The answers to my two letters were analyzed by using the method of positioning. By positioning themselves and others people can give meaning to their behavior and make it intelligible. Positioning manifests the way individuals describe or understand things, express their conceptions and affect their practice (Harré & van Langenhove, 1999). So, answering my letters was understood as production of a small-scale teachership narrative. I read the answers several times and identified different themes and phases of the learning process and identity construction.

Findings – critical phases of identity work

In the narratives of the teacher students it was possible to identify five phases in the process of identity work: acceptance of responsibility, facing of uncertainty, cracking of conceptions, reframing of teachership and transformed action. They can be seen as possibilities in transferring to the liminal state and onward to new understanding and transformed action as they require re-evaluation of personal thinking and practice. In the following description of these phases I will quote

the teacher students' narratives to concretise the presented interpretations. Pseudonyms are used in connection with the quotes. The words "new teacher" after the pseudonym means that he or she did not have teaching experience before starting the teacher education, and "experienced teacher" stands for someone having prior work experience as a teacher before starting the teacher education.

Acceptance of responsibility

Participatory pedagogy gives room for teacher students' own viewpoints in setting learning objectives, planning own studying and even assessing own learning. This may seem very interesting and almost a relief compared to earlier experiences as a student.

> "I think it is good that we adults are not given a ready template to be used systematically but we can find out about things by ourselves. Ready and clear answers are not common in working life either." *Leena, new teacher*
>
> "I need the teacher educator to have order in my studying. Otherwise I will not usually have it even if I am not so young anymore." *Olavi, experienced teacher*

The teacher students did not have prior experiences of planning their own studies and formulating own learning objectives. However, the readiness to engage with to reflective, investigative, developing and entrepreneurial work approach existed. As adults are responsible for their lives they need to be seen and treated as capable and self-directed in learning, too. According to Knowles, Holton and Swanson (2005) adults are life-centered (i.e. task-centered, problem-centered) in their orientation to learning and they want to learn what will help them perform tasks or deal with problems they confront in everyday situations and those presented in the context of application to real-life. Many of the teacher students were ready to take responsibility for their own studies because they saw similarities between the way of studying and teaching practice. Teachers work is supervised to an increasing extent by teachers themselves, involving negotiations in various teams, groups and communities. Some limits and directions were however hoped for. Order or discipline was not always achieved on the individual's personal or team's internal decision.

Facing of uncertainty

The participatory curriculum includes the element of uncertainty because everything is not given in advance in curriculum. Teacher students have to consider together their learning objectives and important issues of the operational context and formulate assignments with no ready answers.

> "At the moment the unclarity of what I should do first causes some stress. I mean what I should do first as regards the studies."! *Pentti, experienced teacher*
>
> "Some curriculum matters have already become clear but quite many are still unclear.

> I however believe that they will little by little become clear during the contact days with the support of the team." *Maija, new teacher*

The process did not seem to start off well as some element of unfamiliarity was disturbing. Lack of clear instructions also caused uncertainty of what would be the right thing to do. The knowledge of support being available from the peers (other members of the teacher student group) and the teacher educator however helped in living with the uncertainty and created hope of things becoming clear.

Facing the reality of being responsible for planning one's own studies caused anxiety. Doubts about one's own ability to make decisions started to cause stress. According to Zembylas (2003) the construction of teacher identity is at bottom affective and investigation of the emotional components of teacher identity yields a richer understanding of the teacher self.

Cracking of conceptions

Identity construction may be a troublesome process. Cognitive processing is important but issues related to feelings and interaction require consideration too. Transfer to the liminal state means that prior understanding or knowledge is challenged but there is not yet a new basis for understanding. According to the principle of liminality teacher students "stand at the threshold" between their previous way of understanding themselves as a teacher and structuring their identity, and a new way.

> "This orientation was very memorable as I reacted very strongly with feelings. At times I thought the school was an excellent place for growth and from time to time that was a total waste of the learning time. I wish I could interview the graduated who are already in the working life!" *Jarkko experienced teacher*
>
> "All available time went for preparing the lessons and making the PowerPoint presentations. I wouldn't have believed how much time goes to preparing the lessons." *Leena, new teacher*

The concrete situations in which the teacher students are involved create experiences that can be used in the reflection process (Korthagen, 2001; 2011). Hermeneutic experiences are unpleasant but essential in learning. Practical studies and working in real situations with their own students gave the teacher students new perspectives. Recognition of their own understanding and lack of skills awoke strong feelings. In addition experiences in working with other teacher students in a small group caused frustration and uncertainty.

> "But then I have been quite annoyed about the rude tone of these messages or maybe I just interpret the tone of the messages too sensitively?" *Henna, new teacher*

It is not self-evident that working in teams is easy. It requires commitment, flexibility and openness from the members to face and deal with the problems. Even if the team did not always fulfil personal expectations, problems were identified and the teacher students learned through them.

These kinds of reflections are important in identity work because the way teacher students explain things in relation to other people and different situations mirrors their professional identity (Coldron & Smith, 1999). In addition of reflecting on cognitive matters it is important to ponder on emotive issues, too. Emotions lead to better retention of cognitive material and provide students with seminal learning experiences (Taylor, 2010).

Reframing of teachership

After the confusion things started to become more clear. Along with new kinds of understanding i.e. reframing of teachership, attention was also paid to matters the students had not noticed before or matters whose connections had earlier been unclear.

> "I unify and strengthen my prior competence and bridge different things together – to a new whole. This education seems to give the feeling of a whole when my different competences come to use under the title vocational teacher." *Maija, new teacher*
>
> "I have gained concepts for my practices. To some degree I have also started to understand why I do as I do. Even if I am only at the beginning of my teacher studies, I have noticed that my competence is more extensive than I have thought because I have not understood that some competences I already had are relevant for being a teacher." *Jarkko, experienced teacher*

The teacher students started to find theoretical grounds or justifications for their thinking and practices and recognise teachership and teachers' competency in a new way. This also gave a new basis for evaluation of one´s own teaching practices.

> "In my opinion I did not focus enough on for example interaction. My own coping was emphasised, not how the students experienced the learning situation. Leaving enough looseness to the plan also causes anxiety for not having enough content for the whole lesson." *Kerttu, new teacher*

The teacher students did not just blindly accept the problems they face day to day but reflected upon them, recognized their own part in problematic situations and searched for solutions and improvements. New viewpoints help in developing the pedagogical approach but also raise new themes for consideration. Even very critical considerations were used in evaluations of oneself and of co-workers in the

workplace community. It can be said that possible selves (Markus & Nurius, 2006) started to clarify. Teacher students started to articulate how they would cope with difficulty that they might encounter in attaining their desired possible selves.

Transformed action

Reframing of teachership does not only concern thinking and speech. The narratives showed how teacher students positioned themselves in a new way, not just as implementers of readymade plans but active as developers of practices.

> "I have suggested alternative ways of action in my workplace, worked as a member in teacher meetings, tried new learning environments and techniques, and worked as a teacher in multicultural groups, also in English." *Liisa, experienced teacher*
> "I have participated in many student wellbeing promotion projects in cooperation with different educational institutions and the city." *Ritva, new teacher*

It can be said that teacher students' sense of self-efficacy had strengthened and increased. They were more open than before to new ideas and more willing to experiment with new strategies and teaching methods (c.f. Sang & al., 2009). Reframing of teachership opened up new possibilities in interaction with the students, acting as a member of the community, as well as a member of local and regional networks.

As a round-up I present an aggregation of one teacher students' narrative (*Helena, new teacher)* on her learning. It describes well how the above-mentioned critical phases of identity construction can be successfully gone through by facing the feelings of uncertainty and problems concerning your own skills, participation and self-efficacy

Helena's response early in the program:

> "I have thought what causes the hang-up and why I do not progress as usually? I am usually not shy of new people and feel I get along with many. The teacher education group however seems so wise and experienced that I am sometimes scared and anxious of struggling to keep up with the thinking. The "teacher language" that the more experienced teacher students use sounds strange.
> Starting of the teacher education studies appeared interesting but strange for us who do not work as full-time teachers. My expectations were somehow different and that's why it has taken time to piece together and organise the matters in my head. I am trying hard to understand the new curriculum but the whole still feels quite strange. I try to develop my thinking to a new level and know that I should not compare my studying process with others but to follow my plan independently. And it is difficult to make the plan for the spring.

Helena's response towards the end of the program:

> The autumn was hard in many ways. The autumn however gave a good basis and it seems that the pieces can gradually find their places. I feel that the autumn module deepened, expanded and developed my awareness and view of the learnt and experienced matters. I have also learnt a lot new during the team work.
> I notice that I deliberately use different methods than before when supervising students. I search for different alternative methods and I am more aware of their existence. I also listen to students and their learning objectives and methods in a different manner. More than earlier I hope that students assimilate what they learn and do by strengthening their student identity. I also want to facilitate students individually from their own starting points and objectives."

The different phases of identity work can be recognised in Helena's narrative. New viewpoints raised confusion but even familiar matters started to open in a new way and get new meanings when uncertainty and even conflict was faced, tolerated, reflected on and resolved. After having new perspectives, viewpoints and understanding to herself as a teacher, Helena changed her interaction with her own students.

Teaching or facilitation – expectations for the teacher educator

The teacher educator cannot just stand back and see how both individual and team processes develop and how conflicts take place. I also asked the teacher students to respond to the following questions related to my own action: Does it disturb you that I have not told in detail what you should do? And in what order? What kind of support and guidance would you need from me right now? The two first quotes below are from the answers to my first letter and the last quote is from the answers to my second letter.

> "Yes it disturbs … a list of the written assignments to be done would be good …it would give an idea if I have understood matters at all … in my opinion no special need for supervision when the basics are clear." *Kerttu, new teacher*
> "Your way does not disturb me, quite the opposite. With your help I have understood that things can be understood and done in many ways. There are several paths to the same goal." *Pekka, experienced teacher*
> "To give triggers and different viewpoints, make questions, deepen understanding, wonder together, give feedback, encourage!!! Exactly what you have done, thank you!" *Ritva, new teacher*

A concrete list of assignments and a timetable would have helped in orienting teacher students to the new way of studying. However, the teacher students seemed

to be very willing to face the new and unknown as they knew it was possible to get support from me as their teacher educator. As a teacher educator I understood my task to support and facilitate the individual meaning making and identity work. This included maintaining their trust to reach their zones of proximal development and further toward new challenges, new zones of proximal development.

People evolve in whatever direction they ask questions about. I tried to help the teacher students to discover what could be, rather than correcting mistakes or showing them what they should fix. Human systems are projecting ahead of themselves a horizon of expectation that brings the future into the present (cf. possible selves, possible future). What we believe to be true determines what we do and what we do today is guided by our image of the future (Cooperrider & Whitney, 2005; Peavy, 2006). The teacher students' conceptions about being a teacher are expressed in the stories they tell each other every day, and these stories are constantly being co-authored. I wanted to bring together the stories teacher students tell (c.f. scaffolding). Korthagen (2001; 2011) emphasizes the importance of teacher students' own perceptions, thinking and feelings in the process of becoming a teacher. By sending the two letters and discussing about the stories the teacher students told I tried to stimulate new ideas, stories and images that generate new possibilities for understanding and action.

Discussion

The results of my study confirm the idea that identity construction in vocational teacher education is a multilevel process in which the teacher students may be in different phases in relation to different aspects of teacher practice. An interesting observation was that the five critical phases were found both in the narratives of teacher students with previous teacher experience as well as in the narratives of those who had no previous experience in teaching. It can be assumed that teacher students with no experience as a teacher started the identity work i.e. the process of becoming a teacher and those already having experience as teachers started the process of reconstructing their existing teacher identity.

Cognitive elements and acquiring of new teaching methods is only one part in the process of becoming a teacher - though of course an important part. Emotive issues are of crucial importance in identity construction: learning to face difficult questions, living in uncertainty and frustration and enduring the breaking of one's own conceptions. Learning is both affective and cognitive and it involves identity shifts which can entail troublesome, unsafe journeys (Cousin, 2006). Teacher student's opinions concerning his/her own skills and knowledge of becoming a teacher are connected to self-efficacy. The possible self - 'I as a teacher' - may begin to look unclear or even unachievable and self-efficacy begins to weaken.

Especially in phases where self-efficacy is low it is important that the teacher student gets emotional support and is helped to build positive outlooks towards the future. Thus, teacher identity can be considered as a dynamic, reconstructing and constantly reforming process. It is not a constant or solid entity that evolves cumulatively. This brings challenges teacher education.

The process and critical phases of identity construction are visualised in figure 1.

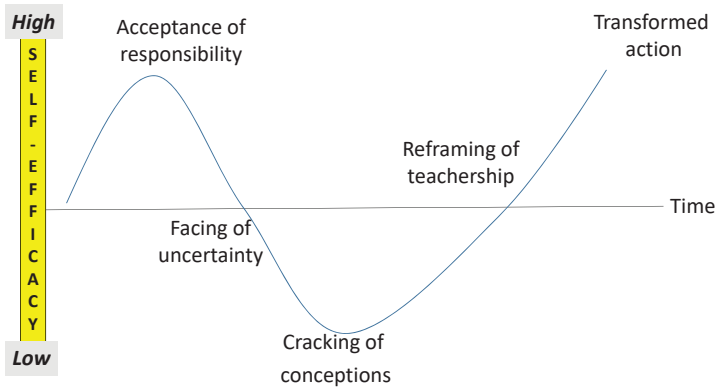

Figure 1. The process and critical phases of identity construction

Participatory pedagogy includes the possibility to make personal choices. This was seen as fascinating and working in small groups was eagerly accepted. The responsibility for planning personal studies and facing team dynamics however raised uncertainty in what to do and how. This could be seen in the need for clearer instructions, assignments and discipline and in a decrease of self-efficacy. Gradually conceptions and knowledge were however reorganised and teacher students' thinking and practice changed. According to the principle of liminality new terrains emerged in which things formerly not perceived came into view. This permitted new and formerly inaccessible ways of thinking and practicing.

The teacher students were willing to face new kinds of situations even if they were not sure how they will cope in these uncertainty provoking situations. Knowledge of how to get help and support from the teacher educator, from their own team and also from other teams, helped to reduce confusion. Especially two phases of identity work can be identified as places of sensitive guidance: 'facing of uncertainty' and 'cracking of conceptions'. As the teacher students started to reframe teachership, their knowledge became less tacit and more explicit, discursive, and conscious. This development of metacognitive awareness is an important step toward transformed action.

The critical phases of identity construction should not be understood as separate. They are overlapping and interwoven and the teacher student can be in different phases in relation to different phenomena in teacher practice. Identity transformation

occurs when the emotional salience or power of one's experiences changes. Identity is not a fixed state but a continuing dynamic process of intersubjective discourses, experiences, and emotions: all of these change over time as discourses change, constantly providing new configurations. (Zembylas, 2003). Beijjard, Meijer and Verloop (2004) consider identity to be an ongoing process of interpreting one's self as a certain kind of person and being recognized as such in a given context. Identity can be seen as an answer to the recurrent question: Who am I at this moment? Thus a teacher's identity is not a fixed attribute once attained during one's studies but a continuing dynamic process constantly challenged and under transforming shifts.

Participation and agency calls for trust in not being left alone in uncertain or conflict situations (cf. liminal state, hermeneutic experiences). The mission of the teacher educator is not just to transmit new knowledge and methods but to open new viewpoints and approaches and above all to offer support and understanding in situations where prior thinking and operational models are challenged. Giving room for teacher students' different voices gives the teacher educator valuable information about critical phases and the need for facilitation.

Conclusions

This study searched for an answer to the question: 'How do teacher students in vocational teacher education experience participatory pedagogy?' In the narratives of the teacher students it was possible to identify five critical phases as regards progress of identity construction: acceptance of responsibility, facing of uncertainty, cracking of conceptions, reframing of teachership, and transformed action. The narratives clearly showed that identity construction or reconstruction had started and had an effect on teacher students' thinking and practice. Reframing of teachership had thus taken place.

The problem of teacher education is of one dealing with natural emotional reactions of human beings to the threat of losing certainty, predictability or stability (Korthagen, 2001; 2011). It is possible to set a provocative question based on the results of this study. What would happen if instead of implementing detailed plans we would just let learning take place? This does not mean such relativism that everything is left to be freely constructed by teacher students according to the principle 'everything goes'. There are naturally learning objectives for teacher education. If learning is let to take place, it leads to surprising situations but that's what genuine experiences are. This also applies to the teacher educator. The teacher educator could be expected to have some prior experience. Gadamer (1979) argues that experience is not based on knowledge or competence but an experienced person is ready to seek new situations and learn from them (c.f. hermeneutic experiences). The teacher educators should ask themselves if they too

are ready to have their conceptions cracked and to reframe their conceptions about teachership. Even the teacher educator's identity is not fixed and constant. Is he or she ready for his/her own identity construction at the same time as supporting the teacher students' identity construction?

Participatory pedagogy aims at something new. Davis (2004) is of the opinion that teaching and learning are not about implementing current conceptions but aim at expanding the possibilities of knowing, acting and being. The focus is not on what is but on what we produce and achieve. It can be asked if learning and identity work taking place in vocational teacher education are not about cumulative learning of different knowledge and skills but about consciously recognising, evaluating, accepting, refusing and ignoring different alternatives while constructing or reconstructing one's own identity?

This study was carried out in the context of vocational teacher education. As the five phases of identity work are not related to any particular subject or field of study, further research is needed to investigate how they can be applied in all manner of situations where learning, professional development and identity construction are a high priority.

Evaluation and development of participatory curricula and vocational teacher education should be based on research. Perhaps it would be useful to use an approach similar to participatory pedagogy: reflective, investigative, developing and entrepreneurial. The research should be concerned with inquiring into the processes of professional identity construction through the narratives that occur in various professional contexts. Looking to the future it is important to study the experiences of teacher educators in relation to participatory curriculum. Participatory curriculum is open and takes shape in practice. It calls for the teacher educators' joint understanding of how a curriculum can be used without losing its key bases as regards the idea of man, knowledge, learning, and operational principles.

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Student teacher inquiry-based learning through 'You Tube'

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Abstract

Various forms of online-platform-related inquiry-based learning experience can provide valuable opportunities for teachers to develop their content knowledge as wells as to improve their digital, problem-solving, autonomous learning and cooperative skills. Furthermore, this type of inquiry learning can contribute to the enhancement of students' learning motivation. However, the implementation of inquiry-based education in classrooms presents a number of significant issues. This chapter aims to explore the nature of the components and the challenges student teachers face during inquiry learning via YouTube videos in their primary teacher training courses. The question is: In what ways do student teachers learn from analysis of classroom video clips available on YouTube?

Key words: inquiry-based education, YouTube platform videos, primary teacher training, learners' motivation, problem-solving

Introduction

In this chapter the focus is on inquiry-based learning via YouTube simply because, at present YouTube is the most widespread user-driven video content provider, which can be distinguished from other social network platforms that are marked by "reciprocative linking and assortativity" (Wattenhofer, Wattenhofer & Zhu, 2012, p. 1). Also in the case of videos created for educational purposes fair use, the limitation of and the exceptions to general copyright regulations, must be applied and users are allowed to watch copyrighted works to a certain extent. In the case of education and scientific work YouTube contents can be used without permission, however, appropriate citation must be provided in the references (Levy & Siddiqui, 2009). The YouTube platform offers various channels and videos for education, which lend themselves to integration into tertiary level courses, too, in various ways and in many fields. The appearance and application of YouTube videos during primary teacher training courses can be regarded as relevant for many reasons.

First, YouTube videos are easy to get access to and fairly popular among young adult students with different levels of digital competences. Furthermore, YouTube can offer high quality content and these online videos can be used in and out-of-class as well as can have a motivating effect on student. Finally, foreign language videos can also enhance students' foreign language skills and competences.

Inquiry-based learning belongs to the constructivist approach and advocates the essential role of social interaction and the students' active involvement in the learning process (Dewey, 1929; Vygotsky, 1986), which can intensify students' learning motivation and can also contribute to the development of their critical thinking (Magnussen, Ishida & Itano, 2000). All things considered, research into the implementation of inquiry-based education through YouTube videos in lower primary teacher training can be seen as a relevant issue. The aim of this chapter by reviewing the literature and briefly presenting a small-scale empirical study is to investigate different avenues of using YouTube videos to make the educational process more challenging and beneficial for the students. The target population involved students taking part in lower primary teacher training, that is these trainees are going to be qualified to teach English as a foreign language (EFL) from Form 1 to 6 of primary school. The research question was formulated as follows: *How can YouTube platform videos enhance the learning motivation of student lower primary teachers through various effective methods of inquiry-based education during their first English Language Pedagogy and English Speaking Cultures course?* That is, it was highlighted how students can gain and extend their knowledge via problem-solving, research and cooperative tasks exploring YouTube videos in and out-of-class during their aforementioned courses.

Theoretical background

In this section the two key-concepts of this chapter: inquiry-based learning and YouTube for educational purposes will be highlighted. First, an introduction to the historical evolution of this type of educational method will be presented, subsequently different definitions of inquiry–based learning will be explored followed by a short discussion about tutor and student roles. Next, the possible educational functions of YouTube and some empirical studies into YouTube-related inquiry learning will be explored in brief.

Inquiry-based learning

Friesen and Scott (2013) found that the term itself 'inquiry' originates from the Latin 'inquīrere', which emerged in the 13th century, meaning 'to seek for'. As far as the history of inquiry learning is concerned, it can be claimed that it stems in old traditions in the West particularly inspired by the Ancient Greek philosopher Socrates' questioning method, which meant carrying out a dialogue with his interlocutors

based on his claim that he merely knew that he knew nothing. This method implies a sort of examining life, a way of living rather than a formal instructional technique. Socrates posed logical and well-organized questions on for example ethics, pointing out that there can be assumptions that can be proved illogical through this way of challenging. The inquiry method following the Socratic path does not simply imply gaining knowledge from an 'inferior' teacher figure that has all knowledge. According to Ross (2003), based on the Socrates' line the educator and the students both share the responsibility in the classroom context to extend the dialogues via challenging questions. That is, both the teacher and the students come up with questions in order to highlight basic assumptions. They have the 'drive' to create situations where they can elicit answers, ideas and thoughts which can be regarded as valuably thought-provoking. Centuries after Socrates in Renaissance Italy a trend sprang up to observe, investigate, experiment, find answers and solutions to beliefs and superstitions about the universe (e.g. Galileo Galieli, Leonardo da Vinci). This type of inquiry wave became even more intensive in the 18th century Enlightenment period in Europe. In the 20th century a science teacher, a key figure in education progress, Dewey developed a model of inquiry (1910) which can be regarded as a milestone when discussing the history of inquiry learning. He advertised the significance of highlighting a problem, setting up and testing related hypotheses, doing testing during revision and implementing a solution (Barrow, 2006). Dewey advocated that teachers are not to do merely frontal work during lessons providing knowledge, furthermore, he advertised that students are to take an active part in their exploration and learning with a certain level of control by the teacher who undertakes the role of a facilitator/guide. Similarly to Socrates, Dewey also claimed that inquiry is about learning how to live.

Since the 20th century there has been a growing number of empirical research studies which reveal that the competences of adapting various skills in different situations, problem-solving and critical thinking can provide new avenues in learning and teaching instead of old rigid educational approaches, where students have to memorize and use unlinked facts and definitions, procedures and rules (Darling-Hammond, 2008). It has been argued that new educational models are needed to meet 21st-century requirements involving the advancement of technology, digital networking, the current nature of economy and social milieu. In this new environment a mere focus on content delivery and discrete skills development can be considered out-of-date and traditional education requiring passive transmission-based learning is insufficient. Contemporary students have to face real-life problem-solving, collaborate with experts, and use various means of communication including podcast presentations, short documentary video-making or display boards (Friesen & Scott, 2013).

At present, inquiry-based education, which is an umbrella term, can be defined from many different perspectives and is associated for instance, with project-based learning, problem-solving, cooperative learning as well as diagnosing problems, planning investigations, searching for information (Turkmen, 2009). That is, based on

the tutor's needs analysis of his/her students, the learners often have to get engaged in open-ended explorations regarding a certain issue, in evidence-based reasoning and in sorting out problems in creative and unique ways. It is natural in inquiry learning that teachers, metaphorically often titled as provocateurs/facilitators/guides, and students are jointly responsible for the learning process involving planning, content, evaluation as well as class and individual progress (Fielding, 2012). It is necessary to emphasize that the educator's main task is to take part actively during the inquiry-based educational process by creating a culture, a suitable classroom atmosphere, meaningful settings and contexts where the students' ideas can be checked, piloted, modified, refined and even questioned (Scardamalia, 2002). The facilitator should aid and guide the students to raise their curiosity level to begin a journey of regular inquiry, which is an ultimate aim of inquiry-based education. Furthermore, facilitators must function as models by presenting how to find new big ideas to be explored as well as by offering insights into how to conduct investigations.

The stages of inquiry learning processes can be identified from different aspects. One possible avenue consisting of guideline questions for the students is provided by Watkins (2012 as cited in K-12 Capacity Building Series, 2013), who distinguished three main phases of the inquiry cycle: 1) planning, 2) monitoring and 3) reflecting. According to Watkins, the planning phase of the course should involve the identification and conceptualisation of various components, that is the subject of observation and certain prior knowledge about the topic before commencing its investigation. Also hypotheses should be formulated to test initial theories and questions should be formulated for the whole group to explore the phenomenon and to understand it more deeply. Furthermore, the careful selection of appropriate approaches is fundamental. Finally, the tutor and the students' current knowledge and the paths of further learning should be identified. Regarding the monitoring phase, first it is essential to continuously follow the course of observation and to check whether the direction of the learning process is headed towards the objective/s. Second, it must be discussed how to share and enhance the students' newly gained knowledge via various forms of group experiences. As far as the reflecting and consolidating phase is concerned, it is vital to check whether the learning process has been successful in achieving the learning objectives. It is important to consider what has been learned and what obstacles emerged along the route to gaining that new knowledge. It must also be analysed and discussed if that route can be beneficial again in future learning processes. Also it must be studied how the obstacles were handled and how individual learner groups coped with them. The most significant question is if the learning process has resulted in really new knowledge, understanding and questions. Ultimately it is crucial to gain insight into whether learners are capable of thinking about the investigated phenomenon and the world in a new perspective.

Regarding the implementation, the action phase of inquiry learning, *Table 1* reveals certain techniques of how students can contribute to the process, how

Types of student activities	Examples of student reactions	Examples of prompts applied by students and tutors to extend the discussion
Statements	*I share/don't share _____'s opinion.* *The answer is the Audio-Lingual Method.*	*Could you explain why you share/don't share _____'s opinion??* *What makes you think that the answer is the Audio-Lingual Method? Could you tell us how you found that solution?*
Relying on	*Relying on what ____ said, I believe it's also crucial that…*	
Paraphrasing/ clarifying/ synthesising	*Up till now, I understand that we've been discussing…* *When you were talking about the rights of Head of State in the UK, did you mean that she has the right to advise because…?*	*That's a very good summary of the big ideas we've been talking about. Does anybody else have anything to add?*
Connecting	*What you are saying reminds me of what we've learnt about how to assess students' work. According to the Grammar Translation Method and the Direct Method, they both allow the use of discrete point tests.*	*That's an interesting connection. What other ways may these two methods be related?*
Asking questions	*I wonder what would happen if you applied the Grammar Translation Method and Communicative Language teaching during one foreign language course.*	*It may help to first consider what sorts of functions these methods carry out.*
Setting up theories	*Students' accuracy can be effectively improved via various communicative tasks.*	*How could we test this theory without doing any harm to the students?*

Table 1. Different student contributions to inquiry learning adapted from K-12 Capacity Building Series, 2013)

they can respond as well as what prompts can be applied to extend the process of inquiry. The original table (K-12 Capacity Building Series, 2013) has been adapted to focus on issues related to language pedagogy and English speaking cultures.

Finally, Sawyer (2006) sums up and compares the elements of traditional transmission-based education (instructionism) and the cognitive approach (learning knowledge deeply) regarding learning and teaching. Sawyer argued that during transitional practice teaching materials are usually not connected to previous knowledge by the students. Instead students tend to go through the learning process memorising facts and they are not aware of the nature of the procedure. Students learn new information from their teachers and their course-books, however, it is challenging for them to understand new ideas that are not mentioned, or are presented from a different approach in their course-books. Knowledge is often regarded as a non-dynamic one by the students, which can be gained from their teacher, who is the authority in the classroom. Furthermore, students apply learning strategies without reflecting on them and the learning objective/s/. Concerning deep learning, it can be claimed that students connect new ideas and knowledge to prior experience and information. Students' various "interrelated conceptual systems" (Sawyer, 2006, p. 4) need to be integrated and during this process learners detect emerging patterns and fundamental principles as well as assessing new ideas and drawing conclusions. To achieve new knowledge via deep learning students require critical thinking and logical augmentative skills and they need to be capable of processing the dialogues which are avenues to new knowledge. Finally, students' self-assessment and self-reflection about their own learning process and understanding is inevitable during deep learning processes.

In the next section, the nature of YouTube for educational purposes will be discussed. It can be claimed that online technological support for inquiry learning is beneficial for multiple reasons as it has several effects on the learning process which may be summarised as follows: 1) intensified engagement and motivation 2) access to a range of information 3) active, manipulable representation 4) structured with tactics and strategic aid 5) diagnostic function and error correction and 6) dealing with complexity and helping production (Blumenfeld, Soloway, Marx, Krajcik, Guzdial, & Palincsar, 1991; Edelson, 1995).

YouTube for educational purposes

YouTube, which hosts a massive quantity and range of contents including music, sports, entertainment, and education videos, offers a suitable tool for higher education. The reasons are many-fold. It can address current and would-be students, it can serve as a platform for disseminating various teaching materials as well as research findings (Wilkes, Pearce & Baker, 2011). Regarding the quantity of YouTube educational videos, it was found that in 2011 more than 400 university YouTube channels were operating in the world and alone in the UK there were 102

(Azyan 2011). A beneficial nature of YouTube is that it can contribute to increase the accessibility and quality of teaching as through this technology more students can be reached and their motivation can be enhanced (Wilkes, Pearce, & Barker, 2011). Therefore, it is not surprising that YouTube studies have become more intensive in the past few years in the field of social sciences (Burgess & Green, 2009).

Snelson's article (2011) gained insights into 188 peer reviewed journal articles and conference papers whose titles included the term 'YouTube' and focused on strategies and modes of integrating YouTube videos into learning and teaching processes (Tan & Pearce, 2011), which indicates the growing spread of scholarly interest in particular in the field of sociology. For instance, Miller (2009) dealt with some anticipated problems regarding the use of online media, for example the resistance of students with limited computer literacy as well as technical failures including broken Internet access or link or poor picture quality. Miller emphasised that a most striking function of YouTube videos lies in its representational applications that provide students with images, for instance displaying new stories, conducting interviews, documentary films. These can be beneficial tools to aid students to acquire conceptual understanding of the content.

Wiegel (2002) discussed the role of multimedia as a source of icebreaker in the lessons. Furthermore, in Brown's study (2000), a team of students were introduced who were not capable of attending traditional lessons and they watched online videos in a social environment. The control group of students, who attended traditional lectures, was outperformed by the experimental online video intervention group. It was emphasised the above-mentioned experimental group did not use the videos in a flipped classroom but in a social setting of a traditional classroom (Tan & Pearce, 2011).

A three-year longitudinal study carried out by Marx, Blumenfeld, Krajick, Fishman, Soloway, Geier and Tal (2004) at the University of Michigan jointly with Detroit Public Schools detected that inquiry-based elements can be integrated into the state curriculum in a beneficial way. Inquiry-based science lessons were delivered in grades 6-7-8 for more than 8000 participant students. The topic was how big things can be moved and the participants' task was to find ways of exploring simple machines and the nature of force. In seventeen assessment categories out of eighteen a statistically significant higher achievement was revealed among the participants with the conclusion that inquiry learning enhances students' progress with poorer results in the past.

The benefits of YouTube videos are that they are visual, entertaining, break up monotony, contain funny elements and also the preparation process for teaching and learning is not too time-consuming. Creativity is essential for the facilitator to compile the video playlist or ask students to do it. YouTube videos can be applied as supplementary materials to other types of tasks to provide stimulating variety for students. Furthermore, YouTube can become a repository in which teachers as

well as students can store their recorded lectures, seminars or workshops. Missing students can watch the videos and they can be beneficial for revision as well. YouTube lessons are not necessarily examples of flipped classrooms giving instructions to students' out-of-class through a virtual platform and bringing homework into the classroom. For further video assignments facilitators can apply EdPuzzle a webtool freely available for teachers to crop and edit the videos, to comment on the video with your own voice and to attach multiple-choice tests to evaluate the students' understanding of the video. With this tool the teacher can monitor and evaluate the learners' understanding of the video contents and language and it enables the teacher to keep track of which students have watched the assigned videos (Hicks, 2015).

YouTube can be regarded as the main source for educational videos online, but there are other resources available. For example, teachers can use the free access only educational content TeacherTube, which also offers a library of audio and photo contents, which is a comfortable and reliable video community for teachers, students, and parents. Neo K-12 places special emphasis on science through its huge variety of educational videos for K-12 students. The videos are easy to integrate into a lesson since usually they are ten-minute-long or less. This platform also offers interactive games and tasks that can be attached to the videos. Explore.org, which shares pre-recorded educational videos, can also be applied similarly to TedEd, which is famed for its highly captivating and entertaining educational videos. Zane Education consists of subtitled videos, which make it especially suitable for foreign language learners. The free version offers only a limited access. Stuff Works also offers various subjects in various formats, which are educational and entertaining at the same time. PBS Learning Media provides free access to its videos after registration, too. The world-famous and trusted brand National Geographic offers free access to informative educational videos, for example about world cultures. Also the reputed BBC provides their collection of videos for education (Hicks, 2015).

The interview study

In the section that follows a small-scale qualitative research carried out in the Hungarian context will be presented. It investigated the participant student teachers' perceptions, experience, beliefs, and opinions about inquiry-based learning via YouTube videos during two of their lower-primary-school teacher training courses, namely English Language Pedagogy and English Speaking Cultures.

The Interviewees

The interview schedule elicited data from 15 student teachers (1 male and 14 female) specialising in teaching English as a foreign language (EFL) from grade 1 to

grade 6 at primary school during and after completing their first English Language Pedagogy and English Speaking Cultures courses having one lesson of both per week. The average age of the participants, who were ensured anonymity during the investigation, was 20 ranging from 21-24. Their English language specialisation program lasts for six terms involving English descriptive grammar, English language development, literature, children's literature, phonetics, drama pedagogy, English speaking cultures (civilisations), and English language pedagogy courses. The English specialisation curriculum consists of two English speaking civilisations and six language pedagogy courses. The participants come from a diversity of social background mainly from the convergent regions of Hungary. Most of the participants are would-be first generation graduates in their families.

The interview schedule

The interview protocol formulated in Hungarian consisted of 12 open-ended items focusing on the participants' experience regarding inquiry-based learning during their university studies with a special focus on their aforementioned English civilisation and language pedagogy courses. More precisely, the qualitative data were elicited on what types of videos the participants had used, to what extent they found them beneficial, how these videos helped the understanding and memorisation of the teaching materials, their exam preparation as well as how enhancing they were for learning motivation. It was also elicited in what ways the participants had used inquiry-based learning through YouTube videos during their presentations at their courses and their primary-school teaching practice.

The procedure of inquiry learning via YouTube videos and the data collection

The procedure of finding ideas for inquiry-based learning for the two target courses was the first step in our planning. The facilitator teacher and the students had to adjust the issues to the course syllabus and find creative ways of integrating inquiry learning into the flow of the courses. The language pedagogy course consisted of eight topics and all of them were suitable for inquiry-based learning. As a result, during the action phase for the English language pedagogy course the participants got a playlist consisting of videos on various teaching methods, namely: the Direct Method, the Audio-Lingual Method, the Silent Way, Suggestopedia, Total Physical Response and Communicative Language Teaching. The students had to watch the online YouTube videos at home and search for other related videos for their peers accompanied with some task. For the English civilisation course the YouTube videos comprised videos on topics such as London and the Royal Family. The students had to do various cooperative tasks during the seminars (for example information gap exercises, cooperative group work, and dialogues). The participants were also responsible for searching for related YouTube videos out-of-class for their peers suitable for classroom and home exercises. During this stage constant monitoring

was carried out by the facilitator through observation. The reflection phase consisted of informal class discussions and also the present small-scale qualitative study.

The qualitative data of this investigation were collected during the time span of 2015-2016 at a lower-primary teacher trainer institution in Hungary. The questions of the interview schedule were distributed in word document format via e-mail to the participants selected by purposive sampling. The fifteen prompt questions were designed to provoke narrative data from participants around their experiences of using videos during their programme. The data processing was conducted in the form of content analyses using colour codes to find emerging patterns in the students' reflections about their experience of inquiry learning via YouTube videos.

Results and discussion

The participants' answers revealed that they had encountered YouTube videos during some of their other courses, apart from English language pedagogy and civilisation, for example applied pedagogy, pedagogical planning, social-psychology, sociology, which were delivered in Hungarian. During their sociology course the participants watched the videos in-class and took notes, which was followed by class discussions. They found these videos beneficial as they served as a good ground for communication, sharing opinions, and debates. The students found these videos motivating because of the audio-visual impact and the discussions that they generated. These YouTube videos were beneficial since they could get access to them later on as well and they often felt the inner drive to search for further videos in the same topic. These online videos proved to be helpful with the understanding and the memorisation of the contents. Furthermore, it was also detected that the participants sometimes use YouTube videos during their presentations on various courses, however, they mainly mentioned their English language pedagogy and civilisation courses.

The facilitator teacher complied a playlist of related YouTube videos and the students were asked to search for further ones occasionally prior to the lesson sometimes following their English language pedagogy and civilisation lessons. The videos generated discussions and different types of activities, for instance class discussions, question and answers, key word cards, role plays, cooperative group work and further exploration on YouTube at home. The participant student teachers also had to select a language teaching method from their English language pedagogy course and a topic related to British culture from their English civilisation course. The students' presentations were illustrated by YouTube videos often using the questioning and cooperative task technique with their peers. According to the student teachers' answers, the applied YouTube videos proved to be efficient since they offer visual illustration of foreign language teaching methods as well cultural items related to various areas of British culture. The online videos on different language teaching methods provided a visual and audio overview of the methods

and also highlighted their characteristic details. During both target courses YouTube videos acted as sources for meaningful homework and the participants found them informative and thought-provoking. The student teachers also mentioned that with online videos it is easier for the teacher as well as the students to connect theory and practice of a particular subject area. Furthermore, the participants perceived that YouTube videos enhance transferring information from short-term and work memory into long-term memory by repeated watching. Therefore, viewing YouTube videos is an appropriate avenue for exam preparation, too, since the participants had to take an oral exam in English language pedagogy at the end of the term and in English civilisation at the end of the subsequent term. The students found inquiry-based learning via YouTube videos refreshing in particular when having their lessons in the eighth or ninth lesson or on Friday. With online videos integrated into the learning process work was more interactive, cooperative and explorative, making the lessons more motivating for the students. The student teachers were also asked to what extent they apply the use of YouTube videos during their teaching practice. Only two examples were provided by one student teacher, who had used YouTube videos in a Nature lesson about environmental protection and in an Art lesson about how to dye Easter eggs in grade 5. Consequently, a fundamental aim of lower-primary teacher training should be to provide the student teachers with appropriate methodology and teaching techniques that can be efficiently applied in various contexts of primary-school classes from grade 1 to 6. Another major finding is that all of the participants perceived that through viewing various YouTube videos for education purposes they can improve their English language skills, in particular listening comprehension. Also they can tune their ears to various dialects and accents as well as extend their vocabulary.

Conclusions

This chapter has undertaken the task of gaining insights into inquiry-based learning and the application of YouTube videos using various educational techniques in order to make the teaching process more efficient, motivating and enjoyable for students. The review of the literature on inquiry-based learning detected the necessity of a paradigm shift and attitude change regarding traditional transmission-based education towards methods and techniques to provide students with transferable deep knowledge. Inquiry learning, which originates back to Socrates, offers various types of avenues from problem-solving tasks to cooperative group work adapted to the particular learning context. These techniques can be tailored to the students' age and needs. The educator must act as a facilitator during inquiry education and share the responsibility for the exploration and learning with the students. In the 21st-century environment inquiry-based learning can be sufficiently complemented

with the use of digital platforms including the application of YouTube educational and other types of videos and connected quizzes and games. Engaging with YouTube can go beyond the classroom and exploit teachers and students' curiosity, motivation, creativity, and exploration.

To investigate the nature of inquiry learning via YouTube videos a small-scale empirical qualitative study was also briefly discussed in this chapter. The answers to the 12-item survey schedule were provided by 15 participant student teachers attending a lower primary teacher training programme. The interview questions were formulated in Hungarian to elicit information about the participants' experience of and motivation for using YouTube videos through inquiry-based exercises integrated into their courses in and out-of-class situations during their teacher training programme. The data were analysed with the content analysis method and the main emerging patterns detected that within the framework of inquiry-based education YouTube videos are: 1) motivating, 2) aid memorisation, 3) are beneficial in exhausting learning environments, 4) act as a useful tool for exam preparation, 5) provide general overview as well as highlight details of a topic, 6) are useful as an audio-visual effect, and 7) students are encouraged to apply them during their own teaching. There was no significant difference pointed out regarding the popularity of problem-solving, investigation and cooperative tasks. In sum, it was found that YouTube videos and inquiry-based education (in particular problem-solving, investigation and cooperative work) were welcome by the participants and can make their learning motivation more intensive during their first English Language Pedagogy and English Speaking Cultures courses as well as in their practice primary school classrooms.

A limitation of this research is the low number of participants and therefore, generalisations cannot be drawn from the findings, it is to be regarded as a descriptive explorative study. A major pedagogical implication of the results is that inquiry learning relying on YouTube contents can be used with different age-group students involving student teachers in an efficient and motivating way. It is the facilitator teacher's task to create a suitable learning environment to foster deep explorative learning and a culture of inquiry in the classroom. In the future special attention must be paid to the methodological training of student teachers so that they can beneficially apply YouTube contents during conducting inquiry learning in their primary-school classrooms.

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Practice, pedagogy and inquiry: addressing complexities in online teacher education

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Abstract

Through this chapter we explore theoretical and conceptual frameworks for practice, inquiry and online pedagogy in designing and enacting professional learning in pre-service teacher education. Such a framework, we suggest, incorporates inquiry-based professional learning that is central to the teaching of high quality, evidence-based practice and enables teacher educators to challenge pre-service teachers to deconstruct and deeply understand the connections between theory and practice as beginning teachers. We examine the possibilities of teacher education in relation to the work of communities of practice in online learning (Garrison, 2009) and practice theory in teacher education (Grossman, 2011), to consider how inquiry-based pedagogy in online teacher education is enacted. In doing so, we draw together research and practice through the use of examples of the design and teaching of online teacher education - learning experiences where the central tenet is pre-service teacher inquiry to construct understandings of teacher education as more than the 'study of teaching', but as professional practices that rely on aspects of interaction and contingency (Grossman, 2011). In conclusion, we reflect on the conditions of learning that are made im/possible through the online delivery of teacher education. We posit that learning activities that scaffold the observation, evaluation and deconstruction of good teaching practices are possible through online teacher education where purposeful design, pedagogy and practice are enacted. In turn, such an approach enables the development of practice understandings and strategies that better prepare pre-service teachers, as well as their future students, for initial classroom teaching experiences.

Key words: pre-service teachers, online learning, Social Practice Theory

Introduction

As teacher educators our central concern is the training of pre-service teachers to demonstrate high-quality, evidence-based teaching practice in preparation for the challenges of classroom practice. This includes a disposition to self-manage

continual inquiry into their ongoing development as teachers. Adding to this complexity is the increasingly popular modes of online and blended learning in pre-service teacher. These modes of delivery provide a range of economic and social equity benefits to both students and universities through flexibility of study time, accessibility and opportunities to attract students from geographically diverse contexts and life situations who are unable to relocate or attend on campus classes. However, due to this nature of delivery, the modeling of teaching practices and inquiry-based approaches can be somewhat constrained, with the many requirements of both school and university meaning there is little real opportunity for teacher education students to spend time actively engaging in inquiry-based learning through observing, evaluating and analyzing teacher practice in ways that are conducive of developing deep understandings of pedagogical theory in practice (Ball & Forzani, 2009, 2010).

Given the social and political spheres in which teacher education operates, in this chapter we consider the complex contexts in which universities work, the shift to online learning, and the impacts and possibilities that this has for pre-service teacher education where access to the embodied practices of teachers and teaching creates an additional complication and challenge (Grossman, 2011). As such, we explore theoretical and conceptual frameworks for practice, inquiry and online pedagogy in designing and enacting professional learning in pre-service teacher education. Such approaches, we suggest, incorporate inquiry-based professional learning that is central to the teaching of high quality, evidence-based good practice and enables teacher educators to challenge pre-service teachers to deconstruct and deeply understand the connections between theory and practice as beginning teachers. In building a case for practice-based pedagogies that encourage inquiry in teacher education, we provide examples from the design and teaching of online teacher education to reflect on the conditions of learning that are made possible through online delivery.

The Australian context

Teacher education in Australia, where we work, is in the process of several shifting contexts. In one such context, teacher education has become a priority on the national political agenda, mirroring that of countries like the United States and United Kingdom. The growth of international measures in student comparison and testing has led to the "fixation with international measures of student achievement and our seeking to emulate the current star performers" (Dinham, 2013, p.2). Further, Australian teachers have the additional complexity of working across many varied, and often inequitable contexts based on population variance, including poverty, students with English as an additional language, and rural and remote schooling,

which have significant and compounding impacts on educational achievement. Despite this, the political context in Australia has seen an increased focus on quality teaching, teacher standards and resultantly a critical eye turned to university accreditation of initial teacher education courses.

In addition to political agendas, the profession of teaching is undergoing change. On one side are the growing focus on quality, performance and accountability, with the introduction of teaching standards over the past five years contributing significantly to this discussion (AITSL, 2011). On the other side is the growing social and cultural changes, particularly in relation to technology, which are changing the focus of what is taught and how it is taught. Twenty-first century teaching and learning approaches being adopted and celebrated in schools are seeing the increasing uptake of open and inquiry based learning, often mediated through connected technologies (Edwards, Deed, & Edwards, 2014; Hirumi, 2002). Although the broader 21st Century skills and knowledge are typically labelled 'soft' skills, in schools they focus on developing a range of competencies and understandings that are considered critical for students growing up in the 21st century (ACARA- Australian Curriculum Assessment Reporting Authority, 2013). These include different ways of understanding and accessing knowledge, critical thinking and problem solving, developing global and sustainable perspectives, learning that is able to be personalised and tailored to an individual, and project based and team work approaches to solving problems (Bruns, 2007; Fullan & Langworthy, 2014; Leiringer & Cardellino, 2011; OECD, 2009). As a result of changing practices in schools, the increasing adaptation of 21st Century skills and knowledge has seen a shift in the widespread adoption of technology in the teaching and learning process as well as changes in the design of learning spaces that allow for more collaborative and cooperative work amongst students as well as teachers (Alterator & Deed, 2013; Prain et al., 2013). While the changes occurring in schools are significant, there is a resultant need for the practices of teachers, and therefore teacher educators, to keep up-to-date.

Additional to the shifts in schooling and in teacher education, the current political and economic contexts in which universities are operating are also seeing significant changes given the social impact and affordances of increasing uptake of connected technologies. This largely economically-driven shift has seen a proliferation of online and blended learning as an economically feasible and efficient means of providing higher education qualifications (Moore, 2013). Habib, Miles and Pawsey (2016) provide a critique of of online education based solely on corporate efficiency and automated teaching enabled by the mass delivery and digitalisation of learning resources. They argue that while there is now means for knowledge to be infinitely replicable, the challenge for higher education providers is to value-add the student experience through incorporating the pedagogical aspects of online learning, as opposed to the technical, in adding value to both the knowledge and skills that students learn.

Consistent with the broader higher education trend of moving learning online, there is an increase in demand for initial teacher education courses to be accessible through online and blended delivery, adding an additional layer of complexity given the issues outlined earlier. Online and blended modes of delivery provide a range of economic and social equity benefits to both students and universities through flexibility of study time, accessibility and opportunities to attract students from geographically diverse contexts and life situations who are unable to relocate or attend on campus classes. For teacher educators, however, this brings with it the imperative to design purposeful learning experiences, with research in online pedagogy showing that good learning designs need to demonstrate an eclectic mix of cognitive, teacher and social presence and draw on pedagogical principles of andragogy, constructivism and inquiry (Garrison, 2009; Brinthaupt et al., 2011). Further, there is growing recognition of the role that practice and embodiment play alongside complex and fluid forms of knowledge in becoming a teacher, with necessary access to 'all the different ways in which the work of [teachers] is made visible to novices' (Grossman, 2011, p. 2837). Given this, the complex nature of teacher education provides for additional challenges when delivered through what is perceived to be an often disembodied and individually experienced online medium.

Working within the spheres of university economic rationalisation, teacher quality and accountability, and 21st Century pedagogy, our work as teacher educators becomes increasingly complex. At the same time, the affordances of new technologies and pedagogical approaches enable differences in the way that we work, giving scope to address differently broader international critiques of teacher education. Criticisms of the epistemology of teacher education by Zeichner, Payne and Brayko (2015) highlight the poor connections made between theory and practice, with Miles, Lemon, Mathewson Mitchell and Reid (2016) calling for teacher education to be reframed within an understanding of the recursivity of research and practice. Such an understanding, encourages the stakeholders in teacher education to question how its delivery may enable students to understand both the complexity and plurality of practice, alongside ways to "ready theory for practical use" (Miles et al, 2016, p. 4). This is to be done cautiously, however, with Zeichner, Payne and Brayko (2015, p. 124) outlining the limited success of field experiences as practice-based application of theory and fast-track teacher education programs (such as TFA) which "uncritically glorify practice". Such claims to minimize theory, and an emphasis on 'essentials of teaching practice, ultimately prepare "teachers who can implement teaching scripts, but who have not developed the professional vision, cultural competence, and adaptive expertise they need to meet the changing learning needs of their students or to continue to learn in and from their practice" (Zeichner, Payne & Brayko, 2015, p.124).

In Australia the issue of quality in teacher education has been in the spotlight of both federal and state governments for many years, with "on average, one major

state or national inquiry into teacher education every year for the past 30 years" (Dinham, 2013). The most recent federal government inquiry into quality teacher education has focused on the standard of pre-service teachers, classroom readiness, attraction to the profession, and the registration requirements of institutions that offer teacher education. Yet for many novice teachers, theoretical knowledge remains inert where it "can be retrieved when required, but it does not guide their classroom practice" (Bloomberg, et al., 2013, p.91; Cochran-Smith, 2003). Zeichner and Cochran-Smith (2005) suggest that beginning teachers often find it difficult to apply learning from their teacher education course to subsequent experience as teachers. Dubbed 'practice shock', beginning teachers will typically regress from the research-based knowledge learnt during their teacher training, to personal theories of learning and teaching that are developed through their own experiences of schooling (Bloomberg, et al., 2013; Lampert & Ball, 1998). As Bloomberg et al (2013, p. 91) maintain, teacher education needs to be more effective in helping pre-service teachers "to develop knowledge and skills in a way that can be applied in a classroom" (Bloomberg, et al., 2013, p. 91).

Online pedagogies and teacher education

Given the many and varied ways in which teacher education is undertaken, assessed and accredited, and the criticisms of how it is undertaken, teacher education needs purposeful and thoughtful design in preparing future teachers for the professional and political landscape of a career in education. Further, this notion of purposeful design needs to be considered differently in online, blended and technologically mediated contexts where there is an additional layer of construction between the learner and the teacher. Indeed, while there are conditions of learning that are made impossible through online delivery, there are multiple other ways of imagining teacher education that become possible.

Drawing on pedagogies of online learning affords opportunities that are different to those enacted through face-to-face teacher education. With the burgeoning field of educational technology, as well as advances in internet speed and affordable access, online educational design and quality is fast becoming a key factor in student experience. Yet, despite this, much of the focus of university professional development for designing educational experiences for students online still focuses predominantly on use of technological platforms and basic curriculum design (Bailey & Card, 2009). The provision of educational design training which focuses on the affordances that online learning provides to pedagogical approaches that are inquiry based and draw on experiential, radical and andragogical principles, are still limited. Online, blended and face-to-face modes of delivering learning each have different affordances, constraints and

possibilities for the learner's experience, development of understanding, and learning. As Vaughan (2007, p. 82-3) suggests:

> … blended learning should be viewed as an opportunity to redesign the way that courses are developed, scheduled, and delivered in higher education through a combination of physical and virtual instruction… engaging students in these types of online learning activities also changes the nature of the in-class sessions

While models for online pedagogy can vary, typically the key theoretical models accepted in the fields of online and blended learning are andragogy and constructivism (Ooman-Early & Murphy, 2009; Baran, 2011).

Andragogy provides for the learner to be understood within the unique role of adult learner (as opposed to pedagogy which is drawn from child and adolescent learning theories). Understanding higher education students through an andragogy lens allows for the focus of (online) learning to:

- foster relationships, particularly through student-academic contact and communication
- build engagement, through active and problem-based, real world and authentic learning situations and experiences
- ensure prompt feedback, understood as formative to ongoing learning
- organization, presented clearly, consistently, provided in ways that allow the student to work based on their own schedule and availability
- utilize technologies, demonstrating competence and appropriate utilization of multi-media and online tools to facilitate the teaching and learning process
- have defined expectations, allowing students to work flexibly, with clear understanding of what is expected of them as learners (Bailey & Card, 2009)

Constructivist models of learning and teaching take that learners actively construct their understandings based on their prior knowledge and experiences. As such, each learner comes to a learning experience with different knowledge's that they draw from to construct new understandings. Further, constructivist theory recognizes the learner as actively involved in the learning process and in constructing their understandings (Bonk & Cunningham, 1998; Jonassen, 2000; Partlow & Gibbs, 2003; Bailey & Card, 2009). The role of the teacher is to facilitate student learning, "helping students collaborate with each other in order to develop personal understanding of course content, linking students to learning resources, and encouraging student initiative" (Bailey & Card, 2009, p. 153)

As Garrison (2009, p. 96) suggests, constructivist approaches require a different way of conceiving the teacher-learner dynamic, whereby the learning experience is, "a dialectic process dynamically supported through collaborative exchanges with another person who knows more than the student and who has a wider,

more balanced view". According to Bangert (2004, p. 218), the constructivist model suits online learning, making use of "authentic examples, judicious feedback, and enhanced self efficacy, in addition to active and collaborative learning strategies, … capable of promoting deep and durable learning".

Drawing on these models for online learning, a focus on the pedagogy of online learning enables for the role of the teacher and the role of the student to be understood differently. Learning experiences extend beyond knowledge transmission to add value to students' learning – that learning is for understanding and that experiences are crafted and constructed. As such, learners are enabled to develop a depth of knowledge through learning that is:

- exploratory
- dialogical and socially interactive
- capitalises on knowledge networks
- problem-based, collaborative

However, the introduction of online technologies for learning experiences is not a simple process, with (Hickman, 1990) suggesting that technology be viewed as a knowledge system. Such a view sees that where technology is a part of the learning process, it "causes the representation of new concepts and requires developing a sensitivity to the dynamic, transactional relationship" of pedagogical, technological and content knowledge (Koehler & Mishra, 2005, p.134). Further, teaching and learning that involves technological, alongside pedagogical and content, knowledge requires the development of understanding of "the complex web of relationships between users, technologies, practices, and tools" (Koehler & Mishra, 2005, p.134).

Online pedagogy principles align with and draw on inquiry based approaches to teaching and learning. The modelling of teaching practices in online and blended delivery for teacher education students can be somewhat constrained from traditional face to face teacher education. In particular, a problem that continues to challenge teacher education, particularly operating under the many requirements of government, school and university sectors, is the limited real opportunity for teacher education students to spend time actively observing, deconstructing and analysing teacher practice in ways that are conducive to develop deep understandings of pedagogical theory in practice (Ball & Forzani, 2009, 2010). However, there is scope to draw on different ways of relating, collaborating and using technologies to communicate, learn and generate new understandings through the use of purposefully designed online and blended teacher education. The affordances of different technologies, an understanding of online pedagogical principles, and different ways of designing learning experiences provide for ways in which teacher educators can provide student teachers with representations of explicit practice that are able to be deconstructed in order to provide for deep

understanding of the work of teachers in the 21st century. It it this which has prompted our collective interest in a practice theoretical framework for online, inquiry based teacher education, which we outline now followed by some examples from our own online and blended teaching design and practice.

Social Practice Theory

Conceptually, we have been informed in our design and delivery of teacher education by social practice theories, and in particular the practice framework for teacher education suggested by Grossman, Hammerness and McDonald (2009). While we have found that this framework provides useful ways for thinking about the design and delivery of teacher education, the research and literature that draws on practice theories assumes face-to-face teacher education. For us, this provokes questions in relation to teacher education through online and technologically mediated contexts – and how teacher education that draws on practice theories might benefit from the multiple and complex ways in which these different modes of delivery enable.

The turn to practice theory takes an understanding of social practices as bodily acting upon the world involved in the performance of complex relationships, in place. Thus, it is the activity and action, constituted through bodies that is understood broadly as *doing things* and *saying things* (Schatzki, 1996; 2002; Kemmis & Mutton, 2012), that contribute to those bodies making meaning and making judgements about activity in specific contexts. Theoretically, practice theories have a strong connection to *praxis* and *phronesis* – of embodied activity and action in place guided by wisdom and wise judgements developed through practice and experience.

Practice theories attempt to understand the social as in-the-moment being formed, re-formed and transformed through the (re)interpretations of the carriers of a practice. Relevant to teacher education, this can be understood in relation to student teachers learning the practice of teaching - through the activity and action of teacher education student teachers form, transform and reform their understanding of teaching as a practice, as well as through practising become carriers of the practice of teaching. In this way, practice theory accepts the agential nature and dispersed interrelations of people and places and material things that 'hang together' through practices (Reckwitz, 2002; Schatzki, 2002). This understanding also carries with it the awareness that practices, and specifically here practices of and in education, curriculum, and knowledge, are always creating, always in a state of becoming, changing and ending – and in this way, teacher education necessarily needs to demonstrate complex and multiple representations of practice.

Teacher knowledge is understood as a potent mix of theory and practice. It is understood as both theoretical and practical expressed through practice

(Elbaz, 1981). It is a combination of intuition and conscious responses to practical scenarios (Verloop, Van Driel, & Meijer, 2001). The expression of teacher knowledge as *practical inquiry (Cochran-Smith & Lytle, 1999)* is consistent with our practice theory framing. Further, the broader rendering of teacher knowledge as pragmatic (Deed, 2015) and based on practical judgement and wisdom developed through experience (Flyvbjerg, 2001) lends weight to the emphasis on encouraging complex articulations of practice.

The body, and a post-Cartesian understanding of the inseparability of mind-body, are central to practice theory. Here bodily movement, behaviours, and speech acts, actualised through the nexus of *sayings* and *doings* that are performed as actions in the world, underlie the formation/construction of habits, pre/dispositions, life conditions and subjectivities (Schatzki, 1996). In other words, when considered as a practice, teaching becomes a way of moving, behaving, speaking – of doings and sayings that become habitualised over time. For teacher education, this contributes to "a shift from a focus on what teachers know to a greater focus on what teachers do", as a matter of attention to both theory and practice in teacher education (Ball & Forzani 2009, p. 503). In particular, Ball and Forzani (2009) have called for understanding the practices of teaching as different to the everyday 'teaching' that we naturally undertake in explaining, questioning and sharing with colleagues, friends and family. Teaching as an unnatural practice highlights the minutiae of specific and core knowledges and practices that teachers are required to know and do in facilitating student learning – for example being good at maths does not necessarily transfer to being good at teaching maths, as the skillset of identifying student misunderstanding and correcting it plays out very differently to that of being able to work through to a correct solution (Ball & Forzani, 2009).

The practice turn in teacher education has seen an increased focus on how we might explore the nexus between practice theory and the work of teachers for student teacher learning (Grossman et al., 2009; Ball & Forzani, 2009). Grossman, Hammerness and McDonald (2009) argue that alongside the pedagogies of reflection and investigation common in teacher education courses, we also need to incorporate a *pedagogy of enactment*. While school placement experiences are typically seen as times where students are able to enact the theoretical and knowledge components of their teacher education, there is often a variability of experience as well as the immediacy and complexity of in-the-moment practice which doesn't allow the development of deep understandings

Grossman (2011) presents a framework for teacher education practice, which argues for the need for representations of practice that can be deconstructed and analysed, followed by opportunities to approximate the practice. While the framework is practice-based, it is inextricably interrelated with teacher knowledge and research. The complex practice of teaching requires an understanding of the plurality of practice interconnected with theory (Schwab, 1971). As such, teacher

education is an eclectic art – of teacher education as a practice, which enables students to "ready theory for practical use" (Schwab 1971, p.495). This requires a focus on what it means to be a teacher and, more importantly, what a teacher can be, and do, in the complex, relational interaction of teaching. Teacher education understood through practice theory allows for the design of particular ways of learning, such as the representation, decomposition, and approximation of core teaching practices, that "address[es] teaching as a complex task", while also enabling a focus on core or high leverage practices, and providing novice teachers with multiple opportunities for enactment – in other words, for practising (Grossman et al 2009 p. 277).

Given the focus of practice theories on *practising,* as teacher educator's whose work is predominantly based on the 'disembodied' online environment, we are faced with a peculiar challenge in the design and implementation of practices theories in this context. However, this is not specific only to teacher education taught through online contexts. Identifying and working with technologies is becoming increasingly important given the influx of networked devices and their many and varied ways of contributing to the teaching and learning process. The work of teachers in schools, and the experiences of students coming into, as well as exiting, primary and secondary educational settings are increasingly mediated through connected technologies. As such, the designing of online, blended, and technology mediated learning experiences that enhance and develop student teacher knowledge and understanding of learning through technology, as well as their practices of teaching, is imperative to quality learning for the 21st century. A key consideration in relation to this is how best can these core practices of teaching be taught through a technology mediated context, while engaging with the complexity and multiplicity of teaching practice and embracing and utilising online and blended pedagogies.

Examples of Online Learning

To address how we are approaching this challenge, we provide here several examples where we have drawn on practice theory as well as online pedagogies to inform our work as teacher educators through online, blended and technologically mediated contexts. The course that the two examples are drawn from is a postgraduate initial teacher education course that is run in blended/online mode. Students undertake three trimesters over 12 months. Each trimester involves four subjects, with the makeup of teaching and learning including one week of face-to-face classes (known as intensives), 6 weeks of online learning, and a four-week teaching placement.

The first example provides a description of an assessment task that was undertaken during the online teaching and learning weeks, and is also discussed in Habib, Miles and Pawsey (2016). This assessment task was designed in a subject that asked students to develop their professional understandings of theory and

pedagogy drawing from research and evidence. This assessment task was introduced to encourage student interaction with each other, facilitate deeper reflection and understanding, and model a predominately peer based form of assessment. Drawing on constructivist principles, the aim was to foster deeper engagement and critique with a range of forms of teaching pedagogy and theory in order to disrupt the tendency of pre-service teachers to base their personal teaching philosophy on their experiences as students (Korthagen, Loughran & Russell, 2006).

> The assessment task involved several steps. First students needed to form groups of four. As a group of four they worked in a two-week cycle, where one member would take the lead and the rest of the members would participate. After two weeks the leadership would rotate to another group member. The leader needed to select a reading from a set list, with each fortnight's readings based on different notions of pedagogy – classroom community building, student choice, radical pedagogy, and learning mindset.
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> At the beginning of each fortnight, it was the leader's job to notify the rest of the group about the chosen reading and organise where the virtual discussion would take place and whether it would be synchronous or asynchronous – if asynchronous, the leader needed to designate the timeline for the discussion to take place. As long as the discussion could be recorded and submitted (i.e. a forum, discussion board, wiki, webcam recording) it was at the discretion of the group to decide how they would do this. This allowed groups to work to their level of technological competence and also promoted peers assisting each other and learning new technologies.
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> The leader was tasked with providing prompting questions and facilitating the discussion. Clear rubrics were provided for peers to assess the leader, as well as a self-assessment for the leader to complete, meaning that everyone had clear expectations. The assessment rubric was designed to promote skills in questioning, using evidence to support reasoning, reflection, and critical thinking as well as participation. At the end of the fortnight, group members would submit peer assessments and the leader would submit their self-assessment as well as the record of the discussion. These were then amalgamated by the subject coordinator as a final score for the leader of that cycle, with feedback comments mediated for unreasonable criticism before being provided to the leader – however throughout the entire process there was no need for such censoring as students approached the task in a highly professional way.
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> Throughout the process, there was no lecturer assessment, although there was lecturer presence in the mediation and sharing of feedback and overall grades, as well as in troubleshooting any issues that arose. Informal feedback was provided by the lecturer to groups regarding their approach to the task.

Theoretically, the assessment task in this example drew on several key constructivist and andragogical principles. Notably, a key component of this task was the promotion of student led discussion and choice through a community of practice, as well as mirroring, albeit online, professional learning team discussions based on real-world situations (Bailey & Card, 2009). Further, it promoted dialogical and collaborative learning that was exploratory, interactive and allowed students to reflect on their own experiences as learners and teachers while accommodating new understandings (Bangert, 2004; Brinthaupt, et al., 2011; Garrison, 2009).

The online implementation provided opportunities for us to establish and contribute to the students' reflection on teacher practice. This allowed us to encourage a nuanced reflection and make explicit the complexities of practice. This approach required the use of educational principles outlined above as well as our own agility. The need for an adaptation away from traditional teaching practices was present in the move to blended delivery and the processes of monitoring, participating, and assessing student learning. The success of the activity relied on the design and implementation of the program.

In utilising this approach to pre-service teacher learning, the role of the teacher changes substantially to replicate that of a facilitator of collaborative learning rather than a transmitter of knowledge. Enabling students to control the discussion encouraged them to develop a mutual responsibility in developing knowledge for practice. In turn, informal feedback indicated that students engaged in the discussion in more depth because they were sharing their developing ideas and being assessed by peers rather than the lecturer.

In terms of preparation for initial experiences in the classroom, the articles were purposefully selected to provide a middle ground between theoretical and practical. They were also selected to challenge the pre-service teachers to consider and question educational conventions and the nature of knowledge in schooling and education. Evidence from assessment tasks later in the course, including a major research project, showed the impact that these articles and discussions had on the pre-service teachers' approach and preparation for initial professional practice.

The second example draws on a blended philosophy of teaching and learning which has developed from the limited number of times in which students are on campus for face-to-face teaching and learning. We see it as instrumental that these times do not involve learning activities which could easily be undertaken online – such as lectures or information-based workshops. Resultantly, these five days of face to face learning focus on students being actively involved in *practising* some aspects of the work that they will be required to undertake as teachers – such as collaboration, enacted teaching practices, and team work. This particular example is a collaborative curriculum planning activity which purposely draws on the practice framework of representation, decomposition and approximation (Grossman, 2011).

As part of an assessment task, students were required to work within a group of 4 to plan a 10-week overview for a thematic unit, covering all aspects of the curriculum for an Early Years (First year of school to Grade 4) class. The plan required students to provide links to curriculum documents, to cover all key learning areas, include ideas for activities, assessment of and for learning and a list of resources used. The students took part in an initial information session, where common planning practices were described. In a 'fishbowl' setting, they then observed practitioners developing a 10-week plan based around a theme, and finally were then able to develop their own practice, by creating a planning document, based on the proposed criteria. Representation and decomposition occurred concurrently throughout the initial stages of this task when students were able to learn about and then observe an illustration of good practice to guide their understandings of what teachers 'do' when planning.

During the initial part of the session, the students were shown images of different planning documents, suggested places to plan, and planning procedures that take place in a school setting. Information such as planning in teams with colleagues, the relevance of timing of planning sessions and discussion of involving student voice in the planning of the curriculum, were also covered, providing a representation of varying forms of planning practices.

In a 'fishbowl' style setting, the students' observed three teachers work together to plan a terms work based on a theme. These teachers were briefed to speak about their thought processes and ideas as they were undertaking the planning activity, in order to make it explicit to the students. Using a Whiteboard with Textas and a laptop connected to an overhead projector, the three teachers mind-mapped the process of planning; talking about their ideas verbally, carrying on topical conversations, extending other's ideas and illustrating their thinking processes, making their thinking visible and audible to the students. The teachers discussed possibilities for activities for the class connected to the theme, between themselves, making visual notes to capture ideas as they were suggested, or ideas that were prompted by each others thinking. The students' observed the teachers 'self-talk' and 'open discussion' between themselves as they worked their way through planning the 10-week overview.

While participating in the 'teacher conversation' around the planning, the third teacher also demonstrated the assessment task requirements by recording the planning ideas and activities into a form designed specifically for the task. Student questions were held until the end of this phase, although many found themselves drawn into the dialogue between the teachers, calling out ideas that could be included.

> At the end of this phase, the students' approximated this planning practice by working in groups to plan a 10-week thematic unit. Students were in groups based on a theme common to the Early Years curriculum such as Transport, My Self, Australian Animals, The Sea, etc. As a group they collected relevant documents required for the task, such as curriculum documents for the appropriate year level, planning forms and a box of thematic resources that gave them a starting point for their planning. All documents were available online and gave the students the flexibility to plan as they wished. Various locations around the campus were available for PST's to use. They had 2 1/2 hours to complete the group's overview of curriculum activities for a 10-week term, including planning for assessment, curriculum links and all key learning areas to be addressed.
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> Interestingly, all groups worked on a mind-map to start their planning, even though it was not a part of the assessment task. As this mind-mapping tool had been their visual representation of practice, it seems that all students 'took on' this way of planning as an effective way to start approximating their practice.

Utilising this approach to pre-service teachers' preparation, enabled the use of the online platform to convey information while ensuring that the face to face time was more optimally used for observing and then practice skills for teaching. Feedback from students following this activity showed that they found the process highly valuable for developing curriculum planning skills as well as professional collaboration skills. More informally, once students participated in a primary school teaching placement, many reported back that they observed and participated in similar planning activities with their mentor teachers. This contributes significantly to pre-service beginning professional identity, challenging stereotypes of teachers as working alone in their classroom and instead promoting the collaborative nature of curriculum work undertaken in schools.

Conclusion

There are conditions of learning that are made im/possible through the online delivery of teacher education. However, where purposeful design, pedagogy and practice are enacted, learning activities that draw on inquiry and practice theories to scaffold the observation, evaluation and deconstruction of good teaching practices are made possible through online teacher education. In turn, this approach enables the development of practice and inquiry-based understandings and strategies in order to prepare pre-service teachers, as well as their future students, for initial classroom teaching experiences. We provide here two limited examples where we have drawn on such approaches in the design and delivery of teacher

education. However, through purposeful design, the utilizing of practice theories in more consistent and course wide contexts will provide students with further opportunities to learn and develop a depth of understanding of teaching. The studying, observing, deconstructing and approximating of practice, through the use of multiple representations of teaching designed through online pedagogies has possibilities for teacher education in the current socio-political contexts in which it operates that are rigorous, evidence-based and reformative.

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Digital storytelling in Tertiary Education

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Abstract

This study examines the potential uses of digital storytelling in Lower Primary Teacher Education in Hungary. The hypotheses of the connected research project were that digital storytelling provided better and a deeper understanding of the course materials and enhanced awareness. Furthermore, the participants could improve different skills such as technical and communication skills as well. The theoretical background suggests that the area of digital storytelling can personalize the learning content and changes the attitude towards the mechanism of learning, and sharing information while modifying the operation of the traditional authorship mechanism and narrative procedures. The paper summarizes the results of a research project where both qualitative and quantitative components can be found - focusing on the attitudes and aspects of the participants. The data were collected from 40 full-time and correspondent students who were aged between 19-50 years old at Szent István University, Faculty of Applied and Professional Arts.

Key words: narrative techniques, storytelling, active learning, lower primary teacher education, digital skills

Introduction

Digital storytelling has received considerable international attention and it has been developing as a communication, teaching, research and personal reflection tool over the last decade (Clarke & Adam, 2012). That is to say, digital storytelling is increasingly recognized as having important theoretical and practical implications.

The method is often presented or perceived as a link or a merger (Norman, 2011) between the long oral tradition of storytelling and the new digital media. Digital storytelling has attracted advocates among teachers, educationalists and even artists looking for alternatives to traditional teaching methods. For many educators there remain questions about what digital storytelling is and how it differs from traditional storytelling or how it can be integrated into the process of learning in tertiary education. Adding to the confusion teachers do not always understand how it is related to active learning.

This study addresses the issues previously mentioned. First, it defines digital storytelling and distinguishes the different elements of digital stories. Second, the

study focuses on the educational uses of digital storytelling and the components of creating and editing via Moodle. Finally, it summarizes the most important results of a research project.

Definition, literature review

It is not easy to provide a universally accepted definition for digital storytelling since different authors in the field have focused on different dimensions of the genre. Among others Ohler (2008) and Robin (2006) concentrated on the wider educational context, while other researchers exploited the new opportunities for specific areas of child/ student development offered by digital stories, for example, identity formation (Davis & Weinshenker, 2011) or improving reading skills for remedial students who have learning disabilities and dyslexic problems (Yussof et al., 2012). Recent findings show that digital storytelling as a strategy enhances student learning and student experiences (Clarke & Adam, 2012), fosters collaborative learning and creativity in learning about sustainability (Daskolia et al, 2014) and helps EFL learners to improve their different language skills as well as helping them increase their motivation toward learning a language (Somdee & Suppasetseree, 2012; Abdolmanafi-Rokni & Qarajeh, 2014). Papadimitriou et al. (2013) suggested that digital storytelling can be used as an alternative tool to enhance children's ways of expression in kindergarten classrooms. Schiro (2004) used digital storytelling to teach students algorithms and problem solving in order to help them develop mathematical skills.

Despite the diversity of scope of application, it is possible to provide some generally accepted aspects of the definition and to highlight distinctions in how common terms are used.

Traditional versus digital storytelling

Let me start with the second component of the term. As stated by Fisher (1984) the two key characteristics of traditional storytelling are the following. First, storytelling is a creative art which entertains people over centuries and across cultures. Second, it has instructional potential which serves teachers. As argued by Robin and Pierson (2005) digital storytelling captures the imagination of its audience and the act of crafting meaningful stories elevates the experience for students and teachers. Seemingly, these characteristics appear and play a crucial role in both traditional and digital storytelling. The question then arises: apart from the digital aspect are there any unique narrative elements or features that typify the genre of digital storytelling?

Ohler (2008) examined the internal structures of digital storytelling. He pointed out that digital stories are linear presentations of the information they contain. Stories often use the story core, tension-resolution, and transformation explicitly. Davis and Weishenker (2011) found that digital stories that have transformative potential for the author: identifying significant experiences, reflecting on them, and sharing the reflections with others involve personal risk. Either described as an autobiographic narrative (Lanszki & Horváth, 2015) or new possibilities of voicing agentive selves (Hull &Katz, 2006) it becomes necessary to thoroughly examine the adjacent interpretability of the categories of fiction and reality.

In certain situations, at some levels it is rather difficult to differentiate between events that happened and those that did not. Their status should be revealed for the recipient by storytelling. Storytelling, however, either is unable to do it (e.g. due to indefinite sources), or has identical aims. In such cases, the recipient can decide about the referentiality of the story on the basis of pragmatic signs (e.g. generic conventions) or elements coded in the text, thematic about "storytelling" (Orosz, 2003).

An integral part of this set of problems is the narrative identity constructed by presenting the actual events and putting them into a life story. In the case of narrative identity, similarly to narration-organization (Thomka, 1999), the act of representation has a decisive role: the emphasis is put on the relation between the events that took place and their presentation in the course of a life story. The insertion of notes, remarks, references to authors, literary pieces such as poems, extracts, quotes, visual and audio components alter the operation mechanism of digital storytelling. It can be added that similar operation mechanisms can be observed in some (auto)biographical novels, too. So the readers face the dilemma how to interpret the categories of fiction and reality, historical, literary, fictitious and non-fictitious elements of these texts (Sinka, 2013). Figure 1 illustrates this shift in the process of digital storytelling.

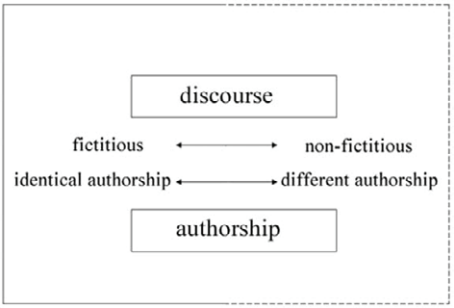

Figure 1: Modification of form of discourse and authorship (created by the author)

These textual and audiovisual elements with different authorship inserted in the story assume the preservation of memory and the successful reconstruction of the past in the text in addition to modifying the operation of the authorship mechanism. Discernibly, the gesture of providing references, the reading of references as references is the essential narrative intention of the texts. This is why the inserted textual and audio-visual elements with different genre and authorship play an outstandingly crucial role. The storyline makes use of authentic documents, which influences the time and space structure of the digital story.

Narrative procedures of digital storytelling in literature courses

Digital storytelling offers tools to investigate texts and contexts in non-traditional ways (Coventry, 2008). When studying the operation of narrative procedures within the digital storytelling used by different literature courses, the analysis of the complex system of relations among author, narrator, and digital story becomes necessary. One of the most important questions while studying the narrative design of digital storytelling is to what degree the distinct role of intertextual relations can be brought to surface. One significant problem of digital storytelling is that during a specific reception and reading (viewing) process no uniform rules can be determined for the recognition of unmarked or marked intertextual relations. The emerging intertextual space and the context of the digital story in its continuous formation function as the main directing element of reception process, of "intertextual perception". The reception process is always followed by some mergence of horizon, which is affected by the given communicative situation on the one hand and the (aesthetic) empirical and expectation horizon of the recipient (Kulcsár-Szabó, 1995).

The interpretation of digital storytelling connected to literature can only be complete with the study of the intertextual relations and their integration. The experience and interpretation attitude of the recipient (viewer) is indispensable since the storyline cannot be interpreted without preliminary experience, and this statement is supported by the application of narrative devices. The expectation horizon of the recipient decides if the intertextual mechanisms operating at several levels in the digital story are noticed or not. It can be emphasized that digital storytelling 'opens out' the original text, and the borrowings from other genres eventuate that the intertextually imbedded textual and audio-visual components reproduce the experience of not a book but of a video clip.

Digital storytelling is often accompanied by narration-organization actualizing memory techniques and sample autobiographies. Implicitly, architextual, intertextual relations with (traditionally interpreted) generic antecedents play a role in the reception of the digital stories. The narrative procedure is characterized by the

conscious balancing on the boundary of fiction and by fictionalizing the author's biographical facts, while the reference to a concrete event may connect the author directly to the extratextual reality. These characteristics appear in autobiographical novels, too (Britton, 1990). Merging reality and fiction in an elaborate, subtle way can be regarded as a typical and recurring feature of the authorial set of devices.

The involvement

Compared to traditional storytelling, digital storytelling audiences appear not simply as listeners but also as learners who can interact and shape the story (Dorner et al., 2002). In this sense digital storytelling is closely related to an educational technique, called active learning. While integrating digital storytelling students are encouraged to do more than listening: they are actively involved into the process of learning. As Bean (2011) pointed out, with the help of active learning students become active participants from passive listeners and they understand the subject through inquiry, exploration and discussion. Barrett (2006) demonstrated that digital storytelling can facilitate the convergence of student centered learning strategies such as (1) student engagement, (2) reflection for deep learning, (3) project based learning, and (4) the effective integration of technology into instruction.

Digital storytelling as a complex method

The type of digital storytelling I have been attempting to use varies from the original intentions (Lambert, 2010). Following Robin (2006) and Gregori-Signes (2008) I focus on the educational purpose thus the digital storytelling is used not only as a tool for personal expression (StoryCenter, 2016) but also for teaching and learning purposes. But as mentioned earlier I also regard digital stories as narrative constructions. Robin (2005) suggested that using digital storytelling in many ways supports students' learning by encouraging them to organize and express their ideas and knowledge in an individual and meaningful way. With aural, visual and sensory elements, digital storytelling has the potential to utilize the multitude of cognitive processes that construct learning (Lynch & Fleming, 2007). The effectiveness of the technique lies primarily in the fact that the instantaneous experiences of oral storytelling are recorded and shared via e-learning environment with the participants of a given course. As Robin (2005) pointed out digital storytelling has number of applications in the classroom, including telling personal stories, narrating historical events, or being used as a means to inform on a specific topic. In this sense the digitalized personal story can serve as a versatile source of further discussions, debates within the classroom. The educational use of digital storytelling suggests that the activities

are embedded into the context of the courses. This embeddedness depends on the final purpose of the given activity. Jonassen and Hernandez-Serrano (2002) suggest that stories could be used to support learning three different ways: as exemplars of concepts or principles being taught by direct instruction; as problem cases to be solved by students; as advice for students, for supporting them how to solve problems.

The starting points of digital storytelling activities in the recent research project were strongly connected to literary works, novels, short stories, poems or illustrations. While interpreting different literary works, the students can create their own stories; reveal their connections, inspiration or motifs of their choice. By adding these activities into the e-learning content of the course, they can bring extraordinary and unexpected dimensions to the process of learning. Behaving as an artist, the student has the opportunity to visually and verbally explore the literary works or the characteristics of the genre itself. Creating something new, making art can be mentally challenging, motivating and emotionally stimulating. The digital stories can illustrate the students' personal perceptions from a new and quite complex perspective.

Integrating technology in education

By integrating the technique into the classroom, the emphasis is on improving different fields simultaneously. Ilomäki et al. (2011) suggest that digital competence consists of technical skills to use digital technologies, abilities to use digital technologies in a meaningful way in various activities, abilities to critically evaluate the digital technologies, and motivation to participate in digital culture. Beyond the technical skills the participants need to use the potential of ICT to create the narrative and visual design of the story by integrating their previous knowledge and information interactively. As argued by Sadik (2008) the use of technology is only effective for story creation and the benefits can only be received if teachers have the ability to use it in the classroom effectively.

A certain paradigm shift can be seen in the literature about adapting and integrating technology in education. In the 1990's it was often interpreted as time-consuming and resource-intensive endeavour and as more trouble than it is worth (Sheingold & Hadley, 1990) and it was believed that many teachers would not be able to adopt and sustain technology enhanced approaches for teaching and learning purposes successfully (Jacobsen 2001). At the same time the emphasis was placed on the keyword: meaningful technology integration and learning (Schofield, 1995; Earle, 2002) which allowed for more interdisciplinary project-based instruction (Jonassen et al., 1999). According to Harris (2005) we can speak about meaningful integration of technology when students can select technology tools to obtain

information in a timely manner, for analyzing and synthesizing and presenting the information professionally.

Another important factor has been the continual improvement of technologies in which they often become less expensive and the diffusion of technologies throughout society affected education, too. In short, digital cameras, editing software, authoring tools and electronic media outlets have encouraged teachers to apply more approaches and tools than ever before to help students to construct their own knowledge and ideas to present and share them more effectively (Standley, 2003). Evidently, digital storytelling makes use of low-cost digital cameras, non-linear authoring tools and computers to create short multimedia stories (Meadows, 2003).

Concerning the recent Hungarian educational context, every participant (the students and the teachers) of the course are expected to use technologies in their professional lives. But as they have different skills and knowledge some of them might need more support and guidance to be able to create their own digital stories. Apart from providing clear strategies on how to integrate digital storytelling when teachers and their students do not have any previous training and experiences in digital stories (Ohler, 2008) one of the first conscious teacher's decision was to select from those multimedia and authorizing tools that were frequently used by the students.

First, initial workshops were conducted to explain how to create digital stories step by step (Smeda et al., 2014). According to Lim and Tay (2003) classification ICT tools fulfilled different roles within the process of creating digital stories. They were used as informative tools that store and provide vast amounts of information in various formats (e.g., databases, encyclopaedias and web resources), as communicative tools that facilitate communication between the students and the teacher (Moodle database) and third, they functioned as constructive tools for manipulating information, constructing student's own knowledge or to produce something for a given instructional purpose.

Methods

This research project focused on exploring the potential of digital storytelling as an alternative teaching and learning approach in different literature courses and its potential to enhance student motivation and outcomes. The research involves an online questionnaire and classroom observations. It focuses on exploring the use of digital storytelling within tertiary education, namely lower primary teacher education. In the selected courses the participants, the student teachers had the opportunity to be involved in innovative and alternative learning experiences based on digital storytelling. In order to enhance the reliability and validity of the research,

both qualitative and quantitative components of data collection and analysis can be found and were used. Data collection and analysis of the questionnaire was based on Lime Survey free open source survey tool (http://limesurvey.szie.hu/index.php?sid=31858&newtest=Y&lang=hu).

Research Questions

The aim of this investigation is to understand better the impact on student learning when they take advantage of digital storytelling for their learning and to explore the pedagogical benefits of digital storytelling. Therefore, the main research question is: from a student teacher perspective how does integrated digital storytelling impact on learning within a teacher education programme? Within this overall purpose there are two subsidiary questions: 1. How can digital storytelling provide better and a deeper understanding of the course materials? 2. How does digital storytelling improve important skills, subskills and competences, such as communication, social, or digital skills?

Recently many research studies have been conducted to ascertain the effectiveness of integrating artistic creation and art making into the process of learning. One of the reasons for using the method of digital storytelling in the classroom is that it can enhance the motivational level of students and provide active involvement in the process of learning, digital literacy and communication skills (Hung et al., 2011).

Significance of the study

The main intention of this study is to investigate the effects of digital storytelling on students learning, motivation and different skills. Introducing and integrating digital storytelling within the courses can help students, future or present teachers, to live through authentic learning experiences. A meaningful application of digital technologies may result so that these future teachers endeavour to try this innovative way of teaching and learning.

Participants

Forty university students from five different literature courses took part in the present study ranged in age from 19 to 50 in the academic year 2016. Fewer than half of the participants (45%) had had previous teaching experiences as they took part in different correspondence courses offered by the faculty, SZIU, Faculty of

Applies and Professional Arts. The students were introduced to digital storytelling at the start of semester and examples of previous students' work were shown and analysed. They were required to complete three pieces for assessment: two written pieces (the type of the written pieces varied depending on the given course) and the digital story. The digital storytelling project comprises 30-40% of the total semester grade. The students worked independently on their project, only few of them have chosen to work with selected peers. The students were expected to produce an audio visual presentation of between one and three minutes in length, formatting and organizing a script for recording with a 120-250 word and 12-20 accompanying images. Completed projects were viewed in class.

The fact that the most commonly used ICT tools have been PowerPoint and Word for the purpose of presentation and composition writing (Lim & Tay, 2003) played a significant role in selecting them. The students were encouraged to produce their own digital stories using Power Point but they were allowed to use other tools as well. The results of the online questionnaire and the assessment of the observation instruments suggest that PowerPoint was found to be effective constructive tools for 85% of the students to create visually engaging digital stories while 15% of the participants used other tools, such Movie Maker and iMovie.

At the beginning of the course they were being introduced to how to use Moodle database for editing purposes. They presented, and shared their own stories with other students in the class and also published their productions via Moodle database activity module where any members of the class were able to watch the videos. The database activity module allows the participants to publish their documents anonymously, but each member of the given courses agreed to publish their own videos using their names. The students were able to upgrade their digital stories at any time till the end of the semester.

Data Analysis

All of the students used the technique of digital storytelling in the given course and at the end of the spring semester they were asked to fill in an online questionnaire. The questionnaire consisted of 21 multiple choice and open-ended questions in four sections. The first section included demographic questions about gender, age and teaching experience. The second section dealt with the students' perceptions of digital storytelling in the classroom. The third section focused on motivation and areas of development, and the last section asked about sharing and editing the digital stories.

To record qualitative observations and data pre-observation form and field notes were used by the students and the teacher of the courses. According to Smeda et al. (2014) the pre-observation form was used to collect information about the class being observed, objectives of the story, and materials used. The direct

observation field notes form was used to aggregate student performance-based assessment data immediately following the students' performances. The field notes contained specific information such as date, time or chosen area/topic. To make the observation more manageable the participants were asked to write jottings, short descriptions and reflections focusing on only one or two of the following dimensions such as selecting information; reasoning, professional qualities, student-centered learning, ICT skills, and communication skills.

Quantitative data analysis was extracted from the questionnaire which was administered to all groups immediately after the given course ended. The aim of the questionnaire was to collect the participants' reactions and motivation toward the genre of digital storytelling.

Some of the questions asked include: Do you think digital storytelling promotes expressing personal opinions, feelings? What is your view of digital stories as a form of learning? What are the benefits of integrating digital stories in the classroom? Which key areas were developed the most effectively? Which skills were most needed / most unneeded to create your digital story? Do you take ownership of your digital story? Why can digital stories be successfully integrated to support learning? What obstacles did you face in using digital storytelling? Under what conditions would you share your digital story via Facebook or Google+?

Results and discussion

The analysis of the online questionnaire and the classroom observations constitute the body of this research. It can be claimed that the research included participants from one faculty (even though the participants had different educational backgrounds). The main focus of the research was not to perform a comparative analysis, but rather to evaluate how to meet course expectations by integrating digital storytelling. Therefore, this section will focus on the main conclusion derived from the discussion of most important findings related to teacher students' attitudes, perceptions about digital storytelling as a pedagogical tool and learning outcomes.

Active involvement

Ryan and Deci (2000) focused on the social conditions that enhance or diminish a very positive feature of human nature, more precisely, the natural activity and curiosity referred to as intrinsic motivation. They argue is of a great significance for individuals who wish to motivate others in a way that leads commitment, effort, and high-quality performance.

With respect to the first question of this study, 'How can digital storytelling provide better and a deeper understanding of the course materials?' the findings indicate that the learners feel more involved in the process of learning. The majority of the responses (80 %) show that digital storytelling allows, furthermore encourages expressing the students' own opinions and attitudes. In accordance with (Dogan & Robin, 2008, Abdolmanafi-Rokni & Qarajeh, 2014) the findings of this research showed that learner motivation is an essential factor of successful learning. 65% of the participants agreed that one of the most powerful motivating factors has been its novelty and its originality. In addition, the findings of research conducted by Sadik concur with this research. He concluded that students were encouraged to think more deeply about the meaning of the topic or story and personalized their experience and also clarified what they knew about the topic before. The well-chosen points of view, unconventional content and varied resources indicate that students did not just report facts and concepts connected to the subject, but reflected on their own thoughts and engagement with the subject, both visually and aurally (Sadik, 2008). Davis-Weinshenker (2011) illustrated that digital storytelling can serve as a resource for identity construction for youth by opening up new possibilities for self-presentation and storytelling in general, and as a means of identity developing through the process of constructing, presenting, and reflecting upon a particular first-person story.

As mentioned earlier the topics of the present research project were strongly connected to literature. Not surprisingly, this restriction supported the literary technique, called a frame narrative. The main narrative - introducing one of the chosen literary topics, authors, different literary pieces - provided the traditional structure of the story. The secondary story, the story of the author/narrator was placed inside the picture frame. These secondary stories reflect the relationships between the author/ narrator and the chosen topic as they can explicitly express the author's opinion. The relation of the two can be for example humorous, sarcastic or even authoritarian. At the same time the selection and organization of information might express hidden / or not that hidden opinions, too.

While fostering the students' active involvement into the learning process, broadening their horizons at the same time digital storytelling promotes different social skills, including empathy, understanding and accepting others feelings. 77% of the students thought that the method of digital storytelling encouraged them to express their personalities. The students were unequivocally motivated to listen to their classmates, to learn from them, to concentrate better on their chosen topics. In other words it strengthens social cohesion of the class as well (Yuksel et al., 2010).

Furthermore, the majority (57%) of the participants believed that the strategy was efficient for the process of elaboration of the chosen topic. As mentioned by Barrett (2006) digital storytelling helps the convergence of four student-centered learning strategies: student engagement, reflection for deep learning, project based learning, and the effective integration of technology into instruction.

However, it can be noted that approximately 30% of the participants have not consciously recognized digital storytelling as a learning method. According to the results of this study the technique of digital storytelling actuates emotions and feelings. The participants mostly had the following comments: 'Till the end of the exercise I started to understand the aims and started to enjoy'. 'I found digital storytelling useful and meaningful if the participants have enough freedom'. 'I found it good and exciting though I needed help how to use ICT devices. Despite this I think I've learnt much'. 'I'm happy to get to know the approach and to try doing it for the first time. It was instructive'.

65% of the participants agreed that the embedded pictures, the voice and the narration technique give complex experiences which makes it easier to recall the information. In this way it helps deeper understanding. It is in compliance with the results of studies done by Van Gils (2005) who examined the advantages of digital storytelling on the three different senses: people learn better if they see, hear and do at the same time. Consequently, students' technical literacy can be increased, too.

Digital and technical competences

With regard to the second question 'How does digital storytelling improve important skills, subskills and competences, such as communication or digital skills?' the questionnaire survey presented a positive answer.

When students had to rank particular areas of development they needed during the process of storytelling, their information seeking attitude explicitly influenced preferences. The proper use of ICT devices was ranked first (42%), other areas such as expressing oneself with using visual information (30%), evaluating, synthetizing or contextualizing information (25%) were considered almost equally important. Interpreting different types of textual information (15%), and the role of public communication in order to gather information and to help each other (10%) were viewed as relatively less important. The fact, that most of the students worked individually on their projects must have affected their choices. They also found some interpersonal skills, such as division of labour within the group and writing skills the two least important skills during the process of creation. They ranked evaluation and self-evaluation skills a bit higher, but still it is the third on the list of the least important skills. The reason for underestimating the role of peer evaluation and self-evaluation could be that these are rather neglected forms of assessment in the present Hungarian tertiary education context.

The classroom observations show that students got through their project effectively. The digital stories varied in length and quality, but most of stories were about 2-3 minutes long. Most participants (82%) were able to explicitly express

their points of view for their stories that contributed to the overall content of the chosen topic. Though it can be noted that in some cases that personal point of view did not connect precisely with the chosen focus of the digital story. Referring to a study conducted by Sadik (2008) on the effectiveness of the technical solutions, it can be added that fewer number of stories showed very little variety in the sources and types of information although their contents were accurate to some extent and relevant to the theme of the topics represented in the stories. 65% of students used pictures from the Internet by not providing the precise sources and only 35% of them added their own photos. 32% of them worked up their own writings including short stories, drawings, illustrations and paintings. Despite this fact, the majority of the students (67%) consider their own digital stories as their own products, their own artistic creation. That could be one of the possible reasons why they felt stronger emotional connection.

Few lines were presented as a text, instead students used narration with very personal connections to the topic. Some of them inserted notes as well. In terms of technical design, the stories created and presented by the students demonstrated that they could use the technical features of Power Point and Movie Maker without serious technical difficulties. The results showed that the visual designs were mostly stylish but inappropriate colour choices or confusing graphical solutions appeared frequently. The timing or tight integration between the audio and image tracks were smooth as well. The biggest challenge for students was to get used to listening and working with their own voices. In a small number of stories sounds were cut-off or unclear. Classroom integration of digital storytelling was observed to provide a picture of the actual implementation practices used by students. The observation tool focused on variables such as the nature of student work and the level of student engagement. Across all the observations, it was clear that using new functions of Power Point did not distract students. They were actively involved in their own learning process. The majority of the students found the software easy to use as they use it frequently in other subjects as well.

Sharing and editing the information

Although students had restricted prior knowledge in multimedia authoring tools, their technical skills were adequate to use Moodle database activity module, which allows students to build, display and search a bank of record entries. The format and structure of these entries can be almost unlimited, including images, files, URLs, audio, and text (Moodle, 2012). However, it was also observed that students were able to significantly develop their technical skills. As Neal (2001) observed the power of storytelling as a pedagogical tool has been recognized for ages, and in more recent times, for e-learning.

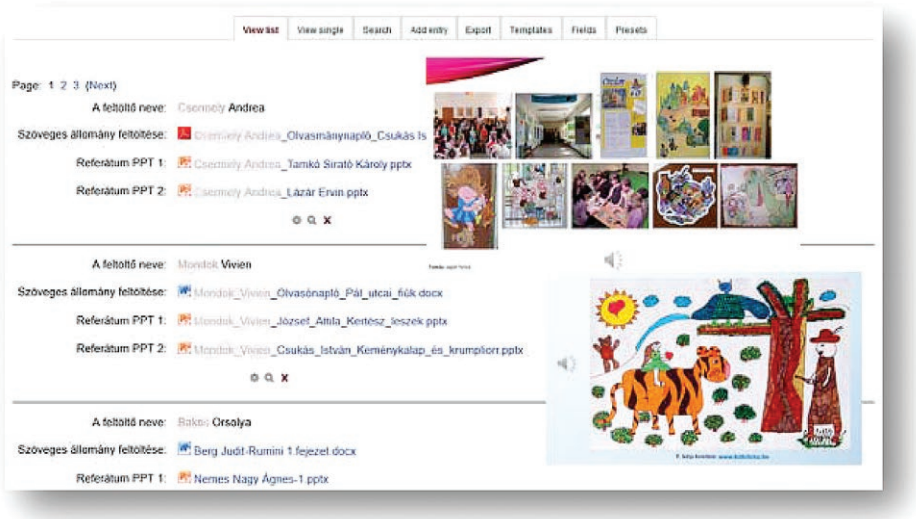

Figure 2. Sample of Moodle database activity and student produced digital stories (created by the author for this study)

The digital stories were shared via e-learning through Moodle database activity. The findings show that only 7% of the students did not find important to share their videos with their class and considered the oral presentation to be sufficient. 57% were satisfied with their ability to watch other classmates' videos while 45% emphasized how important to learn from each other. Every participant was willing to share their videos via you tube, Facebook or Google+. However, 27% of the participants agreed under the condition that only invited guests would be allowed to watch them, and 47% would show their videos only their classmates taking part in similar projects.

It is also worth mentioning that integrating the digital storytelling approach into the classroom might help to reduce teacher talking time (TTT) in the classroom. Reducing the amount of TTT can quicken the interactions between students. Expressing their opinions and insights freely on the topics covered in class also develops the students' performance in practical speaking skills.

Conclusion

The aim of the present study was to illustrate the implications of integrating digital storytelling into tertiary education, more precisely into literature courses within the framework of lower primary teachert training. The purpose of the research was to

test whether the integration of digital story-telling can have an impact on learning within a teacher education programme.

Considering the findings of Smeda et al. (2014) digital storytelling can integrate instructional messages with learning activities to create more engaging and exciting learning environments. The analysis suggests that digital storytelling enriches the classroom learning environment and the curriculum of the given course in multiple ways. By altering the operation of the traditional authorship mechanism and narrative procedures the method of digital storytelling provides a unique, unconventional point of view, catches interest and enriches student learning experiences as well as social and technical competences. While creating digital stories, integrating different ICT devices and experiencing collaboration within an online learning environment student teachers can experience the process of artistic creation which is strongly connected to literary works, novels, short stories and poems. Behaving as an artist, the student has the opportunity to visually and verbally explore the literary works or the characteristics of the genre itself and integrate this experience into their own future teaching repertoire.

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Becoming a Teacher: the role of body at work

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Abstract

Practice-based studies highlighting the role of body have exerted a new influence in understanding teacher's work. Drawing on a systematic literature review, this chapter, bringing together body, professional performance and teacher inquiry, critically reflects on new methodological approaches to researching teachers' professional development. Starting from the assumption of work as lived and embodied practice the authors investigate the practice of teachers and their professional development through the lens of the body. They argue for a perspective on teacher learning as an embodied way of knowing.

Key-words: teacher work, body, professional practice, teacher education

Teacher and teacher education frontiers

There have been considerable changes over recent decades in traditional notions of teachers' role, their practice, and their educational and professional developmental paths. Marion Cochran-Smith synthesises these transformations of teaching and of the teacher education field:

> '…first, there were major changes in prevailing ideas about how people learn and what they need to know to thrive in the new knowledge economy… New conceptions of learning require new kinds of teaching, tailored to specific subject matter and students and designed to help them reconfigure existing understandings… Second, there was a mass movement of people across the world prompted by the shift to a global economy, which dramatically transformed the student population in many countries… Third, the major shift from an industrial to a knowledge economy that

> had begun several decades earlier brought unparalleled attention to the quality of education systems around the world and in particular to teacher quality' (2016, p. 96).

There has been consistent attention to the development of research *for* teacher education (about the effective teaching that could inform the content of teacher education) and research *on* teacher education (about the results of different approaches to recruiting and preparing teachers). However, over the years research results have often been ignored, misinterpreted or misused by teachers and teacher educators: 'with the result that the discourse and debates about teacher education today eerily resemble those of half century ago' (Darling-Hammond, 2016, p. 84).

Sometimes, teachers have used the process of inquiry merely to reinforce and celebrate what they have already doing well, instead of analysing, examining, and improving their daily teaching practice. For this reason, we argue that new directions and research perspectives are needed to respond to current emerging conditions and to allow teacher inquiry to become a powerful lever for change in teaching and teacher education.

What does it mean to be a teacher today? And what are the main elements and characteristics of teaching practice? How can educational research and teaching inquiry help to reply to these questions? Starting from the assumption that teaching is a practice-based process we will argue that reflexivity, knowledge, body, performance, and experience can be used as new interpretative categories in order to:

- Highlight and make evident what kind of knowledge teachers need to develop;
- Explain how teachers can learn and improve teaching throughout their professional life;
- Understand how body awareness can lead to easier and deeper explanations of processes that are implicit in the teachers' professional learning and development;
- Improve the design and implementation of aligned and integrated teacher educational pathways.

Nowadays, technological, political, socio-economic, and cultural changes have significantly changed the concept of teachers' work and their education and professional development paths. Historical shift in the conception of teacher education (from a focus on the "apprenticeship" to one on "theory" and then, in recent times, on "practice") has changed the concept of teachers' work so that it is now seen as a context within which specific knowledge, abilities, and competencies are created, transmitted, and preserved. The growing focus on developing practical knowledge, as well as the recognition of the role and significance of everyday experience in teacher's work and learning, have highlighted the relevance of workplace learning theory and research on workplace

learning. In this perspective, educational research, in recent years, has been focused on different ways of acquiring and transmitting teachers' professional knowledge: 'At the same time, researchers have come to appreciate that learning to teach extends beyond the boundaries of formal teacher education. Moreover, questions about the content of teacher learning are not the same as questions about how teachers acquire, generate and learn to use knowledge in teaching' (Feiman-Nemser, 2009, p. 697).

Professional practice of teachers corresponds to a daily process of learning: this learning is practical, spiraliform, and leads to the embodiment of teaching work.

This chapter begins by introducing the concept of practice and of a practice-based studies perspective as lenses to study and understand teaching practice and its complexities, paradoxes, and tensions. Then we present which categories can be considered in order to analyse teaching practice as an embodied performance. The next section is devoted to the modalities that can help teachers to master bodies of practical and declarative knowledge as well as connections between practical wisdom and self-awareness (Boyd & Bloxham, 2014). Teacher inquiry, in this perspective, becomes a vehicle for teacher professional growth because the inquiry process implies teachers questioning their own practice and rewarding, transforming, and improving it. To conclude, implications and methodological recommendations for further developments in professional learning will be highlighted. This chapter, by emphasizing agentic and selective qualities of learning through practice (Billett, 2014), will shine a light of critical reflection on some of the grey zones within research in the field of teaching.

Professional work as an embodied practice

Over time, the practice turn (Schatzki, Knorr-Cetina & Von Savigny, 2001) has exerted deep and radical influence on anthropology, philosophy, cognitive studies, and other human sciences, which have been called to re-think, through the concept of practice, traditional theories of society, knowledge, and meaning. Increasingly, practice has become a contrasting category in considering concepts such as symbol, structure, and system. Our knowledge, that is a practical knowledge, is stored in our bodies and not in symbolic structures (Bourdieu, 1980):

> 'The function of knowledge is to make one experience freely available in other experiences. The word "freely" marks the difference between the principle of knowledge and that of habit. Habit means that an individual undergoes a modification through an experience, which modification forms a predisposition to easier and more effective action in a like direction in the future. Thus it also has the function of making one experience available in subsequent experience' (Dewey, 1916, p. 339).

In this perspective there has been a reconsideration of daily human life scenarios (first of all, moving from a new interest for working activities), and practice has been recognised as the last dimension of our human being. The debate on the theory of practice has grown at the intersection of different areas:

- Conversational analysis;
- Reflection on categories practitioners can use to bound their competencies field;
- Cognitive, anthropological, and management studies on situated learning.

Research has aimed to contextualise, describe, and identify what are peculiar aspects of a specific professional practice. These studies have questioned practice searching for paths of meaning and attempting a praxiological analysis. The strong influence of symbolic interactionism, ethnomethodology, and socio-material approaches has led researchers to abandon traditional interpretative categories of work. Moreover, practice-based studies moving from different ontological and epistemological assumptions have progressively changed the concept of work that is intended now as a context in which specific abilities and competencies are created, transmitted, and preserved. Any activity (theoretical or practical) undertaken by people can be realised in different forms of activity patterns. Gherardi (2000) points out four main perspectives of practice studies:

1. Phenomenological. When subject and object cannot be distinguished;
2. Pragmatist. When knowledge is defined in comparison with action, instrumentality and intentionality;
3. Marxist. The practice is a 'product of society';
4. Linguistic. Language is an essential and distinctive trait of action systems.

Practice-based studies, highlighting the role of body (as a metaphor, background, and resource) have exerted a new influence in understanding work activities (Schatzki, 1996). Work is defined as a set of learning modalities, as a process of situated knowledge emerging through dynamic workers' interactions:

> '… when individuals engage in work activities and interactions two changes arise as consequences. Firstly, as individuals consider, deploy and utilise their knowledge, those processes change incrementally what they know, can do and value (i.e. learn). The change on learning can be significant or transformational if it arises through an experience that is new or novel to individuals' (Billett, 2014, p. 13).

Indeed, knowledge is not a response in the head of the humans but is "hooked into" and linked to the material world.

Practical knowledge involves professionals committed in the work in a way that excludes distinctions and dichotomies between body and mind, theory and action.

The professional knowledge is distributed in objects, artefacts, and work context. It represents the result of a complex combination between practical wisdom and public knowledge (Boyd & Bloxham, 2014). There is no separation amongst doing, learning, and remaking professional practice. Practical knowledge is embodied and embedded. In the socio-material perspective this kind of knowledge is sensitive and tacit, produced and mediated by the body (Landri, 2012). Similar considerations have marked a real turning in the studies of society, knowledge, and meaning, and have profoundly modified analytical-interpretative categories. The focus is always on doing, on performance, and, for this reason, on body because embedded practice is always a matter of practising the body (Green & Hopwood, 2015).

The relationship between body, mind, and practice can also be seen in studies within different occupations including music, medicine, pharmacy, accounting and nursing.We can consider, as examples: inquiry on how to learn to play the piano and the pianists' ability to distinguish between the movement of the right hand and the left hand (Sudnow, 1978); research on improvisation of jazz musicians and their 'knowledge of hands' (Sparti, 2005): studies on the role of hearing in control rooms (Gherardi & Nicolini, 2001); the classical investigations of G.H. Mead who showed that touch and manipulation of objects not only allow knowledge, but facilitate its internalization (1934); research on the perception of colours (Goodwin, 1994). In this framework, the body adapts itself and learns through practice; a practice that takes the form of a daily activity strongly rooted in the context and in the space in which people act. The body learns at work; at the same time, it represents a resource for learning: we learn to perceive the phenomena and identify standards of knowledge considered for a specific work environment. What really counts is not the experience itself, but people's ability to learn from experience and create meaning from those experiences in order to improve professional competencies (Prior, 2013). This raises a variety of questions within teachers' work and their professional development fields:

- How does the body matter in teacher professional practice?
- What is the role of the body in understanding and researching teaching practice?
- How do teachers conceive their body?
- Is it perceived as a key element for professional reflection?
- How do teachers move meaningfully *in* and *through* their practice, drawing on whatever they can to get things done? (Shotter, 2011).

In order to answer these questions we will focus, in the following paragraphs, on aspects such as:

- The reason why the body should be considered crucial for teacher practice;
- The main components of a teacher's "body literacy";
- How teachers (and researchers) can enhance their own body awareness as professional workers (Shotter, 2011).

Teacher practice through the 'Body glass'

> 'Research into lived experience is a process of deepening and extending the quality of our coming to know; a process of changing the way we understand the phenomena of our experience' (Barbour, 2011, p. 69).

Attention to the body in practice theory and, specifically, to the body at work, has modified the ontological basis for the understanding of society. Bourdieu highlights the importance of understanding practice intended as the acquisition of the 'feel for the game'; an affective and corporeal knowledge *in* and *through* the action. Schatzki (2001, 2012), instead, tries to clarify the concept of 'body-ness' through the distinction between:

- Being a body (the ability to express itself doing and acting. The perceptible experience of the body);
- Having a body (highlight the Cartesian dualism between mind and body);
- Using a body (referring to the bodily action performance. This practical understanding refers to the "know how" performed through bodily actions).

Considering practice and professional performance through the body implies that the body itself is always an active element; it is not an additional aspect. The body orchestrates the practice, grounding it to the context. Only starting by from the body it is possible to 'perform'. Thrift (2006) defines performance as the diffusion of events in which resources are available in a creative and imaginative manner, "grasping" and "making" the moment. For Noble and Watkins (2003) this particular form of awareness in a professional practice is made up both by what is learnt and by the work of memory and representation. Moving from her explanatory review on how artists and artistic processes can support academic research on the role of body within a professional context, Barbour (2011) defines this kind of epistéme as an *embodied way of knowing*.

Exploring the role and the meaning of body in the "practice circumstances" is not an easy task. There are many elements to be considered and many different approaches that we can use. In order to allow the reading of teacher's practice as an embodied way of knowing and performing, literature beyond the educational context can be helpful.

The new analytical-interpretative categories such as, for example, theatre, performance and choreography have determined a radical shift in sociological, anthropological and educational research. Polarising attention on the body leads us to conceptualise work as a choreographic and performative activity in which the coordination of space and time is a fundamental skill (Bruni & Gherardi, 2007). The bodily dimension of work, in this way, is integrated in the concept of performance and allows the creation of a choreography through which one may perceive,

analyse, and answer actively to external stimuli: orienting practice in a reactive way within a specific work context. Through literature review some key elements can be identified that help to systematise the analysis of body in teacher's professional context (Fig. 1).

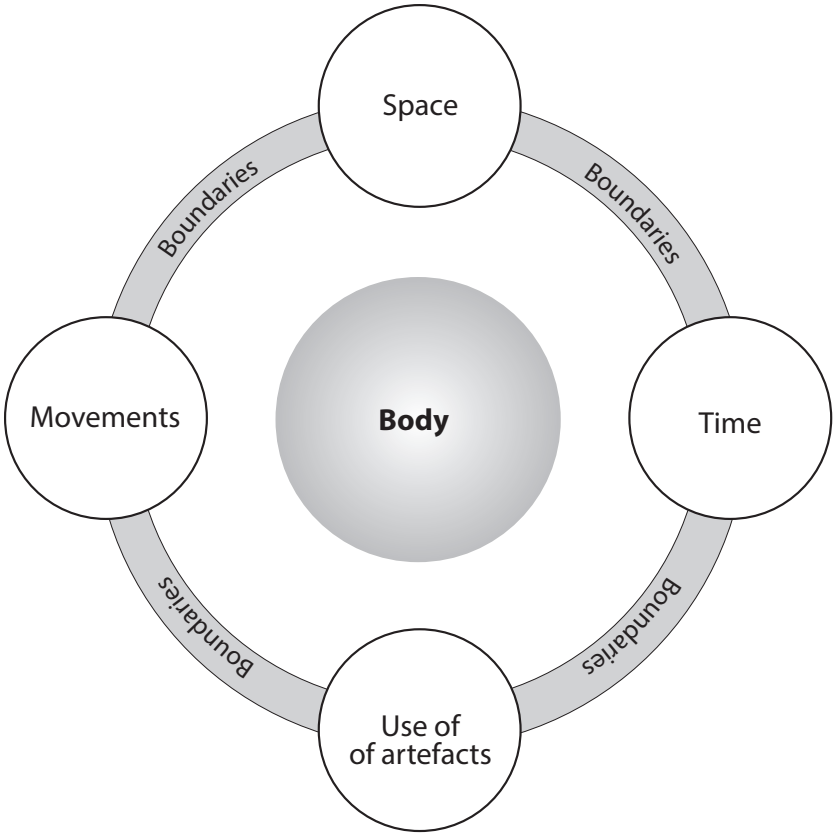

Fig. 1 - Body k-elements for professional practice

Five elements can guide the analysis and interpretation of teachers' embodied practice:

1. *Space*. The space can be considered as the context in which the practice is acted. Contextualising also the analysis can help not only to take into account the use of the space, but avoids a mere behaviouristic representation of work by taking into account the social and cultural meanings of the context.
2. *Time*. The time element is closely related to the concept of rhythm. It refers to the development of a sequence of action movements during a specific period

of time. In this category we can consider, for example, the management of time during the class, or the time spent for instructional design or for the assessment of students' tasks. Schatzki (2010) remarks how past, present, and future dimensions are not separate. He suggests that the body is 'a kind of metronome for social life, and of bodily rhythms as key ways in which human activity is coordinated (or becomes problematic)' (Green & Hopwood, 2015, p. 23).

3. The *use of artefacts* is linked to the use of space and context. In painting, music or sculpture, for example, instruments and tools are an extension of the body. How the artist use these instruments is crucial for the result of the performance. Similarly, in educational context the use of artefacts has an important role for the practice as well as their own management.
4. *Movements* are intended as a wide category which includes: the quality of action such as the flow, the control and the weight of movements; the part of the body that moves; the direction and the intention of that movement (Lefebvre, 2004; Sheets-Johnstone, 1999).
5. To connect all these elements there are *boundaries* intended as awareness of the meaning of the distance between the teacher (the main actor) and other actors involved in the context (such as colleagues and students). The use of personal rather than peri-personal or extra-personal distances from others or from artefacts must be taken into account for the analysis.

Teachers' body literacy: a foray into art

> 'How does someone who has not previously 'taught' in a formal and professional sense become 'some body' as a teacher? How do they acquire a teaching habitus - a body in which the attitudes, gestures, vocalizations and predispositions it has are recognizable to other bodies as 'teacherly'?' (Reid & Mitchell, 2015, p. 89).

Recognition of the importance of body in professional practice stresses the necessity for teacher and practitioner inquiry to find alternative ways to study and to develop a "body literacy" for teacher's professional practice. Recently, a considerable literature has grown up around the use of different methodological approaches that, better than others, can help researchers to explore the dimension of "corporeality" in the workplace (Schatzki & Natter, 1996). Specifically, in the past decade, there has been a growing interest in the use of Art and artistic practices within academic field. In this perspective, both researchers and practitioners can experience new ways to think about, to reflect on and to act in their practice. 'It is through rigorous and reflective practice that theoretical knowledge and lived experiences can be embodied, made meaningful, and thus contribute to the generation of new understandings' (Barbour, 2011, p. 86).

From this literature it is possible to select some instruments that can help teachers involved in an inquiry process to analyse the elements discussed above.

- *Reflective sketchbook*: this instrument allows recording moment-by-moment thoughts, reflections, and ideas (Prior, 2013). Used mainly by artists, the sketchbook can be adopted in the educational context to keep track of things that (unconsciously or not) spring from the flow of working in process. Words, images, sketches, photos etc. can, then, express, with an alternative quality, emotions and meanings connected to the body-practice relationship. 'The sketchbook can be examined and re-examined as one might during any research process enabling the [*teachers*] to evaluate their current work, creative achievements and shaping future objectives' (Prior, 2013, p. 61).
- *Portraits*: another instrument that can trigger a reflexive process about experiences and practices is the creation of teacher's portraits. J. Reid and D.M. Mitchell (2015) have used this instrument in their research on expert and novice teachers practice. The portrait of teaching, in this perspective, 'it is drawn from series of written memories of practice and artefacts of practice in the form of journal notes, lesson plans, worksheets and drawings' (Reid & Mitchell, 2015, p. 91). Although Reid and Mitchell's study was conducted with Visual Arts teachers, they highlight some important starting points for our discussion. The representation in a draw of a portrait or a situation can encourage both teachers and student to reflect on depictions that they have about something. Using the body in a public way entails to show the social and cultural meanings of the use of the body, the knowledge of teacher's body during a particular teaching practice (habits, skills, and limits). These implications are important if we think about the representations that students and teachers have about teaching and learning. Drawing could be a fundamental exercise not only to develop an awareness of body, but also a kind of consciousness about other bodies and the perceptions of these aspects.
- *Photo*: Photography has a long history in fields such as anthropology and sociology, but it is almost new in education. Used mainly to archive research processes about schools, schooling, preschool children, elementary or high school students (Grosvenor et al., 2004; Grosvenor, 2007; Clark, Moss, 2001; Serriere, 2010; Newman, Woodcock and Duhman, 2006; Marquez-Zenkov et al., 2007) this instrument could be employed in different ways. Photography can be considered as illustration and documentation of different aspects of practices, but it can be also considered as an original representation of reality that can encourage the reflection process. Considering the elements discussed above, photos don't represent the best way to capture the quality of movement interactions or the rhythm of the practice. However, this instrument can help reflection on the body with a focus on the use of space (with regard the context or others) and artefacts.

- *Video*: videotaping as research instrument in the educational field has been used since a long time (Leavy, 2014; Heath, Hindmarsh & Luff, 2010). What is relative new for our discussion is the use of video for an analytical study of movements. Video can provide a documentation of quality of movements, of the use of space and time in the flow of practice and of relationship with objects and artefacts. Not only: it allows the researcher to analyse in depth these aspects. In the R. Laban theory of movement, videos can serve to an analytical representation of movement with a code system - in this case the Labanotation (Freedman, 1991; Pastore & Pentassuglia, 2015). In this way the researcher can stay focused on the body and movements avoiding to be influenced by other things recorded.
- *Interviews*: the use of interviews in the educational context is very common. What is important to highlight for the purpose of this chapter is how the interview can help to investigate these themes. In this perspective the interview can complete the research protocol and the analysis of documents in order to better understand data gathered through reflective sketchbooks, portraits, photos and videos. As a "container" of tacit and embedded knowledge, the interview can support teachers (and researchers) to shed a new light on their own representations and perceptions.
- *Representations of findings*: representing research findings with alternative forms different from traditional written text is a new issue in the wider scientific view. In spite of the implications of this process, these kinds of research products in academia are still limited (Bagley, Cancienne, 2002; Mienczakowski, Smith & Morgan, 2002; Rogers, Frellick & Bebinski, 2002).

This review of instruments is useful for the analysis of elements that can define and develop a bodily literacy for teachers' professional practice. It can be considered as a spark for teacher inquiry: it is not exhaustive about instruments and methods for educational research. What really counts for the aim of this chapter is the understanding of the role of an almost unknown character of teacher practice: the body. 'For as we have seen, being oriented in this way, poised, or ready to go out to meet events in our surroundings with a certain set of expectations 'at the ready,' so to speak, is of great importance; they 'set the scene' not only for what we will 'see' or 'not see,' but also for how we will react' (Shotter, 2011, p. 454).

Understanding teaching practice: some implications

Drawing on the literature review presented above, how is it possible to bring together body and professional practice within a framework of teacher inquiry? Body and practice can support teachers in the systematic and intentional study of their own daily work (Dana & Yendol-Hoppey, 2009) in order to foster professional

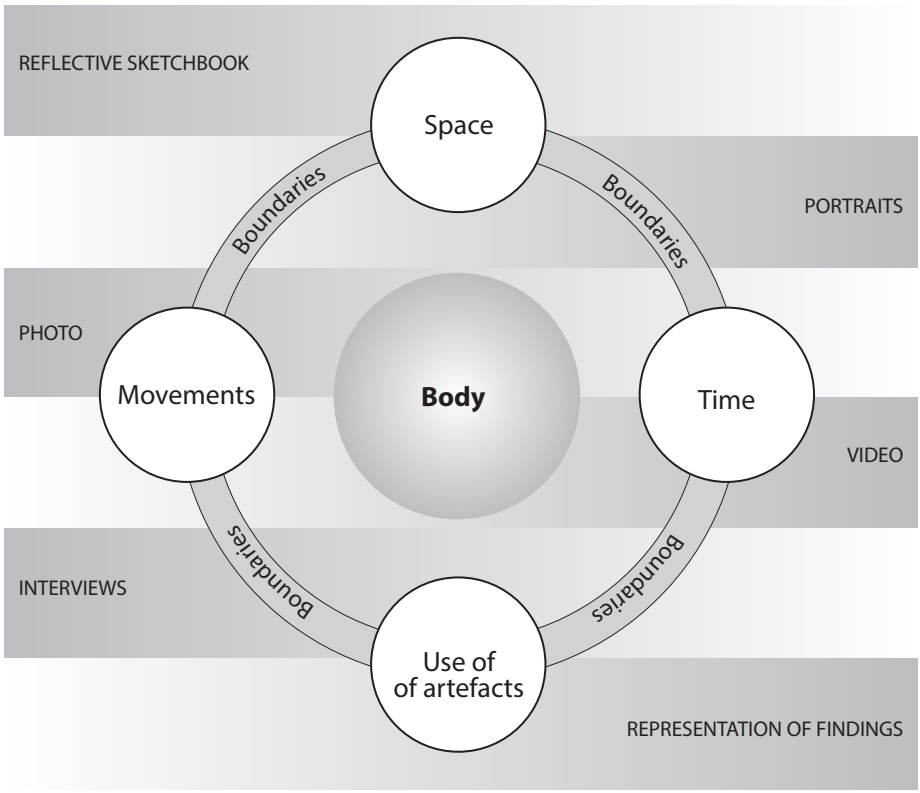

Fig 2 - Tools for body questioning

growth, enhance teaching competencies, and build reflective skills. If we consider teacher inquiry (or practitioner research) as a likely path of conceptualization of teachers' knowledge and practice (Cochran-Smith & Lytle, 2009) through the body, we allow a scrutiny of professional identity that is deeply rooted in the school, or classroom, context. In this way it is possible to make more evident which processes of learning and development of professional identity happen within a specific workplace: 'individuals learn through work whilst engaging in activities and interactions that are shaped by occupational requirements workplace practices and particular sets of goals and practices comprising the circumstances of their work and also how individuals contribute to and mediate the learning process' (Billett, 2014, p. 9).

It is true that the context for a professional worker, as teacher is, represents also a challenge because contextualising, understanding, and knowing within the classroom, adapting to students' learning needs, and supporting students' learning process is really hard to do:

> 'Not only do teachers need to be able to keep order and provide useful information to students, they also need to be increasingly effective in enabling a diverse group of students to learn even more complex material and to develop a wider range of skills. Whereas in previous decades teachers were expected to prepare only a small minority for the most ambitious intellectual work, they are now expected to prepare virtually all students for higher-order thinking and performance for only a few… teachers need a new kind of preparation on that enable them to go beyond covering the curriculum, to actually enable learning for students who learn in very different ways' (Bransford et al., 2005, p. 2).

To do this effectively and responsively teachers are asked to retrieve, organise, and apply knowledge to new problems and situations. Teaching practice cannot be reduced to rusty (and sometimes ineffective) routines. Teachers need to become "adaptive experts". Adaptive experts 'know what to do when known routines do not work, and when they need to expand the depth and breath of current expertise by integrating knowledge from various domains to solve new problems that cannot be solved by what they did previously' (Timperely, 2010, p. 6).

It is important to identify the way in which teachers resituate concepts, knowledge, and practical awareness through the different activities in which they are engaged. The idea of re-situation describes the process that occurs when individuals and groups act upon the recognition that any situation provides, at least in principle, an opportunity for an alternative course of action. Teachers' bodies correspond to explanatory itineraries for describing and understanding teaching practice. To do this, body, body at work, and body awareness can support teachers in the production, repair, restoration, modification, maintenance of effectiveness and correctness in daily action (Johncock, 2014). Moving from the assumption that knowledge, knower and knowing are linked together and that boundaries between inquiry and practice, as well as formal and workplace learning are blurred, teachers' work can be defined as a lived and embodied practice. Teachers' awareness of their own body within the workplace can support them in 'systematic, intentional inquiry about their own school and classroom work' (Cochran-Smith, Lytle, 2009; Timperley et al., 2007) driving them to:

- Be actively engaged in pedagogically rich work activities;
- Learn in the professional practice context;
- Make effective links to what is taught (learnt) in the academic context and what is experienced in practice settings;
- Perform within the practice context;
- Generate critical perspective on work and learning processes;
- Access to artefacts and activities which support individuals' learning;
- Be aware about the meanings of the body and its role in learning (the sensitive perception of the context).

The overlapping of teacher inquiry, reflective processes, and teacher (embodied) practice makes a research that stems from an emic perspective on teachers' own problems and criticalities and provides a unique insider perspective on meaningful issues in educational settings. Teachers can use teaching inquiry as a systematic and rigorous interrogation of their embodied work practice and as a lens that addresses and emphasizes, in a new and original light, how teachers make explicit and probe further their problems; how they reframe and modify questions; how they change their conceptions and perceptions for an effective decision-making.

In this vein, teaching practice is a combination of different aspects such as: theory and intuition, experience and knowledge, observation and reflection, learning and assumptions, personal epistemologies and community shared practical practices. Within the growing emphasis on teaching as a profession it is important for teachers to understand their roles and responsibilities as professionals. However, we have to admit that, even through the existing plethora of studies on the professional learning, teachers' professional identity and teacher education, it has not always realized the change promised and has not helped teachers in the transition from "theory to practice". We argue that the emphasis on teaching as an embodied practice can offer an innovative approach to strengthen teacher inquiry and teacher professional development embedded in the workplace stressing a reflective and questioning stance toward teaching practice.

Conclusions

Teaching practice is a complex research object, it is slippery, with different variables and elements to be considered. The scientific literature demonstrates how few studies aimed to help teachers to understand criticalities in their job and to improve their practice. Defining teaching as a situated practice leads to focus educational research on teaching practice as a set of modalities of actions and knowledge that are *in situ*: this implies that any activity (theoretical or practical) can be realized in different forms of activity patterns.

If we consider teachers' work as a situated practice we recognize that teaching happens in a participative framework. This assumption implies that teachers' professional knowledge is made up by continuous mediations through which actors involved (i.e. teachers, students, teacher educators) negotiate experiences, meanings, and aims. Teachers' work and learning happen in a social context that is dialectically realised throughout social practices made, re-produced, transformed, and changed by teachers themselves.

In this chapter we have tried to identify some elements that can be analysed and inquired in order to understand what is, today, teacher's work. We have started by not asking "Who is a teacher?"; but asking "What does a teacher do?" and

"How?". No easy answers can be found to these questions. The effort of reflection carried out in these pages is still far from providing comprehensive answers. It is rather an attempt, which suggests an alternative category to analyse, investigate, study, and understand the teacher's work. It is, of course, still a long path to be built. Raising questions and possible new paths of research. How do teachers live through their body at work? How do they position objects in space and how do they move with fluidity in the class? What aspects characterize their performance? How do they juggle the various tools? How do they coordinate different actions to perform competently (fluency and rhythm) their work? Which movements punctuate their practice? What kind of knowledge conveys their body at work? What is the choreography of their *routines* (the dexterity of the body)? The answers to these questions cannot be disregarded from reflection and research divorced from practice and practitioners (teachers, first of all). It is evident here the need of a research that, as anticipated in the initial steps of this contribution, is in direct contact with the practical and concrete context of teaching. This chapter, then, seeks to act as a liaison for complex but possible future itineraries of teacher inquiry.

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The use of creative, contextualised, subject specific teaching approaches within primary teacher education

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Abstract

This chapter describes the use of a creative teacher education methodology to facilitate study on a one-year postgraduate initial teacher education programme. It outlines how student teachers can be supported in their aspiration to become highly accomplished educators by inclusion within an active research orientated teaching programme. The chapter is illustrated with a concrete example of how student teachers can be motivated to engage with the acquisition of their own subject specific pedagogical knowledge within primary science. Arguments are made regarding the significance of fostering student teacher learning within a relevant social context in order to fulfil the aspirations and needs of student teachers, as both learners and evolving pedagogues. The self-deterministic approach consists of initial modelling during taught university sessions followed by reflection on student teacher classroom based inquiry. The attitudes of student teachers to this type of professional learning is examined alongside a critical reflection of the efficacy of this mode of learning. The conclusion includes an exposition of the potential of student inquiry within initial teacher education.

Key words: initial teacher education, science specific pedagogy, curriculum subject knowledge, contextualised learning, social change.

Introduction

During initial teacher education in England, many primary school teachers undertake a double stranded training programme consisting of university study combined with school-based learning. A popular route for teacher education is that of a one-year post-graduate course in education, following a three-year degree programme. At the culmination of this yearlong training programme, primary teachers must be confident and competent to deliver effective lessons across a broad curriculum, including the core (mathematics, literacy and science)

and foundation (geography, history and art) subjects. They are also responsible for raising children's awareness of personal, cultural, social and religious beliefs. This is a challenging remit given that trainee teachers must concomitantly refresh their own curriculum subject knowledge and develop a deep understanding of how children learn. They must also be able to cross boundaries between training settings (university and multiple schools) as well as perform as effective teachers and learners simultaneously.

This chapter puts forward a simple subject specific model for a component of postgraduate teacher education which draws on the seminal work of Shulman (2004) of how and what teachers must learn, fused with an appreciation of adult learning (andragogy) from the perspective of self- determinism theory. The model affords student teachers opportunities to acquire subject mastery by testing their competence to teach within a purposeful framework. The specific example used, is student teachers facilitating children's learning about human bodies as a means to support them in making positive lifestyle choices as part of the primary science curriculum. Government policy makers, health care and social service professionals have argued that maintaining child health is a significant challenge in the current climate. Childhood obesity has been termed a "world-wide epidemic" over the last decade and a half, and is projected to be a significant contributor to early death and economic decline. This risk has an underlying social element in the U.K. where studies indicate the incidence of obesity is linked to social class (HSCIC 2012).

Discursive elements of the chapter are illustrated by a four year empirical research study carried out during teacher education sessions using a creative drawing based methodology. This methodology is inspired by the pivotal work of Osborne et al (1992) who used annotated drawings to interrogate children's ideas about human bodies during the extensive Science Processes and Concept Exploration (SPACE) study in the 1990s. In an approach resonating with the current creative methodologies endorsed by Stuart (2015), student teacher drawing was used as a means of facilitating active learning through inquiry. Data from the student teacher drawings is supplemented by their narratives of teaching this topic before and after school based placements, in order to assess the efficacy of the approach. The impact of student teachers' practice on children's developing conceptions of human life processes is monitored using a variety of methods including observation of role play and drawings. Student teachers' perspectives of the challenges of teaching this topic within primary classroom are examined alongside an exploration of their confidence for promoting healthy lifestyles.

The chapter concludes with an assertion that inquiry based subject specific teacher education within a meaningful context is a valuable tool in fostering teaching excellence in the next generation of primary teachers. Given the current governmental agenda of promoting the training of teachers exclusively within

schools rather than within the existing ITE partnerships, suggestions are made as to how the findings from this study may inform future practice in teacher education.

The complexity of teacher education

Student teachers on one year postgraduate teacher education programmes in England have a complex learning remit within their intensive one year course. Primarily they are situated as learners in both academic (at university) and professional (school) contexts. At the onset and early stages of the course they see themselves as learners who will be taught how to become teachers. They imagine that their university mentors will confer copious amounts of knowledge on them which they will assimilate, enabling them to pass the course requirements and become inducted into the profession. They also appreciate that they will be given opportunities to refine their teaching skills within schools to prove their mastery. However further exposition of their learning situation reveals that the system is multifaceted and a composite of many intercalating processes. During their study student teachers begin to understand that whilst they are teaching in a school they are learning at least three different levels; namely learning from their class teachers how to teach children, learning about the needs and cognitive abilities of their pupils and learning from themselves in the form of critical reflection of their practice.

Superimposed upon this triad of learning influences is student teachers' recollection of material they have been taught during university study in terms of pedagogic knowledge and subject knowledge. Many student teachers describe the learning process as "overwhelming" and "over complicated". In the case of primary school student teachers (who teach children aged 3-11 years old) the teaching and learning arena is further complicated in England by the requirement of student teachers to teach across a broad curriculum. The majority of primary schools will require teachers to be familiar with knowledge (subject specific and pedagogic content) pertaining to at least nine different curriculum subjects. Given these obligations it is not surprising student teachers report being overwhelmed.

The overriding complexity of the situation that student teachers find themselves in during the one-year postgraduate programme is that their learning takes place in multiple settings. It is not unusual for student teachers to learn in at least four different locations within a space of nine months (three different schools and a university setting). In all these locations they must develop effective learning relationships with their peers, class teachers, school supervisory tutors, leading school mentors, school senior management and most importantly children. They are also rapidly evolving their own professional

identity as a teacher which we know is significantly impacted by the situations teachers find themselves in (Day et. al., 2013).

It is no wonder that this nomadic learning existence can in some cases cause student teachers to exhibit a degree of uncertainty with respect to what they are meant to be learning and or teaching at any one place or time.

Adult learning

What measures can be taken to support student teachers in their professional and academic learning? It is argued that effective "signposting" of learning opportunities within a meaningful context will assist student teachers to understand what they are learning and support them in the metacognitive process. If the signposting of learning opportunities is explicit, it is envisaged that student teachers will know what they know, how they came to know it, and what should be done with that knowledge. Explicit signposting will also enable them to "package" learning experiences into manageable "parcels" which can be re-explored during the course and at later stages during their early career. Critics of this view will assert that this strategy risks student teachers seeing professional and academic knowledge as being disparate components which can be haphazardly "bundled" together, rather than a deep, meaningful and holistic appreciation of the knowledge required to become an effective teacher (Boyd, Hymer & Lockney, 2015). However given the complexity of their learning situation and the fact that during their formative first two decades (during which they have spent approximately 15,000 hours in schools), learning has already been to a large degree packaged into curriculum subjects and associated assessments, there would seem no easy alternative.

A multi-layered approach

To combat this dislocation of learning components and foster a degree of student teachers taking control of their learning, it is argued that student teachers may benefit from being made explicitly aware of the underlying design of the learning opportunities afforded them within their training. To be most effective these opportunities need to draw on adult learning theory as outlined by Knowles (1990), who asserts that adult learners bring a great deal of experience to their learning situations, expect a high degree of influence over what and how they are taught and need to be made aware of how their evolving knowledge may be best used. As powerfully observed by Burns (1995, p. 233)

> "By adulthood people are self-directing. This is the concept that lies at the heart of andragogy…andragogy is therefore student-centred, experienced based, problem orientated and collaborative"

This premise draws highly on the seminal work by Ryan and Deci, (2013) from a perspective of Self-Determinism Theory. The three main basic psychological needs that self-determinism caters to are:

(a) A need to develop a high degree of competence.
(b) A need to understand the relatedness of knowledge acquisition.
(c) A need to assume a degree of autonomy over learning.

All three of these requirements can be specifically addressed within a postgraduate teaching course conferring qualified teacher status in England. The first is explicit within the course in that the goal of the vast majority of students on this course is to become an accomplished primary school teacher and hence master the multiple competencies this role necessitates. Student teachers understand the need for secure curriculum subject knowledge aligned to the necessary pedagogical competence required to teach effectively. As they progress through the course they become more aware of the reciprocity which acts between learners and teachers and the need for productive learning relationships between both parties.

The second need that of relatedness is realised within this teacher education strategy by affording student teachers the opportunity to work together in small groups, in order to learn from each other in co-constructional shared learning context. In this way they can experience how knowledge may be synthesised through social constructivist mechanisms and equally importantly, how teachers may work together symbiotically to design and evaluate subject specific pedagogical approaches.

The final need, which this author argues is the most compelling, is that adult learners need to adopt a measure of independence during their learning. All student teachers registered on a postgraduate teacher education course are proven learners by virtue of having previously completed an undergraduate degree and some have extensive life experience and or professional learning qualifications. It is not unreasonable to expect that having been proven successful they find it desirable to be afforded opportunities where they can exert some choice in the modality of their own learning. However melded within this successful learning profile it is often apparent that student teachers yearn for a highly time efficient formula to attain qualified teacher status, whilst it can be argued what they actually need is to develop to the point where they realise that self-regulated learning is the most constructive way forward.

Research orientated learners

The third need provides an excellent opportunity for student teacher led inquiry where teacher inquiry is defined as focussing:

> *"on the concerns of teachers (not outside researchers) and engages teachers in the design, data collection, and interpretation of data around their question."*
>
> Dana 2002

Obviously the research question will differ according to the individual contexts teachers find themselves. As opposed to traditional research where often external university based academics explore classroom practice in a research mode, the inquiry will be voiced by those who are making themselves familiar with children's learning. It has also been argued that this approach is likely to result in educational change since the student teacher has a leading voice in the research process. In the case of student teachers at the early stages of their professional development, it can be argued that it is necessary to provide a basic framework for teacher-led inquiry. This can be achieved in many different ways but a classic route is through what is termed subject specific pedagogy. Shulman (2004) asserts that in addition to central subject knowledge, different curriculum subjects have specific pedagogy associated with them, he terms this pedagogic content knowledge.

Conversely opponents of this view argue that it is more important that student teachers master core practices and pedagogies which can then be applied across the entire curriculum (McDonald, et al. 2013 & Forzani, 2014). In the case of primary science many experts have concurred with the former view that there are elements of science teaching that do in fact require specific pedagogical approaches within the discipline (Allen, 2014). For example the relative motion of the planets and moons within the solar system is conceptually challenging for young learners and warrants the introduction of specific concrete prompts and models to facilitate deep learning. Perkins (2006) adds to this debate by highlighting what he terms as troublesome knowledge where ideas are sometimes counter-intuitive (effects of gravity on bodies of different masses) or alien (for example aspects of electricity). It is argued that student teachers may become empowered to teach these science topics by accepting they are troublesome and embracing the challenge of enlightening their learners.

One way they can be encouraged to tackle this may be by formulating their own teacher inquiry during their school-based training. A focus on student teachers as a participant researchers in a classroom-based context, suggests that this strategy can work towards closing the perceived gap between "theory and practice". As eloquently reasoned by Cochran-Smith (1991)

"As a teacher-inquirer in charge of your own learning, you become a part of a larger struggle in education—the struggle to better understand, inform, shape, reshape, and reform standard school practice."

The second route for supporting the conceptualisation of student teacher inquiry is through a pertinent social context, in which the learning takes place. If student teachers feel they are addressing a learning need of significance for both themselves and their young learners, according to self-determinism theory they will be more motivated to increase their teaching efficacy.

A framework for student teachers inquiry was formulated during university based study by looking initially at student teachers' knowledge surrounding a biology topic which then became a stimulus for further individual inquiry in the classroom. In an endeavour to emphasise the assertion that "the central element of becoming a teacher is to learn to see teaching from the perspective of the learner" (Boyd, 2015, p. 57), explicit modelling of appropriate pedagogical strategies is used as a provocation for student teachers to engage with an inquiry based teaching approach. In this way congruent teaching in university sessions is used to encourage student teachers to re- construct modelled activities and evaluate their teaching (and hence learning) strategies in this conceptually challenging area of the curriculum.

Social context

It is important for student teachers to see the relevance of their evolving pedagogy in terms of social context. For them to see children make sense of their scientific ideas and apply their knowledge to everyday experience is critical to their sense of evolving self-efficacy. Children may use their knowledge and skills to explore scientific phenomenon, challenge the ideas of others or change their own perspective. One science curriculum area in which children's understanding can impact significantly on their personal choices is that of healthy living.

Of particular prominence is the question of healthy eating, with recent studies suggesting that childhood health is significantly compromised by poor lifestyle choices. Public Health England undertook the National Child Measurement Programme (involving over a million children) which revealed that over one fifth of 4 - 5 year olds were overweight or obese, rising to one third of 10 - 11 year olds. In the case of children defined as clinically obese the incidence was shown to double between these age groups. Of further concern were the findings that the incidence of obesity in children in areas of high socioeconomic deprivation were double those of their more advantaged peers.

In order to combat this significant threat to the health of children in England, both adults and children need to understand how making well informed lifestyle choices can impact positively upon personal physical condition. Children specifically need to understand what constitutes a healthy diet, how their bodies process food and what effect exercise has on the maintenance of healthiness. It has been argued

that teachers may have a role in helping children understand the importance of nutrition and exercise in maintaining a healthy body (Yager & O'Dea, 2005).

National Curriculum requirements

The National Curriculum (N.C. 2013) which is taught in the vast majority of schools in England supports this area of learning. By the end of key stage 1 (children aged up to seven years old), statutory requirements state that children should be taught to "*describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.*" (Department for Education, 2013, p.11). This is expanded on in the next year of their study, requiring children to *"identify that animals including humans, need the right types and amount of nutrition*" (Department for Education, 2013, p.17). On completion of their primary science study, year 6 (children aged up to 11 years old) are required to "*recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function*." Department for Education, 2013, p.31). If children can develop their scientific knowledge and conceptual understanding of these specific elements of human biology then it can be argued that they will be able to make more informed choices about their own life styles and the impact they might have on their well-being and health.

Key to understanding these scientific concepts is the knowledge of what constitutes a human body in terms of the tissues, organs and biological systems that coordinate together to ensure a functional human. If children can be encouraged to see themselves as a biologically functional entity which has needs in terms of exercise, balanced diet and healthy lifestyle they may be able to use their understanding to make sense of information they are given, for example dietary advice or fitness initiatives.

Fostering subject mastery

To facilitate children's understanding of these key scientific concepts it is vital that their teachers should have an in-depth knowledge of basic human biology. There is a tendency for adults to believe they are knowledgeable in this area of the curriculum, just by the fact that everyone is in possession of a human body. Experience of working with student teachers as a teacher educator often confirms that their subject knowledge is somewhat inconsistent (Blackmore & Howard, 2013). To remedy these deficiencies in subject knowledge and encourage student teachers to view their evolving professional identity through a lens of social context, a research orientated teaching inquiry was undertaken with student teachers enrolled on the one-year post graduate course. The intention of the study was to adhere to the prerequisites of

research oriented study as described by Jenkins et. al. 2007 who defines this teaching approach as involving learners within the research based inquiry itself as participants and researchers. It this way student teachers are given the opportunity to co-design the research methodology, participate in data collection and analysis and assimilate the key findings. This approach is efficacious on two levels, as it makes explicit to student teachers the processes involved in research and encourages their reflections on their subject specific pedagogic knowledge. In other words they are aware of how to assess knowledge within a learning population and how to use that information to inform the construction of future teaching strategies.

Study methodology

The research was undertaken over a four-year period with approximately 40 student teachers per academic year. Ethical approval was granted in accordance with university policy and there was an underlying commitment to adhere to educational best practice during the study. Since student teachers are required during their training to complete a large amount of documentation often in the form of questionnaires and surveys it was decided to deploy a creative methodology which would not just "mine information" "for an own (organisational) benefit" but would encourage "reflection and playfulness" of the participants (Stuart et al, 2015, p. 134).

Student teachers were asked to work in small groups to create their own pictorial representation of a human body using one consenting member of the group as a template to draw around. The student teachers used their own knowledge and that of their peers, to depict how a human body works. They were encouraged by their mentor to consider how the various cells, tissues, organs and organ systems that constitute a human body work synergistically together. Students were given the freedom to portray their ideas in any form they chose, including cartoon drawings, annotations or anatomical approximations and in this way accessed the advantages of multisensory learning as advocated by Laird (1985). This activity prompted a large amount of discussion and science based academic argument between both student teachers and mentors and was seen as a real exemplar of social constructivist based learning.

In addition to their university based study, student teachers were encouraged to deploy their knowledge and pedagogic skills in schools during their eight week teaching placement to teach children about healthy human living. Student teachers undertook a variety of creative teaching approaches including role play, working walls and cross-curricular learning to facilitate children's understanding of human living processes.

By the end of the research inquiry twenty-six group drawings were available along with annotated comments from one hundred and thirty student teachers.

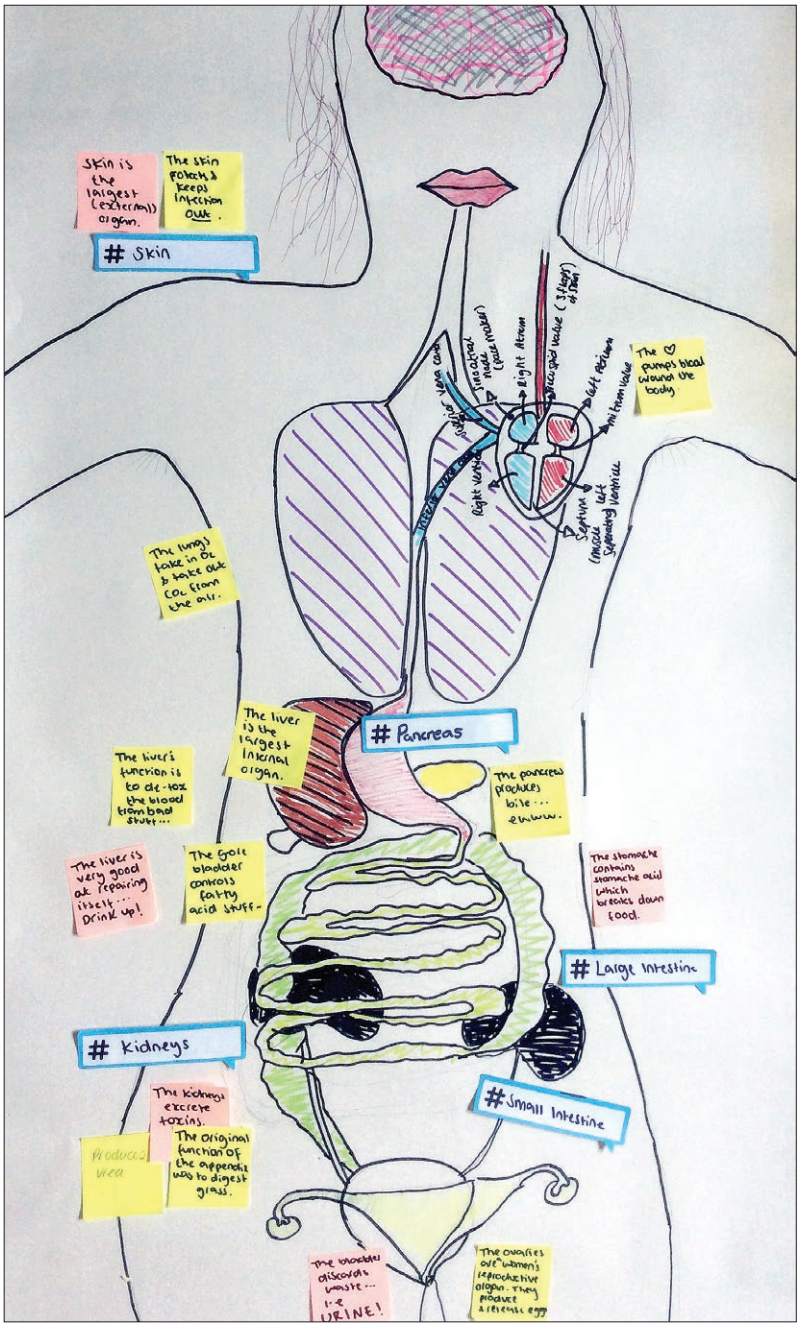

Figure 1: A diagram of the organ systems of the human body constructed by a small group of student teachers during a university session.

The drawings were photographed and collated using NViVO software for ease of analysis. The drawings were scored according to anatomical accuracy (position and relative size of organs) and an understanding of function. The reflective comments were analysed by a process of constant comparative analysis as originally defined by Miles and Huberman and further refined by Kolb (2012) and examined for emergent themes.

Findings of the study

Student teacher subject knowledge

Overall the analysis of the drawings with associated annotations revealed that the student teachers possessed a good level of subject knowledge, commensurate with that required to teach primary age children effectively (see figure 1 for a typical example). The diagrams were as a whole well informed and denoted a clear understanding of the six main organ systems in the human body. The best comprehended system was the digestive system with the majority (70%) of drawings demonstrating good knowledge. Student drawing groups were all judged to have attained reasonable, to good knowledge for the following organ systems: musculoskeletal, cardio-vascular, respiratory and genitourinary. The organ system least well portrayed was the central nervous system (CNS) where depictions seemed to be generally centred on a brain in isolation.

The vast majority of annotations were pertinent and signified a clear understanding of the functionality of the key components of the human body e.g.

> "Epiglottis stops food entering trachea."
> "Stomach starts digestion, enzymes and hydrochloric acid start to break food down. Stomach absorbs nutrients from food."
> "In the small intestine nutrients are absorbed into the bloodstream."
> "The liver detoxes and synthesizes vitamins."
> "Pancreas produces insulin and glucagon."
> "Kidneys filter blood for excretion in urine. "
> "The ovaries are women's reproductive organs, they produce and release eggs."

In the minority of drawings where the brain was depicted connected to the spinal chord and peripheral nerves there was a reasonable understanding of the CNS

> *"The brain is encased in the cranium and controls the CNS."*
> *"The brain receives messages from the body, e.g. movement, sight, etc. and sends messages to body via electrical impulses."*

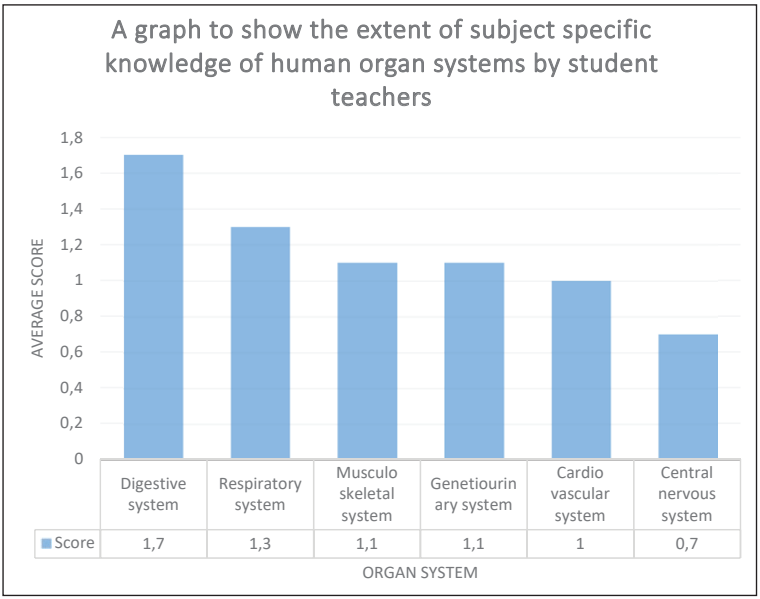

Figure 2: Analysis of the degree of understanding demonstrated by student teachers pertaining to human organ systems.

Figure 2 legend: Figure two shows the average score assigned to student teacher drawings of the main six human body organ systems (scoring as follows: 0 = nil to very little understanding, 1 = good understanding and 2 = very good to excellent understanding)

Figure 2 shows the number of correct conceptions for each organ system as judged by the accompanying annotations. This reinforces that the digestive system was by far the best understood organ system. Within the digestive system the roles of the stomach, liver and intestines were the best understood and portrayed with appropriate diagrammatic refinements e.g. villi to absorb nutrients in the small intestine. Annotations from drawings were amalgamated and analysed using Wordle software to reveal key word frequency use.

The Wordle (figure 3) for the respiratory system shows a good understanding of applicable key words pertaining to the respiratory organ system. This is encouraging as breathing and gas exchange are accessible topics for primary age children so it is heartening to see that student teachers are familiar with the key scientific vocabulary associated with this topic.

Of some concern is the fact that although the musculoskeletal system was represented to a good standard in 60% of the drawings only one pertinent comment was made signifying functional understanding, namely:

> "Arm muscles are antagonistic and work in pairs."

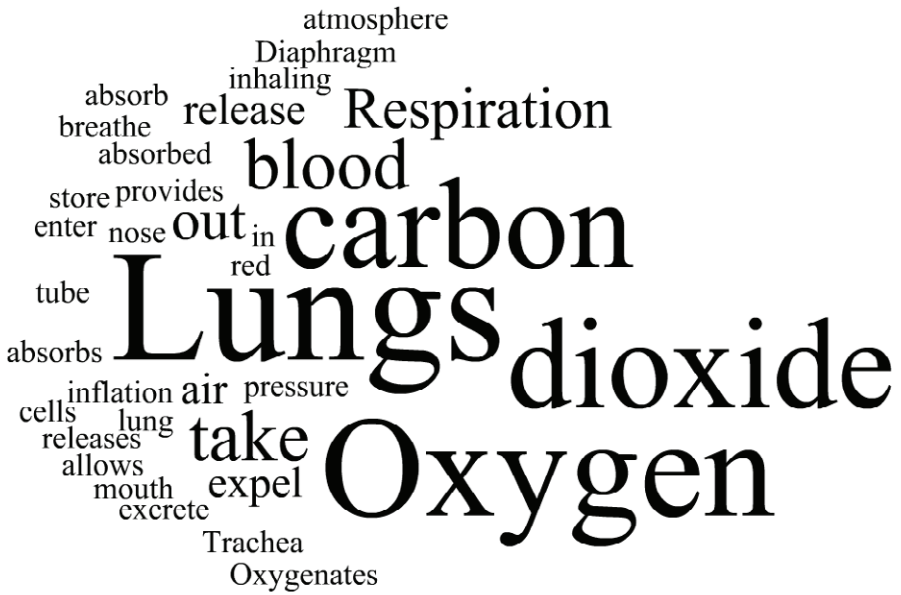

Figure 3: Key words used by student teachers to describe the functionality of the human respiratory organ system.

Figure 3 legend: A Wordle frequency diagram to show the most prevalent words student teachers associated with the human respiratory organ system.

This could however be due to a limitation in the methodology, in that it could be argued that it is easier to represent bones, joints and muscles pictorially rather than describe how they function together to give rise to movement. Since facilitating children's understanding of exercise involving movement is vital in terms of embracing a healthy lifestyle, this finding warrants further exploration.

Student teacher reflections

The efficacy of the modelling of the human body drawings at the beginning of the student led inquiry appeared to have been high with over 75% of student teachers choosing to reflect on this activity favourably after their school experience.

Initially the student teachers seemed to replicate the teaching activity they themselves had undertaken during university sessions with their classes. However it is clear that a degree of reflection and maturation of ideas had taken place as their teaching approaches showed elements of planning for the effective elicitation of children's existing ideas, co-construction of knowledge and exploratory learning.

> "As part of a science day, my class were looking at the circulatory system and the effect of exercise on the heart rate. At the start of the day, I used the paper human

> activity to assess the children's prior knowledge. The children drew the parts of the circulatory system that they knew and working in their groups, they had to also decide where they were located. The children also wrote questions around the body about things that they would like to find out by the end of the day. The children thoroughly enjoyed this task, it was fun and engaging. At the end of the day, we looked back at the drawings to discuss what we had found out and assess what we had learnt. "

Student teachers were also seen to enhance their teaching differentiation strategies, enabling a more inclusive classroom learning environment to be generated:

> "Mixed ability groups were needed as the organs could be difficult to identify, especially if the children had not been exposed to the anatomy of the body before. On reflection, this activity gave a good indicator where the children were in terms of their understanding."

The activity seemed to prompt reflection with respect to both student teacher subject knowledge and emergent pedagogic knowledge.

Two student teachers commented:

> "*I am confident when teaching year 6 science; whilst on my second school experience I had to teach about exercise and how it affects the body. I was able to provide children with enough information and use interesting resources to get them interested in learning. I felt confident enough in my own subject knowledge which allowed for the learners to learn sufficiently whilst also being challenged.*"
> *"Reflecting on my experience of the science teaching, I need to look at muscles and the circulatory system more, as well as human and animal fertility and the various cells."*

It was interesting to note that whilst student teachers consistently reported increased confidence with respect to teaching human processes they still looked for external validation from those they perceived as experts. This resonates heavily with Banduras theory of self-efficacy, which in this case is in part derived from an estimation on the behalf of the student teacher of what others (more senior teachers) know (Tschannen-Moran et al., 1998) .

"I taught two science lessons in a mixed year 5/6 class about the effects that exercise and diet can have on our bodies and heart. I realised how important it was for me to have secure subject knowledge. I was able to answer children's questions which then allowed them to have a deeper understanding of their learning which also encouraged them to become more independent learners, promoting critical thinking skills. Both times the observers commented on how well the children engaged with their tasks and it was clear that they were excited to learn."

Analysis of this narrative also reveals a growing awareness of the student teacher with respect to the underlying learning needs of the children. They highlight the importance of giving opportunities for children to attain independence and extend their critical thinking skills in order to foster deeper learning.

Student teacher attitudes

At the onset of the inquiry there was a slight degree of concern that student teachers would feel they were being used as part of a research project and therefore under a heightened degree of scrutiny. This might have compromised the ethicality of the inquiry, however keeping the research at a fairly informal level allowed student teachers to feel their perspectives were integral within the learning approach. Student teachers as a whole reacted positively to being part of a research orientated teaching inquiry, one remarked:

> "I like to think of myself as part of a research project into teachers' knowledge."

Enabling student teachers to become part of an endeavour which facilitates many layers of inquiry would appear to be highly effective. Student teachers moved away from being passive recipients of knowledge to being actively involved in knowledge acquisition and collation. They appeared to derive a sense of empowerment in keeping with the strands of developing competency and determining relevance.

In addition there was a large amount of evidence that student had developed their critical evaluation skills, they had ceased to merely re-enact tried and tested classroom methodology but refined their own pedagogical approaches.

One student teacher reflecting on her practice during her first school teaching experience with a Year 3 class (learners ages 8 - 9 years old) reflected:

> "I was able to teach three science lessons they were focused upon bones and muscles within the human body. A lesson which I felt worked really well, was where the children worked scientifically, being myth busters and attempting to prove or disprove certain myths about the human body. This included whether or not your ear is the same length as your nose. This lesson also had a cross-curricular link to maths as the children had to decide which measuring tool to use."

There was some evidence that by focussing on the research elements of the inquiry and not merely their own teaching efficacy, this learning approach had a positive effect on some student teachers' self-confidence. One student teacher on reflecting on her first school teaching experience stated:

> "On reflection, initially I was nervous to teach science as it was something I had never experienced before and was a subject area that I found challenging. However after

> my teaching, I was pleasantly surprised with how enjoyable teaching science can be for both myself and of course more importantly for the children."

This comment suggests a growing conception of behalf of the student teacher of the reciprocity that exists between teachers and learners in terms of enjoyment and fulfilment during effective learning and teaching.

Impact on children's learning

Student teachers were encouraged, after securing appropriate permissions, to bring back copies of children's work to the university for further analysis and reflection on the teaching efficacy of the approach. The following descriptions of human processes were offered by a mixed ability Year 3 (8-9 year old) group of children.

> "First you take a mouthful of your food your many teeth grind it up and mix it with spit. Your stomach churns food into a thick liquid."
> "Kidneys remove water and it extracts wee from your blood. Wee trickles down to tubes called ureters."
> "Heart pumps blood around body, this side pumps blood to the lungs."
> "Your brain is made up of billions of special cells called neurons."
> "The brain helps with moving, hunger, balance, touch, smelling, seeing and hearing with nerves."

All these conceptions reveal an appropriate level of understanding of children in this age group as judged by comparison with the National Curriculum. Indeed several elements, for example "*special cells called neurons"* exceed the requirement at this key stage, as this phrase suggests that children understand that cells in the body are differentiated into many forms, which may have specialised functions.

Scrutiny of the work by student teachers also revealed that they felt children displayed a high degree of spatial and organisational awareness in some cases. Children were able to depict structures that were enclosed within organs in an appropriate manner. Figure four shows the children's depiction of a liver, with a gall bladder quite clearly shown within this organ. The associated annotations by the children, and the detail within the drawing suggests a good level of understanding. It is clear the children understand that this is where bile is produced and stored in order to aid digestion. The drawing does show however that the children were incorrect in siting the organ in the second upper quadrant of the human body and probably indicates a lack of overall awareness in terms of anatomy.

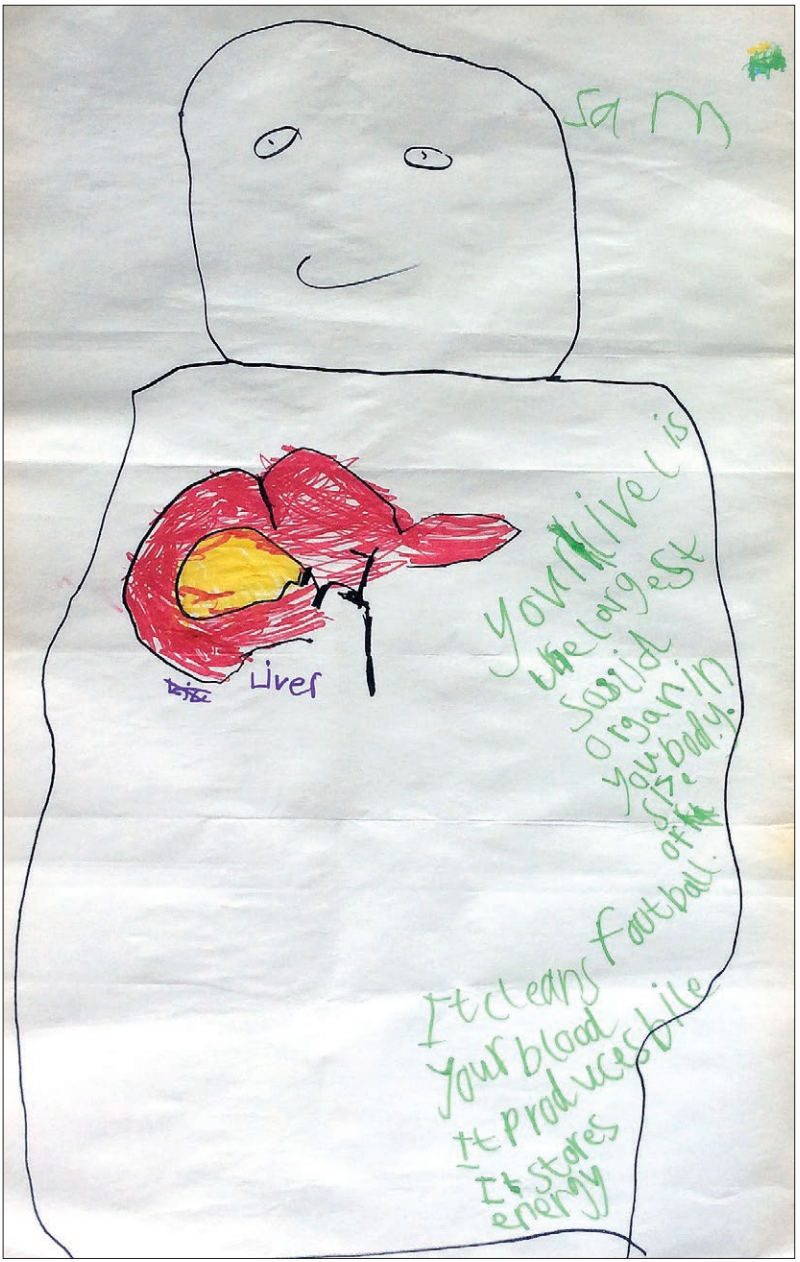

Figure 4: Children's conceptions of the function of human organs following student teacher inquiry.

Figure 4 legend: A drawing done by a small group of year 3 children focussing on the liver. Children's writing says "Your liver is the largest solid organ in your body. It's size of a football. It cleans your blood. It produces bile. It stores energy."

Conclusions and recommendations

It is quite difficult to carry out an unbiased judgement with respect to the inclusive nature of the drawing methodology as a tool to foster student teacher led inquiry. The vast majority of student teachers seemed to have found the approach engaging and an outlet for creativity. A large proportion (over two thirds) chose to deploy this methodology within their school teaching experience, which would suggest they found the approach of merit. With respect to learners who did not benefit from drawing based learning opportunities; it can only be said that during the four year project no student teacher has felt that this approach lacks merit in terms of raising awareness of science specific subject knowledge or associated pedagogy. However it could be argued that if a student teacher felt this way they are unlikely to voice that opinion due to perceived power relationships between student teachers and mentors. It would appear overall that this teaching approach is effective for a wide range of learner ages and abilities.

As a training vehicle for student teachers this type of drawing based inquiry would seem to have the following merits:

- Inclusivity
- Creativity
- Accessibility
- Ease of deployment
- High degree of engagement

Detractors from the methodology would point out that this type of inquiry based teacher education does take a significant amount of time when it is considered that student teachers need the initial stimulus to be taught within university based sessions, then deploy the methodology within schools, obtain evidence for subsequent analysis and return to that setting in order for reflection on their pedagogic practice. This author would argue that this perceived deficit, is in fact is a strength of the methodology. Deep learning can only be achieved as a result of sustained inquiry, extensive reflection on modes and efficacies of learning approaches and a significant engagement with appropriate bodies of knowledge (in this case learning theory and human biology). Whilst student teachers may be supported to design effective teaching and learning strategies, monitor and assess the resultant attainment of their young learners in their professional learning context, there is a dearth of opportunities for them to build upon these experiences, analyse and re-construct their developing pedagogies. Explicit modelling during initial teacher education within university sessions allows student teachers the opportunity to pilot and refine teaching approaches in collaboration with their peers and highly experienced teacher educators. In busy primary schools it is rare to be afforded the opportunity in terms of time, place and space to undergo these essential learning

processes. It is clear that student teacher led inquiry when deployed across academic and professional learning settings can lead to deep, critical learning and concomitant skill acquisition, ideally suited to initial teacher education.

Unfortunately, in the case of teacher education within England the proposed drive is to significantly increase the proportion of student teachers being exclusively trained in schools (DfE, 2016). Due to time constraints within schools and in the case of primary science, lack of expertise, this will essentially mean that student teachers will not be given the opportunity for sustained student led inquiry. Given the findings of this research and that of others in Scandinavia and Australasia (Hansen & Wasson, 2016 &Timperley, 2008) it is of significant concern that inquiry based student teacher learning may experience a demise.

In summary this study advocates a more extensive positioning of student teacher inquiry using creative methodology within teacher education programmes and school and university educational partnerships. It is only with the deployment of rounded, holistic research informed teacher education programmes within the international teaching community that teaching excellence will be achieved by future generations of teachers.

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Fostering student teachers' inquiring attitude

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Abstract

In the Netherlands, as a result of governmental policies, the emphasis on practitioner inquiry conducted by teachers in schools has increased (Gray & Colucc-Gray, 2010; De Weert & Leijnse, 2010). Among other skills teachers are expected to have an ongoing systematic critical inquiry as a 'habit of mind' (Livingston, McCall & Morgado, 2009). For that reason a program about practitioner inquiry is included in the curriculum of Dutch institutes for teacher education. During the undergraduate teacher education course, students have to fulfill several inquiring activities and assignments to develop inquiring knowledge, skills and an inquiring attitude. We aimed to investigate whether one of these assignments, 'an observation task', contributes to the development of an inquiring attitude among second year student teachers. We used a pre- and post-test, with growing critical attitude as an indicator for a student's development (Bruggink & Harinck, 2012). The results suggest that only 16.9% of the respondents (12 out of 71) made progress in developing their inquiring attitude. It seems a more explicit focus on the development of an inquiring attitude at institutes for teacher education may be needed.

Key words: inquiring attitude, institute for teacher education, student teacher

Introduction

In the Netherlands, two types of higher education can be distinguished: universities for scientific research and institutes for higher vocational education. The educational institute central in this paper, belongs to an institute for vocational education. The focus in these institutes used to be merely on education of future professionals. Due to economic and social changes, followed by governmental policies, all higher vocational institutes, among which the institutes for teacher education, are challenged to serve the needs of a 'knowledge economy' and have developed into Universities of Applied Sciences. Therefore, learning how to conduct inquiry has become an important part of the curricula. In the Netherlands, the importance of inquiry conducted by higher educated professionals can be

found in the accreditation framework: the quality of bachelor research reports has a substantial impact on rating results (NVAO, 2014). Recently the Dutch Educational Council (Onderwijsraad), at the request of the Minister for Education, pointed out the importance of innovative professionals (Onderwijsraad, 2014). Upgrading of former vocational institutes to universities applies not only to the Netherlands, but also to some other European countries like Belgium, Norway, Finland and several federal states of Germany (Gray & Colucci-Gray, 2010; De Weert & Leijnse, 2010).

Teacher education institutes are expected to educate future professionals (i.e. future teachers) who are able to renew and innovate their professional practices by conducting inquiry themselves. Future teachers should therefore not be educated as researchers, but as teachers with an inquiring attitude. Livingston, McCall and Morgado (2009) have described the skills these teachers need. They should have skills to read, evaluate and criticize research; to use that research in their own work; have expertise in conducting research about their own practices and programs in order to innovate and improve their practice; have the skills and attitude to stimulate inquiry learning in students; and have an ongoing systematic critical inquiry as a 'habit of mind'. Instead of the word 'research' we prefer to use the term 'inquiry' or 'practitioner inquiry' here, since it suits better to the type of activities we expect future teachers to do.

Changes as written above have only taken place quite recently and practitioner inquiry by professionals in the field of education is a relatively new phenomenon in the Netherlands, as it is in other countries. Based on a literature review, Bruggink and Harinck (2012) distinguish four relevant factors why research is important for educational professionals. Firstly, research is an adequate method for professionalization. Secondly, research is a means for teachers to better justify how they work. In the third place, research literature may help teachers to learn by using others' experiences, instead of finding it out by themselves. Finally, in a quickly changing society, there is a need for actual and evidence based knowledge, based on their own practice. Benefits of professionals doing practice-oriented research are formulated in other ways as well. Teachers doing research may also form a bridge between educational research and practice and contribute to creation of knowledge (Vanderlinde & Van Braak, 2010).

This chapter focuses on a research project conducted within an Institute for Primary Teacher Education, part of the Faculty of Education within a University of Applied Sciences (UAS), situated in the middle-east of the Netherlands. Besides the Institute for Primary Teacher Education (preparing teachers for children aged 4 to 12), the Faculty includes an Institute for Secondary Teacher Education as well (preparing teachers for children aged 12 to 15). In both cases the course takes four years, involving theory as well as practical training in the field of education. Most students start their degree at the age of 17 after finishing general secondary education.

Learning to do practitioner inquiry in the Netherlands

In the Netherlands, learning to do practitioner inquiry has become part of the curriculum within the institutes for primary teacher education. Students are taught to become innovative professionals able to innovate their own practice through inquiry. As it is important, as stated earlier, that student teachers are prepared to become a teacher with inquiring skills, instead of becoming a researcher, the acquisition of inquiring skills and the development of an inquiring attitude is embedded in the training of other professional skills (Van der Linden, Bakx, Ros, Beijaard, & Vermeulen, 2012). Throughout the four years course attention is paid to the development of an inquiring attitude and inquiring knowledge and skills, necessary for conducting practitioner inquiry, as part of the curriculum and linked to competences as a teacher. For this reason, in the initial institute for primary teacher education central to this paper, a program focusing on inquiry has been developed. This program can be seen as an educational tool. The acquired inquiry knowledge and skills, as well as aspects of an inquiry attitude, have been described and divided into sub goals. Students are expected to realize these sub goals by working on specific tasks and assignments during their four years course.

The institute has converted the major part of the curriculum into authentic tasks. Authentic tasks are student assignments that have been designed to have direct relevance to the real world and to the professional role of a teacher (Bloxham & Boyd, 2007). In these tasks, the theory offered or prescribed by the institute and the practical situation merge together. The starting point is that through these assignments, students are meant to acquire the necessary competences to become a teacher. They carry out authentic tasks with increasing difficulty during several smaller internships spread over four years. Part of the authentic task includes inquiry: students need to demonstrate that they have learned one or more inquiring skills.

Knowledge and skills include – among other things – formulating a research question, setting up a design, collecting data, analyzing data, interpreting findings and writing a research report. To make students familiar with inquiry they are offered a practice-based research task twice a year in which they practice several aspects of the research cycle, for example data collection. During their first year the focus is on getting to understand the research cycle. In the second and third year this changes to inquiring skills, like working with research instruments. In the fourth, final year, students are expected to carry out a practice based research, more or less independently, during their final internship in schools (HAN, 2016).

Developing an inquiring attitude

Inquiring teachers do need inquiring skills on one hand and an inquiring attitude on the other hand (Livingston, McCall & Morgado, 2009). Until now, during teacher

education more attention is paid to the development of inquiring skills instead of an inquiring attitude. This is for example expressed in textbooks focusing on how to set up a research and how to organize data collection. However, an inquiring attitude seems to be important (Bruggink & Harinck, 2012). Livingston, McCall and Morgado (2009, p.193) mention the necessity of an "…ongoing systematic critical inquiry as a 'habit of mind'".

It seems that the ability to apply inquiring skills alone does not automatically turn (student) teachers into inquiring professionals (Van der Linden, 2012). The distinction between the ability to do research and an inquiring attitude of educational professionals is also described and distinguished by Cochran-Smith and Lytle (2009) as 'inquiry as a project' on the one hand and 'inquiry as stance' on the other hand. The first term refers to the execution of practice based research, with a clear distinction between education and research and, besides that, a starting- and endpoint. 'Inquiry as stance' refers to an inquiring attitude. That is, a basic attitude of teachers who constantly and naturally answer practice based questions through inquiring activities including literature research, doing interviews with pupils, observing. According to Cochran-Smith and Lytle, instead of being capable of doing research, 'inquiry as stance' is more important in relation to school practice.

Despite the emphasis on the development of an inquiring attitude, a clear and fully established approach to teach student teachers' attitude does not exist yet (Bruggink & Harinck, 2012). The assumption dominates that students automatically develop an inquiring attitude by conducting research tasks or parts of it. Harinck, Kienhuis and De Wit (2009) for example emphasize the importance of a constant return and implicit presence of the inquiring attitude as part of the inquiring tasks in the curriculum. They describe the skills students have to achieve but do not pay special attention to how this attitude can be obtained. Specific parts of teacher education that may contribute to the development of an inquiring attitude are named by others. The importance of assignments in the curriculum that focus on different aspects of an inquiring attitude seems to be successful. Participation in research (Donche & Struyf, 2008; Bakx, Breteler, Diepstraten & Copic, 2009) and also reflection, coaching and intervision could contribute to an inquiring attitude (Imants, Van Veen, Pelzer, Nijveldt, & Van der Steen, 2010). Again, how to develop this attitude is not clear.

Teacher educators even have to deal with teacher students having a negative attitude towards inquiring activities, since students are not automatically enthusiastic about research (Labaree, 2003; Van der Linden, 2012). Instead, they prefer being busy in class (Van der Linden, 2012). In general, most students are not critical towards information or their daily practice. Van der Linden concluded that working on research close to the educational practice, best contributes to the development of inquiring skills and an inquiring attitude. Therefore, students should particularly do assignments related to their profession and the core practices of teachers (Grossman, Hammerness, & McDonald 2009).

The emphasis in the institute for teacher education is on teaching and developing inquiring skills. The assessment of the assignments is limited to the skills and not the attitude as such. The assumption is that working on authentic tasks that focus on inquiring skills, will also lead to the development of an inquiring attitude. In our research we wanted to find out to which degree a second year authentic task with an inquiring component ("Education for all children"), contributes to the development of an inquiring attitude. This is investigated among students who have been working on the task.

Characteristics of an inquiring attitude

Based on an international literature analysis, Bruggink and Harinck (2012) present an overview of nine characteristics or elements of an inquiring attitude (figure 1). These are, among others, Openness, Curiosity, Continuously asking questions, A critical and analytical attitude and Systematic use of knowledge. Bruggink and Harinck emphasize that these elements contribute to the interpretation of an attitude, without the addition of specific skills or knowledge. In their view, skills like data collection or data analysis can be seen as tools or means to work with an inquiring attitude.

Being curious / Wanting to know / Wondering about issues
Having an open mind / Seeking their own presuppositions / Postpone own judgement
Being critical: is it true? Being doubtful
Trying to understand / Willing to gain insight / Willing to understand
Willing to change perspectives
Willing to chance routines / Questioning the obvious / Daring to leave the beaten path and choose own directions
Having a focus on sources / Willing to build on previous concepts and ideas
Focusing on being sure / Willing to use reliable sources and be accurate
Willing to interact with others / Willing to be part of learning communities

Figure 1. Nine general aspects of an inquiring attitude (Bruggink & Harinck, 2012)

In this study, the inquiring attitude was operationalized in 'Being critical: is it true? Being doubtful'. We chose this element, because it fits very well with the students assignment. The assignment ("Education for all children") is explained in more detail in the textbox.

Education for all children: An inquiry task for second years' student teachers

The institute for primary teacher education values the development of an inquiring attitude among students (Educational framework (Opleidingskader), HAN, 2015). The starting point is that in all assignments that are part of the program for inquiry, attention is paid towards the acquisition of inquiring skills and an inquiring attitude. These specific skills are described explicit, besides that in more general terms is mentioned: the student features an inquiring attitude.

We, as researchers working at the educational department, were asked to work together with teacher educators on the development of the authentic task "Education for all children", whereby we focused on the inquiring part. The task is carried out by student teachers in the first semester of their second year. The assignment is part of the subject 'Pedagogy' and its objective is two-sided. On the one hand, students learn to know and recognize differences among children. On the other hand, students practice inquiry and report on that (developing their inquiring skills) and in the meantime it is meant that they develop an inquiring attitude.

More in detail, the assignment examines the question whether boys and girls behave differently in class and how teachers react towards behavior of boys and girls. The aim was to find out whether boys and girls differ in terms of disturbing behavior and whether teachers' reaction is gender specific. Students could choose between two forms of externalizing disturbing behavior: talking loudly in class without having been given a turn (Bossaert, 2009) or (not) being task-oriented during schoolwork. Both the pupils' behavior and the reaction of the teacher were observed three times.

In terms of inquiring skills most attention is paid to practicing the observation instrument, the data analysis and formulating the results and a conclusion. By using the prescribed observational instrument, we expected students to learn how to observe. The ability to make observations is a valuable skill in terms of data collection and is closely related to teacher skills. Besides, the ability to make reliable observations is also related to an inquiring attitude, since students learn to formulate conclusions based on research (observations). The theoretical framework, research question and method including the instrument were developed and handed over beforehand. Because of this, students could focus mainly on the data collection (using a qualitative and reliable instrument), the data analysis and the report. Through this working method, students are challenged to question what seems to be well known to them (do boys show more externalizing behavior then girls in class) and draw conclusions after observations.

The assumption is that after working on the assignment "Education for all children", student teachers have learned to draw conclusions after inquiry, instead of taking information at face value. We presume that they automatically and unconsciously develop a more inquiring attitude by working on this assignment.

Research question

We wanted to know whether fulfilling this assignment actually contributes to the development of a critical attitude among students. Our research question is: Does the assignment "Education for all children" improve student teachers' critical attitude?

Method

In order to answer the research question, student's critical attitude was investigated before and after the assignment.

Research instrument

Students' critical attitude was investigated by using a form with two open questions as a pre- and post-test. The period between both tests was eight weeks, used by students to work on the assignment. The test before and after the assignment was the same.

The first question was: 'Imagine your new class. How do you find out if children are uncertain about their own capabilities?' This would give us more insight into how students try to answer this question: do they start looking for information to find out when a child is uncertain and how this can be seen in children's behavior (=being critical towards given information), or do they start to explore which children in their class are uncertain?

The second question includes a description of a case or vignette: a short description of a practical situation (maximum 100 words) was submitted to the students, who were asked to react. Vignettes form a safe and reliable way for students to share their opinion, since they are invited to describe how they think they would act in a certain situation. That is, the focus is on planned educational action (walking the talk) rather than reflection about acting (talking the talk) (Mena Marcos & Tillema, 2006).

The vignette used in this research included a description of a situation whereby the mentor informs the student how a group of children in the training class, living in a specific street, shows behavioral problems:

> "The mentor of your new training class has informed you about the pupils during an introductory talk. She has warned you about the children living in Robin Square (Roodborstpleintje). The children are indicated on the student list. Robin Square children are cheeky, do not listen, scream, and their performances are moderate or below. The mentor advices you to give plenary lessons in the beginning because that keeps them more easily quiet. Together you agree you will use the first three training days to get to know the (children in) class. For those three days you will make a plan of activities yourself."

Students were asked to describe what activities they would do during the first three introductory days. A maximum of five activities was allowed. Our aim was to find out how students deal with the given information about their training class. Are they critical towards the information given by their mentor (is it true?) or do they take the information for granted?

Participants and data collection

The research was conducted among second year teacher students. The students are divided in six classes, but since they are educated according to the same program, they can be seen as one group. For the pre-test, the forms with the two questions were distributed by the teacher educators and filled in during college. 135 students participated in the pre-test. For the post-test the forms were filled in their own time or in class, because of a change in teacher educators and absence of students. Therefore a smaller group of students participated in the post-test. In the analyses only the forms of students were used who participated in both the pre- and the post-test and who answered both questions. Our final research group consists of 71 students: 12 men and 59 women.

Data-analysis

The answers of the students were analyzed. Students' answers on the first question ('How do you find out if children are uncertain about their own capabilities?') were analyzed with a framework based on both the content of the answers (open coding) and an element of Bruggink and Harinck (2012): 'Asking questions and being critical towards the given information'. Within the framework three categories can be distinguished: 1) Not critical, students only describe what uncertain children look like and how they can be recognized. Students seem to be sure these children can be found in their class and they seem to know how to recognize them; 2) Slightly critical, students plan to use (inquiring) activities to find out whether children are not confident. They seem to know how to recognize these children. Examples of (inquiring) activities are: having a small chat with the pupils or doing observations; 3) Critical, these students first try to find out how to define uncertain children by using literature. They express a need for

more information about uncertain children, before starting an inquiry in practice. A full description of the categories can be found in Table 1.

The answers on both the pre- and post-test were assigned to one of the categories. To consider reliability, the two researchers scored the answers separately. Afterwards these scores were placed next to each other and in case of differences, the researchers together came to an agreement.

Category 1: not critical	Category 2: slightly critical	Category 3: critical
Lists only pupil characteristics that are in accordance with students view of uncertain children. Sums up that these pupil characteristics can be seen when certain pedagogical – didactic approaches are performed.	Inquiring activities to get more information about the pupils: - Looks into pupils learning outcomes - A small chat with the children - An observation - A conversation with mentor / teacher(s) - A conversation with parents - Other ways	Category 2 and additional: Mentions study of literature and further inquiry

Table 1. Analytical framework task 1, with categories not critical, slightly critical, critical

The second question involves a vignette followed by an open question: describe how you would handle in the situation as described in the vignette, list maximum five activities. Comparable with the first analysis, also for this task both the content of the answers and the characteristic 'being critical and asking questions' (Bruggink & Harinck, 2012) were used to develop a framework. Three categories were formulated: 1) Not critical, the student only mentions the introductory activities he is planning to do, common to every new class; 2) Slightly critical, the student accepts what the mentor says and at the same time indicates he will use observations or a sociogram to get further information about the children mentioned; 3) Critical, the student questions the given information. He is planning to use inquiring instruments to find out whether the mentors story is correct. More information on the categories can be found in Table 2.

The students answers were divided in these three categories. This has been done with three researchers: after an individual round we came to an agreement in a joint conversation.

Category 1: Not critical, get to know	Category 2: Slightly critical, get to know and inquiring activities	Category 3: Critical: wondering 'if is it true'
The student takes the mentors information for granted and focusses on getting to know the pupils. The student is not critical towards the given information and tries to get to know the children and the class. Examples are games and exercises to get to know the pupils and individual conversations. Additional: the student intends to set clear rules in class: how do we interact with each other.	*The student takes the information for granted and carries out inquiring activities to find out more about the children.* Activities are focused on getting to know each other, combined with activities whereby both individuals behavior and / or the behavior of the class are inquired. Examples are: observing the class and / or mentor, conversation with pupils, investigating information like pupils results and group plans, making a sociogram. Robin Square is mentioned in all cases.	*The student questions the mentors information. Through inquiry tries to find out if the mentor is correct.* Besides activities focusing on getting to know the pupils, the student mainly pays attention to investigating the behavior of the children in class. The student uses inquiring instruments to find out if the mentor is correct. Examples are: finding extra information in literature or in conversation with the mentor, being critical towards proceedings of the mentor in relation to the pupils and being critical towards their own attitude.

Table 2. Analytical framework task 2, with categories: not critical, slightly critical, critical.

Results

Question 1

For the first question, per category the amount of students being not, slightly or critical, in numbers and percentages on both tests, can be found in Table 3. Given the results, the majority of the students fall into the categories of not or slightly critical. This applies to both the pre- and post-test. The amount of

students not being critical was reduced by a small amount in the post-test, while the amount of students being slightly critical increased a little. In the post-test, three students who are planning to search for literature, combined with inquiring activities, can be found. Most students assume they know how to recognize uncertain pupils.

	Pre-test (n=71)	Post-test (n=71)
three categories of being critical		
Not critical	33 (46.5%)	28 (39.4%)
Slightly critical	38 (53.5%)	40 (56.3%)
Critical	0 (0.0%)	3 (4.2%)

Table 3. Overview students in three categories, pre- and post-test, question 1.

Secondly, we analyzed at student level whether students grew individually in being critical (Table 4). The majority of the students is not more critical in the post-test compared to the pre-test: their scores for pre- and post-test are the same (37) or they are even less critical in the pre-test (14). Twenty students became more critical, two students developed from 'not' towards 'critical'.

	Post-test		
Pre-test	Not critical	Slightly critical	Critical
Not critical	14	17	2
Slightly critical	14	23	1
Critical	0	0	0

Table 4. Overview development students pre- and post-test combined, question 1 (n=71).

The answers in the second category – slightly critical – were divided further, to see what and how many inquiring activities students would like to do to find out whether uncertain pupils can be found in class (Table 5). In the post-test the amount of inquiring activities increased. Activities that are mentioned often by students, are observations and individual talks with pupils. Mainly student results and observations have increased, the latest may have to do with the authentic task that focused on observations. Activities mentioned only a few times, are searching for information or learning results and having a conversation with parents or mentor.

	Pre-test (n=42)	Post-test (n=40)
Collection of information	12 (28.6%)	11 (27.5%)
Students results	3 (7.1%)	9 (22.5%)
Small talk children	30 (71.4%)	33 (82.5%)
Observing	30 (71.4%)	35 (87.5%)
Small talk mentor	6 (14.3%)	10 (25%)
Small talk parents	1 (2.4%)	2 (5%)

Table 5. Number and percentage of students doing inquiring activities, in pre- and post-test.

Question 2

Consequently, the answers on question two – vignette – were analyzed and depending on their answers, students were categorized in being not, slightly or critical. In Table 6 can be seen, that in the pre-test the majority of the students was not critical. These students mainly chose activities focusing on getting to know the children. Students did not ask any question regarding the given information, the information could even have been left out (62%). In the post-test, the majority of the students is slightly critical. They are planning to investigate the given information (50.7%). A small group has a critical attitude. They are wondering whether the information of the mentor is correct: in the post-test 11.3% of the students are critical, in the pre-test only 4.2%.

	Pre-test (n=71)	Post-test (n=71)
Not critical	44 (62.0%)	27 (38.0%)
Slightly critical	24 (33.8%)	36 (50.7%)
Critical	3 (4.2%)	8 (11.3%)

Table 6. Overview students in three categories, pre- and post-test, question 2.

Afterwards, we analyzed at student level if students developed between pre- and post-test (Table 7). 27 students are not more critical in the post-test compared to the pre-test, in both tests they are placed in the same category. 33 students became more critical, while 11 students were less critical in the post-test compared to the pre-test.

	Post-test		
Pre-test	Not critical	Slightly critical	Critical
Not critical	17	25	2
Slightly critical	8	10	6
Critical	2	1	0

Table 7. Overview development students pre- and post-test combined, question 2 (n=71).

Development of students between task question 1 and 2

Finally we used the information from both questions to analyze how students developed (Table 8). We may conclude that twelve students became more critical during the period of the assignment: on both questions they were more critical in the post-test then the pre-test.

	Number of students
Development towards a critical attitude: question 1	20
Development towards a critical attitude: question 2	33
Development towards a critical attitude: question 1 + 2	12

Table 8. Overview development students pre- and post-test combined (n=71).

Conclusions and Discussion

The aim of our research was to gain some insight into the development of an inquiring attitude among second year student teachers. Within the program of practitioner inquiry in the institute for primary teacher education, one authentic task (an observational assignment) was intended to stimulate this development. Before and after the task, students filled in a form with two open questions, in order to answer our research question: Does the assignment "Education for all children" improve student teachers' critical attitude? Having a more inquiring attitude is, following the review of Bruggink and Harinck (2012), operationalized in 'Being critical, is it true. Being doubtful'. We conclude from the results that a relatively small number of students became more critical towards the given information and ask (more) questions. The assignment "Education for all children" therefore unfortunately hardly contributes to the development of an inquiring attitude.

These outcomes are disappointing. Students have been working on an authentic assignment that was linked to their foreknowledge and included a clear description of goals and activities. During the assignment, they were supposed to learn to not just assume ideas and views, instead ask themselves questions and try to find out 'if the given information is true'. Even shortly after the assignment, students show little evidence of 'being (more) critical towards given information'. We may conclude that the development of an inquiring attitude does not take place automatically.

Our participants were second year student teachers, in the first part of their education. We cannot expect them to have a fully developed inquiring attitude. In this particular situation, we assumed students might show a growing inquiring attitude during the period of this research. One possible explanation is the

instrument that was used. The form included two questions with an open character, and although we asked for an explanation these answers were not always profound. On the other side, the second question helped to get close to how students would act in reality and avoid socially desirable answers (Mena Marcos & Tillema, 2006). Secondly, students inquiring attitude is investigated using one characteristic of Bruggink and Harinck (2012). Perhaps the use of another or more characteristics would have given other results. However, the chosen element comes close to the authentic assignment and the phase of the students' education. Another limitation of our research is the short period of time. Therefore we are unable to make statements or predictions about students' development over a longer period. That is a suggestion for follow-up. We also did not take into account the way the teacher educators taught about an inquiring attitude or reinforced it in colleges. This is another suggestion for follow-up research.

Our research made clear students do not develop an inquiring, critical attitude automatically or through one assignment. This attitude is not automatically part of a teacher's identity either. These results correspond with research by Van der Linden (2012) that was also conducted among second year student teachers. In his thesis he recommended teacher educators should more explicitly discuss what an inquiring attitude is and what this attitude means in concrete terms for a teacher in class. From his research it appeared students appreciate a discussion about the 'inquiring attitude' in class, for example by explaining concepts and debating them, and consequently highlighting different opinions and views. Teacher educators may, apparently, not do this often enough: they need to be role models (e.g. Boyd, 2014). If we want to educate innovative professionals – teachers with an inquiring attitude - more needs to be done at the institute for teacher education. However, improvement in our schools should always be our main goal.

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Student teachers' conceptions of learning

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Abstract

The study focuses on the learning theories of student teachers and their beliefs are explored by quantitative and qualitative methods, using metaphor research (Vámos, 2003) and learning questionnaire (Bacskay, Lénárd, L. Ritoók and Rapos, 2008:152-153). The aim of the study is to investigate student teacher learning theories, the possible differences in beliefs between full-time and part-time student teachers and the possibility of changes in beliefs during their programme. The results suggest that student teachers believe not only constructivist, but also objectivist learning theory. Furthermore there appear to be differences in the learning theory of full-time and part-time (correspondent) students and certain changes of attitude could be observed due to the teacher training. It seems possible to make teacher students face their different learning concepts and some basic conceptual changes may occur. Positive alteration in attitudes and motivation towards pedagogy and teaching methodology is expected.

Key words: theory of learning, teacher training, metaphor analysis

Introduction

Today, classes are filled with children who prefer interactivity and diversity to traditional forms of education. Traditional textbooks, courses and teaching methods - generally speaking – the forms of education itself are becoming less and less adapted to the new requirements. Some teachers have started to apply up-to-date technology, and this also demands significant change. Current pedagogical approaches and programs usually rely heavily on learning and teaching methods developed during the 19th and 20th century. Contemporary alternative teaching programs have appeared in the last decades, for instance cooperative learning, project and epochal education, Complex Instruction Program (CIP) and RWCT (Reading and Writing for Critical Thinking). The aim of this paper is to explore the learning theories held by student teachers and how these might change during their programme. The paper analyses the results from two parallel empirical investigations of student teachers carried out in the spring of 2015.

Interpretations of teaching and learning

It is usually claimed that any teaching practice should be supported by some theory or model. As Savery and Duffy (1996) note "*there is nothing so theoretically interesting as good practice.*" Indeed a number of theoretical approaches have emerged during the history of education, which focus on the teaching and learning process. The three major pillars of learning theory are: behaviourism (learning is based on stimulus and response); cognitivism (knowledge is organized in memory, learning is guided by attention, processing and integration of the information, making it possible to be recalled); and constructivism (constructing knowledge is seen as a process of learning, where learning and problem solving are realized effectively with partners). It is indisputable that all three learning theories can be justified in pedagogy, the elaborated analysis of which exceeds the framework of this study. In the past decade, a new approach has appeared associated with network-based learning, i.e. connectivism. Connectivism is a *"student-centred, irregularly organized form of learning based on the student's autonomy and spontaneous exchange of knowledge, which is not hierarchical, but diverse, decentralized and multi-channel; it develops students' creativity by encouraging students to collaborate"* (Forgó, 2009:94). For the iGeneration, the use of digital devices is widely spread, they possess the core ICT competencies and are familiar with the World Wide Web. There is a growing need for information acquisition and transfer supported by electronic tools. Meeting the above-mentioned demands, learning based on network or connectivism became prevalent in educational research and practice. Network-based learning refers to the use of network theory pedagogy (Kulcsár, 2009). The main features and activities of connectivism are presented in Table 1:

Features of connectivism	Activities preferred by connectivism
◉ established in informal frames ◉ organized by students' learning pace and their own methods of attainment ◉ discovery method ◉ the teacher as a supporter	◉ use of community places ◉ community content development ◉ concept maps ◉ content aggregation ◉ reflection ◉ inspiration

Table 1. Characteristics of connectivism (Kulcsár, 2009)

Kulcsár's (2009) theory is undeniably modern and necessary for teaching and learning facilities to organize the learning process. A comparison of the four theoretical concepts of the interpretation of learning mentioned above was carried out by Kulcsár (2009) illustrated by Table 2.

	Behaviourism	Cognitivism	Constructivism	Connectivism
Way of learning	observer, behaviour centred	structuring modelling	social contract individual meaning	network based interpretation of patterns
Influential factors	feedback, reward, punishment	existing schemes, experience	commitment, participation	depth and strength of network connections
Role of memory	repetition, engraving	encoding, storage, retrieval	recontextuali-zation of prior learning	adaptive patterns
Techniques of transition	stimulus--response	duplication of knowledge by structuring	socializing	connecting with the existing nodes
Typical learning situation	task oriented learning, frontal teaching	reasoning, problem solving	open ended tasks	concept maps, inclusive studies

Table 2 Learning Theory models (Kulcsár, 2009)

The 21st century student

Children of today are born in a fairly modernized world demanding the use of technology at a high level. For the young generation network-based learning specified by connectivism and memorising by adaptive patterns are really necessary in view of the possibilities provided by the Internet, tablets, laptops and smart phones. Even a 2-3 year-old child is familiar with the use of smart phones or computers. Teenagers cannot keep up with their peers without the daily information on Facebook and Twitter. The question arises: what are the characteristics of students and their learning styles and methods in this new age? Prensky (2010) used the "rocket" metaphor regarding children in the following list of features:

- expect an immediate response
- fast and easy to decide
- not afraid of change
- developing rapidly
- utilitarian
- "multi-channel" attention
- manage the ICT tools in a professional manner.

On the basis of these properties, it is worth considering methods which help students of the rocket type learn effectively. As an active user of the information - communication technology (ICT) tools, multimedia and social networks in the process of learning - multi-media content could play an essential role, which is combined with networking and the needs of information sharing. Students are open to cooperation, but there is a strong demand for self-study as well. In both cases it is noticeable that they would be anticipating feedback regarding their work. However, a disadvantage resulting from the use of information communication devices occurs in children's situational use of language and time management flows. In the light of all this knowledge and experience, learning and teaching is to be reinterpreted in accordance with the new conceptions, in addition, the methodology has to be adapted to students' personalities and their specific features determined by technological and social changes.

It can be said that ICT tools literally serve as a means for the teacher, but they cannot replace methodological solutions, consequently, they should be used in a supplementary way. It can be emphasized that the constructivist pedagogical approach (which is based on the creation of self-knowledge and its construct) and collaborative learning principles can offer effective and enjoyable ways to organize school work. The development of personal and social skills are greatly supported by educational (either school or training) methods that use group work, collaboration and tasks that require problem solving. Several studies seem to confirm that not only self-knowledge, tolerance for others, interoperability and responsibility, but also school performance is increased by using appropriate learning programmes based on cooperative methods (Józsa &Székely, 2004; K. Nagy, 2012; Kagan, 2009).

In Hungary, new trends in pedagogical practice emphasizing social skills have been applied and researched in a number of public educational institutions (Arató & Varga, 2008; K. Nagy, 2012; Molnár, 2015). These tendencies are rooted in Kagan's cooperative approach, drama-method, problem-based learning, Complex Instruction Programme (CIP) and Reading and Writing Critical Thinking Development (RWCT) methods as well. The common feature of these educational opportunities is collaborative problem-solving in a teamwork frame. Evidently, each approach is unique and often based on a philosophical theory in order to achieve one or more objectives, however, their implementation and realization are often

in congruence. As a consequence, a competent teacher is needed who is aware of the responsibility for choosing the right method and the right tools for the content: 'what and why' as a key to effective teaching of each student or group of students.

Metaphor as qualitative research methodology

Metaphor analysis as qualitative research methodology applied in pedagogy and education has become widespread in the last two decades. The overall interest in the study of metaphors was stimulated by the work of Lakoff and Johnson (1980) who claimed that metaphors are much more than linguistic patterns: metaphors have the opportunity to express the structure of thought. Other experts (Kövecses, 1998; Feldman-Narayanan, 2004) declare metaphor as a comparison which shows how things that are not identical in some way can be similar in another way. According to Oxford et al. (1998:4) metaphor "*involves employing a familiar object or event as a conceptual tool to elucidate features of a more complex subject or situation*." As Vámos (2001a) explains, metaphor is created on the basis of common properties between two entities.

One of the latest definitions of metaphor focuses on the process leading from previous knowledge to new concept. According to Zhao, Coombs and Zhou (2010:381), *"metaphors are not just figures of speech, but constitute an essential mechanism of the mind allowing the modelling and reification of prior experience. Thus, metaphors can be understood as a psychological modelling experience leading to new forms of conceptual insight"*. Shuell's (1990: 102) gives quite an unusual but very emphatic, significant description stating that "if *a picture is worth 1,000 words, a metaphor is worth 1,000 pictures*." It can be recognized that metaphor has become an essential phenomenon since it has developed from rhetorical, stylistic effect to cognitively significant expression.

The question arises as to why and how metaphor-analysis can function as a research method in order to explore educational problems or conceptions. Although Moser (2000) highlights how metaphor analysis can be appropriate for a multifaceted research perspective in psychology, we also accept the following assertions in pedagogical research:

- Metaphors influence information processing.
- Metaphors are a reliable and accessible operationalization of implicit knowledge.
- Metaphors are holistic representations of understanding and knowledge.
- Metaphors are examples of automatic action.
- Metaphors reflect social and cultural processes of understanding.

Vámos (2001b) specified the relationship of metaphor, language and pedagogical thinking. The basic idea affirms that identifying and evaluating metaphors conveys

implicit assumptions into awareness or inspires personal reflection. Consequently, metaphors on certain topics or given key concepts offer some insights into individuals' views and assessments. As stated by Thomas and Beauchamp (2011), the poetic language of metaphor permits the participants to step back out of everyday language.

As a result of the previous statements and descriptions, metaphors also offer a proper and adequate research tool in order to explore educational concepts, views and beliefs. Metaphors can shape any personal practical knowledge and outline the understanding of different educational concepts. Metaphor analysis has the opportunity to increase the real identification of educational problems and thus encourages perspective-consciousness. Many researchers emphasise the meaning and background connotation of 'learning', 'teaching' (Vámos, 2003; Saban-Kocbeker-Saban, 2007; Szántó, 2012) 'learner' and 'teacher' (Bullough- Stokes, 1994; Oxford et al, 1998; Dudás, 2006) or 'language teacher' (Wan, Lowa & Li, 2011; Khodadady-Moghaddam-Azar, 2012; Trentinné, 2016).

In Hungary, metaphor analysis as qualitative research methodology in the field of education has been introduced since the beginning of the 2000s (Szabolcs, 2001; Vámos, 2001, a,b) and for some years increasingly metaphor analysis and results have been published in accordance with pedagogical concepts and principals (Kisné Bernhardt, 2011; Szántó, 2012; Trentinné, 2016).

Metaphor research on the concept of 'teacher'

Many qualitative research projects on language teaching use metaphor analysis to define what 'language teacher' or 'teaching' means to students or educators. Oxford et al. (1998) investigated metaphors according to the concept of 'teacher'. They focused on various perspectives such as narratives by teachers and students, interviews, articles and texts by education theorists and methodologists. The metaphors can be grouped by the following: Teacher as Conduit, Nurturer and Competitor. The authors distinguished the metaphors in a four-part typology: Social Order, Cultural Transmission, Learner-Centred Growth and Social Reform. One of the main results of the survey is that metaphors proved the 'multidimensionality of the learning process and the complex of social philosophies and psychological theories that underlie the aims and methods of teaching' (Oxford et al., 1998:45). Using the metaphors developed by Oxford (1998), Furcsa (2008) expanded these metaphors describing teachers' roles in a class of children with low socio-economic background. She concludes that by using metaphors and visuals images, a more detailed interpretation of the roles and responsibilities of the teacher can be presented, furthermore, the relationships between the teacher and the pupils can also be analyzed in a deeper and more expressive way.

De Guerrero and Villamil (2000) asked 22 participants to define an English as Second Language (ESL) teacher and they differentiated the given 28 metaphors into 9 categories: teacher as cooperative leader, provider of knowledge, agent

of change, nurturer, provider of knowledge, innovator, provider of tools, artist, repairer, gym instructor. Wan et al. (2011) compared the notions between 70 Chinese students and 33 English as a Foreign Language (EFL) teachers, and eight categories could be characterized: teacher as provider, instructor, nurturer, culture transmitter, authority, interest arouser, devotee, co-worker.

Saban et al. (2007) used metaphor analysis for the concept of 'teacher'. Participants (142 prospective teachers in Turkey) could specify their conceptualization of teaching and learning. The roles of the teacher can be defined as: social order (teacher as manufacturer, mechanic of the mind, sculptor); cultural transmission (teacher as conduit, television set, shopkeeper); learner-centred growth (teacher as nurturer, scaffolder, counsellor); social reform (teacher as learning partner, cooperative leader, coach). Another 10 conceptual categories were differentiated by the authors (Saban et al., 2007:136-138) and they claimed that 'a wide range of metaphorical images... reveal multiple realities of a 'teacher' and no single metaphor that can best capture all of the complexities of teaching' (Saban et al., 2007:134).

Nikitina and Furuoka (2008) examined metaphors about language teachers written by a group of 23 Malaysian university students. Three main groups were defined, such as 1. 'teacher as caretaker' (mummy, nurse, nanny), 2. 'teacher as essential element' (vitamin, water, sunshine, computer operating system) 3. 'teacher as giver' (candle, ant, plant or animal, cook, God of passion). The wide range of metaphors suggest that there may be fewer constraints concerning the choice of teaching method, materials and classroom activities.

In a recent survey Şimşek (2014) analysed 138 metaphors about language and English language teaching. Positive results show that there is a '*moving from the traditional conceptions of language as structure and teacher as moulder/knower to the modern understanding of language as communicative tool and teacher as facilitating partner*' (Şimşek, 2014:244).

According to the research of Vámos (2003) 'the teacher' is animal trainer, pen, coach, seller, housekeeper, guide, conductor, trader, gardener, artist, sergeant, pilot, actor, sculptor, servant, parent, host. It is specific in all cases that teacher: exists in a special place, is active, and is connected with special people. The teaching-learning activity has aims, tools and results.

Another, more extensive survey by Vámos (2003) provoked metaphors by completing the following: 'If school is theatre, then the teacher/teaching/pupil/learning is ....' in order to gather 255 university students' views on educational concepts. In the responses, director-actor was given to the teacher key concept and actor-audience pairs to the roles of learner. The concept of school was abstracted as a space of preparation and of being prepared or as a journey explaining that *'the teacher is an adult possessing professional knowledge necessary for creating something, one who is able and willing to direct and influence the process of emergence and progress*' (Vámos, 2003:108). The teacher metaphors contained the concepts of director, actor, conductor, and performer.

The learner's metaphors were the following: actor, audience or prompter and the analysis of the given words suggested that learner is a small creature, the subject of domination, defenceless, or raw material to be processed. Teaching and learning could be connected with the idea of a future objective or product.

Metaphor research on the concept of 'learning'

Research has shown that teacher students come to teacher education with significant prior experience, knowledge and beliefs about the learning-teaching process. These former considerations often have more influence on teachers' teaching methods than their learning during teacher training (Hunyadiné, 1993). Moreover Farell argues that future teachers '*take these prior beliefs into account because any new material taught will have to compete with these existing beliefs and theories*' (2006: 236). In order to explore teachers' previous convictions metaphor can perform as a suitable qualitative tool besides the following methods: Think Aloud Protocol, Critical/Reflective Thinking Protocol, Concept Mapping, Interview, and Portfolio. This section reviews metaphor based research on conceptions of 'learning'.

Şimşek (2014) examined 70 language and 68 teacher metaphors using the framework developed by Oxford et al.' (1998) in order to explore concepts and convictions. Among 37 sophomores (aged 19-21) functional and interactional views of language were highlighted by 70% of the metaphors. 54% of the concepts showed a learner-entered view of teaching, the behaviourist view was maintained by 46% and none of the participants supported a participatory view of teaching.

Lawley and Tompkins' (2010) survey can be claimed as a starting point since they stimulated a metaphor for learning only from ten - randomly selected - adult students. The concepts for learning expose the difference of student's symbolic representations for how they learn. For example it seems that no learning exists in the 'light bulb' metaphor until the light is switched on, but the 'savings account' idea accumulates knowledge. While the 'playing cards' concept tries to find patterns, the 'detective' student needs relevant information in advance for his investigation. The student on a 'quest' needs to notice new things at each step of learning process, on the contrary the 'planting flowers' student would like the seed of an idea. Although not representative, this research provides some insight into how people think of learning.

Dudás (2006) concluded that students' learning concepts are associated with similar ranges of words and phrases: interpretation, synonyms, goals and features. Most of the associations are concerned with the effectiveness of students' learning (interest, motivation, diligence, transfer of knowledge, teacher's individual performance style).

Through metaphor research Vámos (2001a) argues that students consider teaching, but not learning, as a part of life. 255 university students provided metaphor responses to the concepts of school, teacher, learner, teaching and learning. The metaphor of school as theatre acted as the basis of the survey. The

concept of teaching was related with direction and performance/play, while learning was associated with rehearsal and performance/reception/watching. The metaphors for learning were recognized as: preparation for the show, reproduction; and watching the show, reception.

Szántó (2012) used the same method with spontaneous (teacher/teaching/pupil/learning/school is like…; because...) and provoked (If school is a theatre, then the teacher/teaching/pupil/learning is....) metaphors in the same approach as Vámos (2001b). Huge numbers of metaphors were explored (n=1321) and according to the results the professional thinking of teacher students are similar to everyday thinking: teaching performs as knowledge providing, the teacher as the transmitter of knowledge, students as passive recipients of information and learning as a process of acquiring knowledge. Learning based on provocative metaphors can be seen as: active, creative activity, (e.g. acting, sculpture making, playing, practice); passive, receptive activity (e.g. effects , stage, high-quality performance, cabaret, pieces of drama, sale, distribution); competition (e.g. goal, winning , prize, struggle, progress, obstacle); and product (e.g. supply, product, rooms). Learning based on spontaneous metaphors can be perceived as: having new knowledge (e.g. meal, thirst, sponge, bag filling, working, development, acquisition); activity (e.g. life, magic, treasure, stairs, ladder); endless process (e.g. endless line, eternity, bottomless lake, book); and entertainment (having fun, merry-go-round). Most of the concepts are in connection with new information and knowledge (33.3%) and activity (37.4%). It is interesting but not surprising that only 12.2% of the participants think that learning is a product of a process or entertainment (6.2%). As Szántó (2012) summarizes, most of the students associate learning process with getting knowledge and information as in behaviourism (510 metaphors), fewer concepts refer to cognitivism (299 metaphors) and only a few concepts can be related to constructive pedagogy. She added that if students' awareness can be raised that their current views on learning are inadequate, their learning process will be more effective.

In connection with our research on the metaphor of 'learning' (discussed below), the results of Martinez, Sauleda and Huber (2001) must be mentioned and detailed. They explored the metaphorical conceptions of teaching and learning given by experienced elementary school teachers and fourth-year teacher-education students. Three theoretical perspectives were differentiated consistent with the findings of the study: (1) the behaviourist perspective, (learning as a passive process of knowledge acquisition) (2) the cognitive perspective (learning as an individual process of schemata construction) and (3) the socio-cultural perspective (learning as an authentic participation in the activities of a social community). As a result, more than half of the participants (57% experienced teachers, 56% prospective teachers) chose behaviourist perspective metaphors (e.g. "Learning is like a detective who looks for things and into things"). Constructivist metaphors were stated by 38% of experienced teachers and 22% of prospective teachers. Last, but not the least 22% (prospective) and 5% (experienced) of the teachers conceived teaching and

learning as a social process (e.g."Teaching is like a tourist guide who negotiates a route with the tourists") in the research.

Although Farell's research (Farell, 2006) can be considered as a pilot-survey because of the small number of participants, in his metaphor analysis it has been confirmed that many concepts of 'learning' (for example 'learning is a mission' (Farell, 2006:243) did not change during the educational process of language teachers.

Keeping with the previous results we conclude that metaphors can expose a multitude of learning conceptions. Identifying, analysing, and critically reflecting on metaphors helps make the prior beliefs of student teachers explicit, and this needs to be distinguished in the learning and teaching process.

Methodology

Based on the above described philosophy of learning, the aim of our empirical research was to explore teacher students' conceptions of learning, typically not conscious beliefs which may influence their educational and teaching activities.

Our research questions were as follows:

a) To what extent do student teachers hold both the objectivist and the constructivist philosophies as theories of learning?
b) Is it possible to observe discrepancies between the conceptions of learning of full-time and part-time student teachers?
c) To what extent do student teachers' conceptions of learning change during the course of their studies.

The sample of the research consisted of full-time (*N*=55) and part-time (correspondent) (*N*=24) students studying to become teachers at the Faculty of Applied Pedagogy and Arts, Szent István University. The methodology of the research included both quantitative (survey research) and qualitative (metaphor analysis) forms. The quantitative tool of the research was a validated, 17-item questionnaire focusing on learning and information retrieving (Bacskay, Lénárd, L. Ritoók & Rapos, 2008:152-153). In our metaphor analysis, students were asked to complete the following sentence: 'Learning is like … because …'. The aim of this analysis was to help to reveal the less conscious opinion and attitude in reference of the source concept. i.e. learning.

Metaphor Analysis

When presenting the results, first the findings of the metaphor analysis are described (*N*=76). The spontaneously evoked metaphors concerning concepts of learning

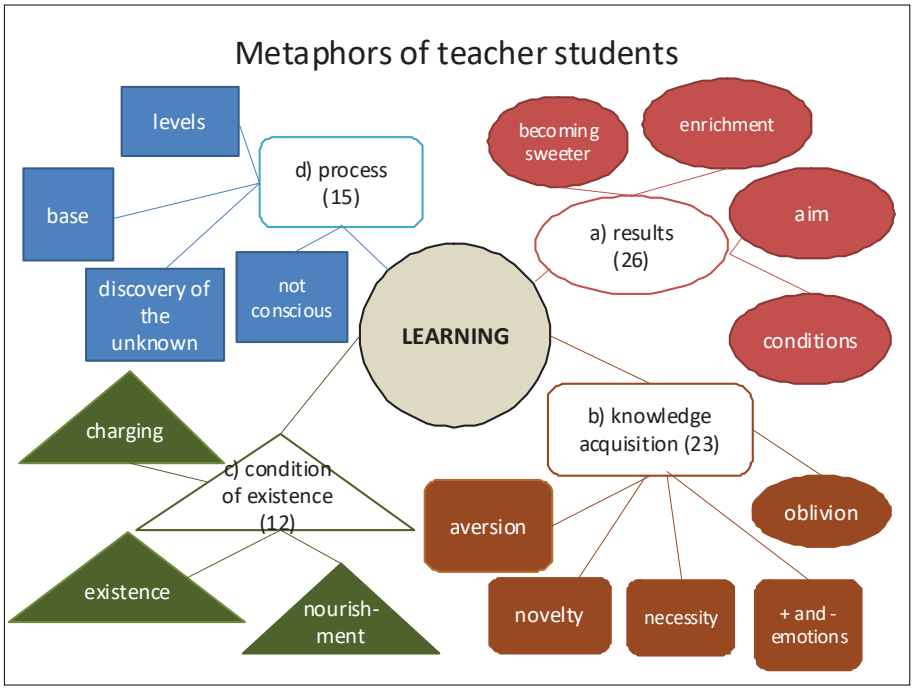

Figure 1. Learning Metaphors of Student Teachers

can be divided into four conceptual categories: 1. results (*N*=26), 2. knowledge acquisition (*N*=23), 3. base of existence (*N*=15) and 4. process (*N*=12).

In terms of the category of **results**, learning is seen as a positive and good process (*becoming sweeter*) that is *making you richer*, which means it is seen as a definitely enjoyable and useful activity. Although it is bound to certain *conditions*, an identified *aim* can be reached by learning. The subcategory of **knowledge acquisition** indicates the feeling of *necessity* and *novelty*, but also the *aversion*, the *oblivion*, and the implication of *positive and negative emotions*. An attitude indicating most doubts and insecurity is possibly attached to this concept. The metaphors evoking concepts as **the condition of existence** were grouped in the sub-category of the third conceptual domain representing the sub-category of condition of *existence*, *nourishment* and *charging*. The **processive nature** of learning was emphasized by thoughts indicating the *discovery of the unknown*, and it appeared that in the course of learning the *levels* built on each other are essential, similarly, the significance of the *base* also implies signs of the knowledge content of building. It can be uncovered in this category that learning is often a not *conscious* process for students.

The subdomains of the main conceptual domains and the metaphor collections of these groups can be seen in Figure 2 and Figure 3, which were categorized on the

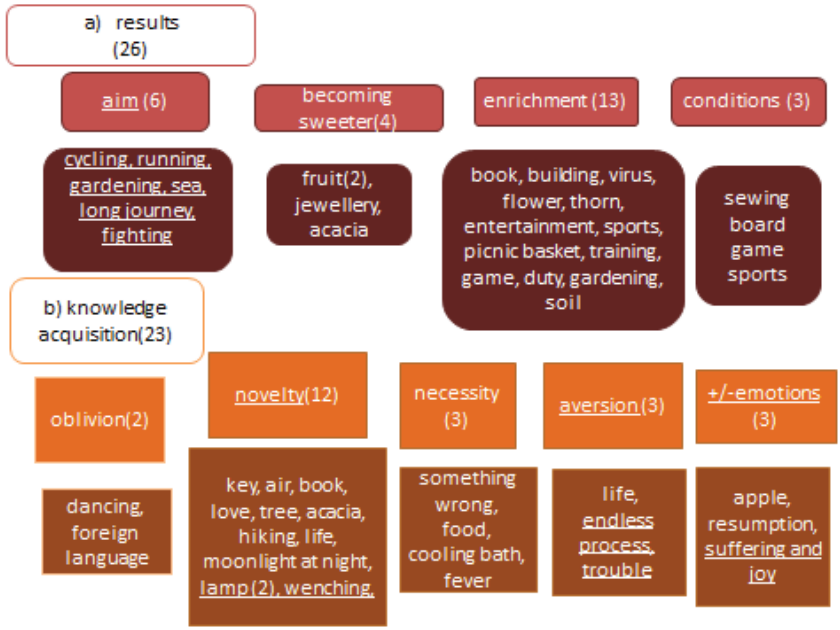

Figure 2-3. Classification of student teacher metaphors

basis of thoughts and explanations belonging to the metaphors. In the domains, the concepts of part-time students are marked by underlining. This picture seems to point out that this is the only form of training which denotes learning as an aim. The reason for this pattern is the fact that part-time students had started their studies usually in an older age as adults, as a consequence, getting the degree is their real aim, which has a more important role for them than for the usually younger, full-time students emphasizing the importance of instrumental motivation of getting or preserving their workplace. It is also typical that the possibility of the idea that learning can become better and better, in addition, it can also have certain conditions, can only be found in the responses of full-time students. In the domain of **knowledge acquisition**, full-time students indicate each subcategory, however, for part-time students the novelty and aversion are formulated. The possibility of oblivion is present only for the full-time students, which can be interpreted as an important finding. The association to the condition of living can be found in the groups of both full-time and part-time students, nevertheless, the conceptual subgroup of nourishment is typical only for part-time students, and the conceptual subgroup of charging is characteristic of full-time students. Assigning learning as a process is dominant for full-time students, only 5 out of the 15 expressions belong to part-time students. Another reason for this can be that the process of learning has been continuous and uninterrupted; these students take part in life-

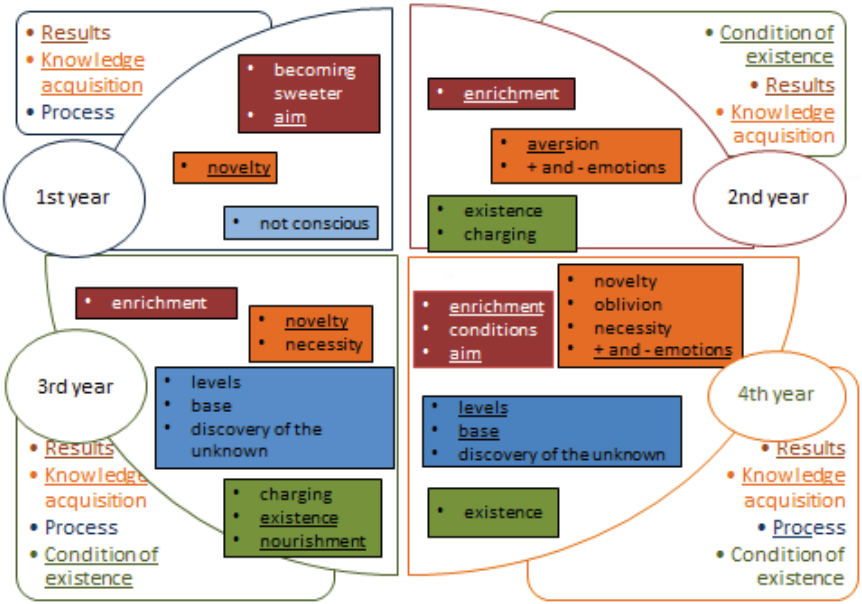

Figure 4. Comparison of metaphors in terms of years of study

long learning. In case of the association of some full-time learners, learning is seen as a not conscious process. Based on these data, the second hypothesis can be regarded as established.

The pie chart in Figure 4 shows the change of the students' learning conceptions in terms of years of study. In this case, the focus of inquiry was whether their ideas towards learning had changed during the training. The significance of this process must be stressed because concepts of learning are important elements of their methodological training and teaching practice. Figure 4 shows clearly that the interpretative concepts of the students become more extensive and the concept of learning is seen in a wider sense and in more aspects. The approach of learning as leading to **results** plays an important role in all four years and in both full-time and part-time training. However, the sub-category of achieving an aim can be found in the input and output years, probably because of the excitement and insecurity of the starting and finishing sections of the studies. The personality shaping and enrichment factors are present in all the four years and both training forms. Learning as a basic and existential condition of life is becoming a more and more vigorous part of everyday life during the training, considering that is not an important viewpoint of 1st year students. It is understandable as teaching is becoming gradually their profession (the course 'teaching practice in group' begins in year 2, and the course 'individual teaching practice' starts in year 3), in this way learning can be interpreted

not only from their own point of view, but also from their pupils' aspect. The concept of **knowledge acquisition** can be perceived in the first two years only in the case of part-time students. The subgroup referring to necessity is becoming stronger in the second part of the training, i.e. in the last two years. A reason for this can be the approach of obtaining a teaching degree, which also incorporates demonstrating their own high-standard capability of teaching. The **processive nature of learning** is becoming more accentuated during the course of years. It appears only in the 4th year for part-time students, and in the 3rd year for full-time students. It is totally absent in the 2nd year, whereas the students refer to the unconscious nature of the process in the 1st year. Based on the above data and analyses, the 3rd hypothesis can be regarded as established.

In the following section, the data analysis and hypotheses testing of the learning questionnaire in Figure 5 will be presented. Students had to evaluate 17 statements on a 6-point Likert scale to express how much they agree or disagree with a particular statement. The questionnaire included pairs of statement related to the *formation of knowledge*, the *reality of true or false*, the *logic of learning processes*, the *naïve personality theory*, the *self-directed learning* and the *relation to problem solving*.

In order to investigate the process of knowledge formation, the 1st statement was formulated to express the transfer of knowledge, the transport of the essence of notion, while the 15th statement expressed the construction of knowledge. When answering the question which the prevalent view of our learning is, the usual answer is the first statement. For both statements 4.45 and 5 points were given by the students, which means that they share both the objectivist and the constructivist viewpoints. In terms of years of study, a positive change of attitude can be observed as in the 4th year fewer students agree with the objectivist viewpoint. In the case of part-time students, the principle of knowledge construction becomes more important, whereas it cannot be observed in the responses of full-time students. Consequently, the first hypothesis stating that both the objectivist and the constructivist viewpoints are characteristic is established.

The following pair of statements investigated the serious question of true and false reality (statements 4 and 16): "*What can be considered truth actually? The systems of logic using these concepts consider the statement which is equal to the facts as true. In this way, this is a case of mapping in every case between the independently (more precisely independently of truth seeking) working phenomena of objective reality, its processes and the judgements and statements based on them. The problem is that interpreting this mapping is a difficult task.*" (Bacskay, Lénárd, L.Ritoók and Rapos 2008:154). Both the full-time and part-time students indicated a minor agreement giving 3.1 and 4.3 points to the ideas, students agreed with the 4th statement to a lesser degree during the training signifying a declining tendency, whereas the

results of the 16th statement showed an upward trend. No such change can be observed in the case of part-time students.

Statements 2 and 9 referred to the directions and logics of learning processes. The 2nd statement included a constructivist and holistic viewpoint putting an emphasis rather on deductive processes, while statement 9 indicated a more traditional and inductive logic. Students valued the inductive logic higher giving 4 points to the deductive approach and 5 to the inductive approach.

Four statements were formulated to test students' opinions on naïve personality theory, i.e. the problematic of talent and diligence. Statements 8 and 14 referred to the ideas when the teacher accepts abilities as unchangeable features and diligence as a feature which can be influenced exclusively by the learner. The concepts of children with high abilities but low diligence and children of low abilities but high diligence may be based on this opposition. Students totally agreed with statement 8 giving more than 5 points on the average, although the tendency seemed to decrease slightly during the training. Interestingly, a similar way of thinking can be observed in statement 14, however, fewer points were awarded by the students.

Statement 5 calls attention to situations when the talent remains hidden and cannot be unfolded due to the circumstances (for example social condition) of the learner, which is not the fault of the learner. The highest score was awarded to this idea (4.46 – 5.50) by both full-time and part-time students, and this view was mostly supported by 3rd year part-time students.

Statement 10 formulated an optimistic pedagogical alternative which should be shaped by the end of the training. This view was supported by the students indicating a strong agreement of 4.25 – 5.25 points.

Statements 3 and 11 investigated students' attitude to social learning. They agreed slightly and moderately with individual learning (2.25 – 4.18), whereas the possibility of group learning was clearly supported. Based on statement 11, the 1st hypothesis can be established, however, the 2nd hypothesis should be refuted.

The essence of self-directed learning was investigated in statements 7 and 12 specifying that the understanding and possibility of alternative ideas should become obvious for everybody. Students' views do not appear in a uniform manner considering that they agree less with the possibility of self-directed learning (statement 7) than with statement 12, and this view does not seem to change during the training. Full-time students show a decreasing tendency of agreeing with statement 12.

Students' relation to problem solving was explored with three statements (statement 6, 13, 17). Statement 6 summarizes the relation in which the problem itself is identified with the task, problem solving concentrates using an algorithm already known. Statement 13 involves basically the same idea as statement 5, however, it is expanded by the practical use of knowledge obtained at school. In contrast, statement 6 had high average scores than statement 13, students strongly agreed with this statement in both types of trainings. Statement 17 refers to the

Learning questionnaire (Bacskay, Lénárd, L. Ritoók and Rapos, 2008:152-153)	Full-time students				Part-time students			
	1	2	3	4	1	2	3	4
1. We learn in the way that knowledge gets into our head by any method eg. reading, listening, experiment or observation.	5,13	4,50	4,65	4,45	5,00	5,00	3,75	4,60
15. We learn in the way that we create knowledge by thinking or understanding. Learning is assisted by observing, reading, listening to the teacher's explanation.	5,13	4,88	4,65	4,09	4,36	4,75	4,50	5,00
4. If I know something, it is considered to be true or false. Although it is not easy but possible to check it.	3,5	3,4	3,1	3,1	3,9	4,3	3,3	3,6
16. It can never be claimed that the knowledge I have got is true - completely irrespectively of me.	3,75	3,73	4,05	4,00	3,44	2,75	3,00	3,40
2. We are permanently getting to know the whole world, however, at a young age it is not so clear and detailed. Our overall knowledge will become more detailed and richer, furthermore, it will be transformed later on.	4,13	3,13	3,80	3,64	3,45	3,75	4,25	3,80
9. Firstly, we come into contact with the simpler and more concrete things with the help of our experience. More complicated and abstract knowledge arises from the simpler one, like a house is built from bricks.	4,75	4,63	5,20	5,09	4,64	5,50	5,25	4,60
5. There are children who live in poverty that is why their talent cannot develop even if they are diligent.	4,88	4,56	5,00	4,64	4,82	5,00	5,50	5,00
8. There are children who are talented but not diligent. They would be able to get high results at school but they are not successful because of their laziness.	5,25	5,31	5,50	5,09	5,27	6,00	5,25	5,00

Learning questionnaire (Bacskay, Lénárd, L. Ritoók and Rapos, 2008:152-153)	Full-time students				Part-time students			
	1	2	3	4	1	2	3	4
10. Anybody, who is healthy, would be able to get high results in learning. Their skills can be improved in their life.	5,25	4,38	5,05	4,27	5,09	5,25	4,25	4,80
14. There are students who are very diligent, but they are not too smart. They can get high results at school but they will never be prominent scientists.	3,50	4,75	4,05	3,64	4,09	4,50	4,00	3,80
3. Learning can only happen by ourselves. Learning with others can be worthy if we help each other or share our knowledge with our mates.	3,25	3,81	3,20	2,36	4,18	2,25	3,00	3,00
11. Learning can effectively process if we solve problems, argue with each other and discuss about the tasks.	5,50	4,81	4,95	4,82	4,73	5,50	4,75	4,60
7. It would be beneficial if students would be engaged in decisions about what and how to learn and how to evaluate.	3,13	3,88	3,45	3,00	3,82	2,50	4,00	2,80
12. In the school our teacher tells what and how to learn, what requirements to fulfill and how to be evaluated. It is totally natural.	4,38	3,69	3,75	3,73	4,27	4,75	3,50	4,40
6. If I get a task at school, I always think how I have learnt to solve this type of exercise. I try to use the method I have been taught.	4,38	4,44	4,30	4,18	4,55	4,50	4,25	4,60
13. We learn at school how to find a solution if we face a problem in our life.	3,75	3,63	3,75	3,09	3,18	2,75	4,00	4,20
17. School cannot teach us how to solve all problems. We should be taught how to start to solve a new, unknown problem.	5,13	4,88	4,85	4,73	5,55	5,75	4,25	4,20

Figure 5 Learning questionnaire results for full-time and part-time students (years 1-4 of study)

possibility of new, alternative ways of thinking, surprisingly, the highest score (4.25 – 5.75) was awarded to this statement in the whole questionnaire, in every year of study, and also in case of full-time and part-time students.

Discussion

In this section the research questions will be discussed in turn before a more general discussion of the findings.

Research Question 1

The metaphor analysis and also the findings of the learning questionnaire indicate that students' learning conceptions can be characterized by both the constructivist and also the objectivist learning theory.

Several signs referred to the discovery of new knowledge in the explanations of the metaphors: ***novelty***, ***enrichment***, ***knowledge discovery***, ***not conscious*** subcategories. In the questionnaire, statements 1, 15 and 11 pointed to the different viewpoints.

Research Question 2

There appear to be some discrepancies between the learning conceptions of full-time and part-time students. This was suggested by the metaphor analysis:

- part-time students: conceptual subcategories of ***aim***, ***novelty***, ***aversion***, ***nourishment***
- full-time students: conceptual subcategories of ***becoming sweeter, bound to certain conditions, oblivion***

However the findings from the questionnaire did not display significant differences between full-time and part-time students.

Research Question 3

Students' conceptions of learning appear to change during the course of their studies. This finding was established by the metaphor analysis, however, the questionnaire study did not support it. The metaphor analysis revealed that the conceptual notions of students expand and they interpret the concept of learning from more numerous and wider aspects. The subcategories of ***base***, ***necessity***, ***processive nature*** appear or become stronger for them. The questionnaire study did not indicate any significant differences of learning conceptions during the training.

It can be stated that the aim of the research was accomplished by using both qualitative and quantitative methods of research. Considering the findings, the

analysed metaphors and the ways of thinking and attitudes revealed by the learning questionnaire contribute to a deeper insight into the learning concepts and beliefs of teacher students, which influence their educational and teaching practices.

Conclusions

This study explores the learning theories held by student teachers and how these might change during their programme. The purpose of the paper is to inform the thinking and practice of university-based teacher educators to help enhance the experience of student teachers. The empirical study confirmed the previous results (Martinez, Sauleda & Huber, 2001; Farell, 2006) indicating that trainee teachers (and also experienced teachers) fundamentally believe in the omnipotence of knowledge, specifically, this knowledge can be planted into the children's head. Some of the students have no intention to construct knowledge, consequently, they tend to neglect ways of learning which are based on cooperation, and fail to make use of the advantages of group work for instance. This study has shown that it is worthwhile to investigate teacher students' views, opinions and attitudes towards the concept of learning, as it can serve as an important starting point during training. On the other hand, teacher students should be encouraged to acquire teaching strategies which ensure efficient and successful educational practices during their theoretical and practical training. Developing personal and social competences of learners should be stressed in the 21st century (Furcsa, 2008; Kagan, 2009), and for this aim, the use of modern educational methodology (cooperative methods, project teaching, drama pedagogy, complex instructional teaching, reading and writing for critical thinking and others) should be promoted. Both the didactic and also the methodological content of teacher training should focus on transmitting these programs and innovative methods. For future teachers it can be exceptionally useful if in addition to theoretical knowledge, they manage to know and use a wide range of modern approaches teaching.

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I.AM for Teaching: The culturometric 'Identity Affirmation Model' for teaching and learning

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Abstract

This chapter formalises identity inquiry-based learning as comprising reflection, collaboration and management inquiry-based learning as requirements of teachers' professional identity development and prerequisites for competence in culturometric committed communication applied to teaching and learning. This is the Identity Affirmation Model (I.AM) for teaching and learning. The chapter also notes a burgeoning literature calling for the development of teachers' professional identity and a restructuring of traditional teacher training programmes to be founded on an evidence-based holistic scientific theory giving more defined teaching/learning methods structure and coherently integrating recent relevant findings with current content and expertise of teacher development. Here we present a generic international solution to these problems by taking a spiral curriculum approach of (i) know yourself, (ii) know others and (iii) manage others to reorder existing content and expertise of teachers' training as matching pedagogic applications of (i) reflection inquiry-based learning , (ii) collaboration inquiry-based learning and (iii) management inquiry-based learning. These applications are explicitly structured for delivery and learning by the I.AM for teaching and learning. We thus propose reordering and restructuring the content and expertise of teachers' training programmes as teachers' professional identity development programmes delivered through reflection, collaboration and management applications of identity inquiry-based learning.

Key words: Teacher Professional development, Teachers' identity, Identity inquiry-based learning

Introduction

There are many ways to teach and there are many ways to learn yet no one method is perfect. Why do some methods work well with some students and not with others? Why is it that some material is easy to understand and other material is so difficult? In teaching and learning we still have many unknowns. Under-specified advice to

'reflect' and to 'collaborate' often leaves trainee teachers drowning in uncertainty, prone to burn-out and ready to leave the profession.

On the other hand, experienced teachers and teacher educators face such unknowns not by answering these difficult questions but by mastering a repertoire of 'inquiry-based' methods and other techniques. This is their professional toolbox (Selig et al., 2016; Tilton, 2003); a toolbox constructed from assertions culled from extensive experience. As they build their toolbox they learn instinctively which methods are more likely to work with which students for learning some types of specific materials. These experienced master teachers not only mix-and-match what is known, they can improvise new and successful ways to teach and to learn. However, if we could answer these difficult questions, analytically and specifically rather than only anecdotally and intuitively, we could short-circuit years' of hard-won teaching experience and give pre-service teachers and beginning in-service teachers the knowledge to improve all teaching methods and to know explicitly how to create and bespeak improved methods of learning and teaching for all students (Korthagen, Kessels, Koster, Lagerwerf, & Wubbels, 2001).

In this chapter we approach the answers to these questions by presenting Identity Inquiry-Based Professional Learning applied to reforming 'Teacher professional development (TPD) programmes', restructured as 'Teacher professional identity development (T-PID) programmes' for pre-service and in-service teachers.

We look at both the content of teacher inquiry (the 'what to' inquire about) and the process of teacher inquiry (the 'how to' inquire):

(i) Inquiry into content of inquiry - This is guided by the Identity Affirmation Model (I.AM) and its applications to teaching and learning. Professional identity is developed through competent use of the model.

(ii) Inquiry into the traditional TPD methods of inquiry - These are the reflection, collaboration and management components of identity inquiry-based learning. In contrast to problematic under-specified practitioner models, these components of identity inquiry-based learning are explicated and guided for programme delivery and learning by the structure and applications of the I.AM.

Although reflection, collaboration and management are traditional processes of teacher inquiry in TPD programs (Boufoy-Bastick, 2014) they lack structured guidance. Attempting to solve trainee teachers' problems by only telling students to 'reflect on it' or to 'collaborate with a successful classroom teacher' or to 'more effectively manage their classrooms' often leaves students flummoxed as to how to reflect on precisely what, how to collaborate on exactly which aspects of the teaching role and wondering why different teaching options might or might not enhance their management of diverse classes, each of which might have their own different teaching and learning problems. However, by focusing methods of inquiry on the I.AM model for identity inquiry, and on its identity guided applications for teaching and learning, we can use the specified functions of the parts of the model as detailed teaching guides on

how to reflect on, collaborate with and manage in potentially problematic teaching contexts. These more structured traditional methods of inquiry will then be applied constituents of reformed identity inquiry-based learning.

An extensive body of research now provides strong support for a model of Teachers' Professional Development based on the development of teachers' professional identity (Alsup, 2006; Arber, Blackmore, & Vongalis-Macrow, 2015; Avalos & Rios, 2013; Beauchamp & Thomas, 2009; Beijaard, Meijer, & Verloop, 2004; Beltman, Glass, Dinham, Chalk, & Nguyen, 2015; Bullough Jr., 2005; Calandar, 2004; Canrinus, Helms-Lorenz, Beijaard, Buitink, & Hofman, 2011; Connelly & Clandinin, 1999; Devos, 2010; Joseph & Heading, 2010; Lindblad & Callewaert, 2004; Oruç, 2013; Sutherland, Howard, & Markauskaite, 2010; Timoštšuk & Ugaste, 2010; Walkington, J., 2005; Walling & Lewis, 2000). Correspondingly, between 1992 and 2008 use of the phrase "teacher identity" in print increased by more than 3,000% - see Google Books Ngram Viewer. A number of key psychological and sociological findings on learning within formal education and of learning within informal enculturation have helped expand our understanding of the links between teaching, learning and important identity functions such as communicative behaviours (Fitzgerald, 1993; Merriman, 2015; Owen & Rolfes, 2015; Price, 2015; Ralph, 2015). In turn these findings justify our proposal of a fundamental unifying model of cultural identity within a teacher development framework.

Importantly, there are also calls for a coherent comprehensive theoretical model that brings together relevant recent findings from relatively disparate literatures – e.g. therapeutic, political, economic – together with anecdotal accounts of successful and unsuccessful teaching and learning practices that populate traditional teacher development programmes internationally (Beck & Kosnik, 2006; Beijaard, Meijer, Morine-Dershimer, & Tillema, 2005; McQuillan, Welch, & Barnatt, 2012; Sugrue, 2004). Such a model would be expected to highlight emerging consistencies across findings and perspectives, whilst accounting for documented variabilities in the successes of diverse teaching methods and to generate novel insights for acceptably enhancing teaching-learning practices within subject areas and across age cohorts within national and ethnic cultures (Canrinus, Helms-Lorenz, et al., 2011; Ertmer, 2003, n.d.; Generett & Hicks, 2004; Mayer, 2013; Sockett, 2001; Sockett & LePage, 2007).

The Identity Affirmation Model (I.AM) for Teaching and Learning

The I.AM for teaching and learning is an application of Culturometric Committed Communication in which the teacher as communicator is committed to affirming not only their own identity but also the identity of the learner (Boufoy-Bastick, 2015, 2016a).

'Culturometrics' means the measurement of cultural identity. It is a research philosophy that has two approaches; (i) it models cultural identity functions like communication, of which teaching is an example, and (ii) it measures strength of cultural identity (Boufoy-Bastick, 2014). Hence, teachers can use culturometric models to design effective motivating belief-paths from methods of teaching to successful learning outcomes and use culturometric measures to assess how successfully their teaching has affirmed their students' identities (Boufoy-Bastick, 2012).

We now briefly describe culturometrics and culturometric's committed communication, so readers can understand the I.AM and how the functioning of its parts can be used to enhance teaching and learning. Later we shall see how the same model can be used to restructure and deliver Teacher Professional Development Programmes as Teacher Professional Identity Development Programmes.

1-2-3 Structure of Culturometrics: One meaning, two approaches, three tenets and their major purposes

Culturometrics (CM) has three tenets. The CM family of methods, techniques and application has been developed in wiki-approach to be consistent with and derived from these three tenets - including this chapter i.e. they are backwards compatible. Using this wiki-approach, new applications (e.g. your new applications) can consistently extend the purposes of the tenets to add new methods and techniques to the CM family for others to potentially reuse and re-mix (Boufoy-Bastick, 2013a).

1 *Meaning*: Culturometrics means the measurement of 'cultural Identity' – the 'contextualised role'
2 *Approaches*: Culturometrics has two linked approaches (i) qualitative models and (ii) quantitative measures. For complete scientific identity inquiry-based research the models can be used to propose theories of identity functions and the measures can then be used to empirical evaluate the theories.
3 *Tenets*: All CM is consistent with, and derived from, its three tenets (Boufoy-Bastick, 2016b) – including this chapter. These tenets and their main purposes will now be briefly presented.

Tenet I: One definition *– The operational definition of Cultural Identity (CId) is 'Values in Context'*

That is, CId is a contextualised role. CId is the unit of analysis in culturometrics. This ensures that each person-generated culturometric data point retains a richer meaning than the traditional 'disembodied' data of classical statistics. Figure 1 illustrates our first model 'Cultural Identity'.

'Values' is an abbreviation of Values, Attitudes, Beliefs and Intentions (VABI). Some values are entrenched and resistant to change. These are core values of the identity, whereas other values are more peripheral to the identity, lightly held, flexible and changeable. Two matching functions of these values in defining Cultural Identity

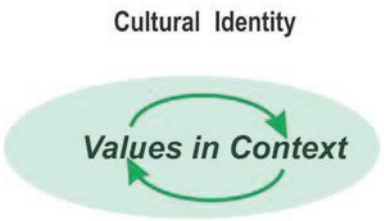

Figure 1: Model of Cultural Identity as 'Values in Context'

are that the changeable fluid peripheral values identify the context and stable values describe the core identity. This is important for advising teachers who need to select an effective teaching method for changing children's behaviour. Because, as we shall see later, behaviours are chosen to express core values. Hence, it is easiest for a teacher, and for a therapist-as-teacher, to replace unwanted behaviours by (i) changing/ reframing the context than by (ii) re-enculturating new behaviours to express core values or (iii) the most difficult of all, by attempting to change/ deep-condition new core values for that context. This is a basic example of identity inquiry-based learning for steering the teacher towards likely successful (context-reframing) teaching methods and away from likely unsuccessful (re-enculturation & deep-conditioning) teaching methods for changing children's problematic behaviour (Lester & Paulus, 2014; Vetter et al., 2012).

Reframe example: John went to his doctor for stress reduction medication.

> Dr. "So why are you so stressed John?'
>
> John "I haven't slept properly for at least three months Doc. It's my wife's snoring driving me crazy. I tried earplugs, sleeping tablets, separate beds, separate rooms. But I can always hear her terrible terrible unearthly snoring piercing my head. I can't take it anymore. We've been married for more than 20 years and it's never been as bad as this. The stress is causing me stomach problems, headaches and costing me days off work. As much as I love her I'm going to have to get a divorce. Her snoring's killing me. You've got to help me Doc."
>
> Dr. "Ok John, we can do that. You are the second patient in two months that's come to me for stress relief because of his wife's unbearable snoring. For the other patient, I gave him some very strong stress-relief medication and tablets for his insomnia"
>
> John "and could he sleep again?"
>
> Dr. "He came back last week with deep suicidal depression. Said his wife had died. I asked him a few times about the medication and his wife's snoring. He just sat there silently staring at that wall, crying. After ten-minutes asked him once last time, and he whispered 'Doc, I'd give everything, just to hear her snoring again.' "

A teacher or learner can transition from one temporal cultural identity to another by changing contexts and/or core values. People with similar CIds can be

aggregated into one cultural group, a class, a school or a company. Culturometrics gives methods for measuring the homogeneity of VABI defining cultural groups and for distinguishing between them (Boufoy-Bastick, 2009). The VABI of a cultural group's CId can be abstracted like a brand, a stereotype or leitmotiv. Further, most, if not all social science constructs used in TPDPs can be reframed as a CId (e.g. by adding agentive suffixes like -ian, -ist -eer, -eur, -ot). The strength of those identities can then be objectively measured for assessment of identity change as linked with teaching of other treatments or to test if proposed social influences affect construct change, e.g. linguistic identity (Boufoy-Bastick, 2010).

The adjective 'Cultural' in CId limits the meaning of context to a situation with culturally consistent VABI – culturally consistent for the individual or the cultural group under consideration. A major purpose of this part of the definition is to resolve the enigma of changing identities. A cultural identity is often thought of as homogeneous national or even pan-national traits (European or Polish identity) which contains groups with different group identities (political groups, religious and ethnic groups) each of which might be defined by different group interests (financial, educational) containing individuals whose VABI align with different occupations (lecturer, principal) who, at different times can take roles of parent or teacher or learner or friend. What we have just described is a journey between contexts that could be illustrated on a hierarchical organisation chart – transitioning up and down (more general contexts/ VABI < to > more specific contexts/ VABI, Parent< to >Child) or between sibling contexts of varying degrees of similar VABI (unlikely transitions between sibling contexts with mutually exclusive VABI or more likely transitions between sibling contexts with a high proportion of VABI mutually in common). That is, seemingly enigmatic combinatorics of identity can be predicted by a set theory calculus of contexts whose parent<to>child and inter-sibling transitions maintain varying relative inclusions of VABI (Cantini, A & Crosilla, L., 2005; Cooper, Löwe, & Sorbi, 2010; Daniel, Schiefer, & Knafo, 2012).

A person's observable chosen behaviour (like a uniform/ regalia, speech, posture, etc.) is required to communicate/ infer that person's cultural identity and it is impossible not to communicate e.g. refusing to communicate is a communication (Gibson, 2011; Watzlawick, 1965).

Tenet II: One assumption: *The purpose of all behaviours is to affirm one's CId.*

The basic need to exist drives all behaviour but the purpose of all chosen behaviours (conscious or subconscious) is to affirm one's existence as a cultural identity – one's values in context. A behaviour is chosen that signifies core values in that context. Experiencing that behaviour in that context is an affirmation of one's identity – confirming one's existence and experienced as increased security of existence. Such feelings of identity affirmation maintain self-succouring identity functions like rumination, daydreaming and wish fulfilment (Regis, 2013). If a

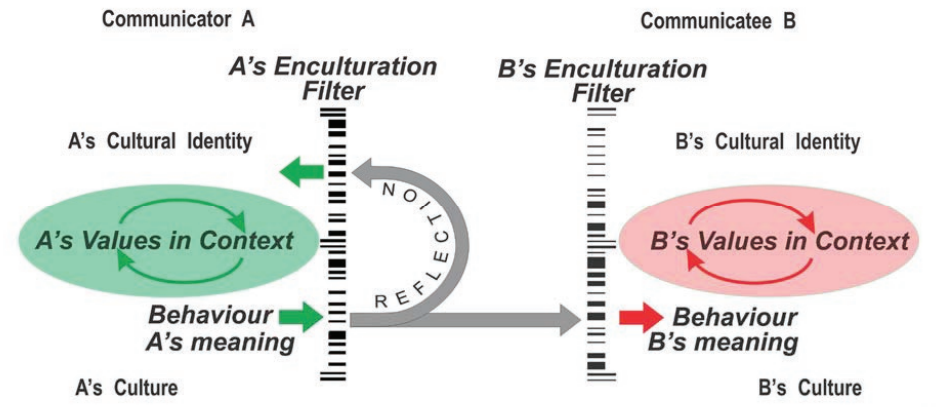

Figure 2: Culturometric communication model showing behaviour as expression of identity

chosen behaviour is communicated to others it is with the intention that it will be accepted. When it is accepted that acceptance is experienced as affirmation given by the communicatee (rapport). Thus, tenet II gives important basic motivation for all chosen behaviours including teaching and learning (e.g. affirming CId via closing the actual vs ideal-identity gap and/ or giving self-succouring).

Communication behaviours are chosen to express who we are in ways intended to elicit affirmation. We do this by using behaviours that will represent, symbolise and communicate our values in the current context. But how do we know what chosen behaviour(s) will represent our values? To answer this important question we now extend the model of Cultural Identity shown in Figure 1 and explain using our second model, Culturometric Communication (CC) Figure 2.

The meaning of behaviour is a major part of our learned culture - our enculturation. Our enculturation is represented in Figure 2 as the Enculturation Filter (EF) - a permeable filter through which we try to communicate from inside our own culture. It is not a coincidence that we depict the EF as a barcode – it is because EFs and barcodes have analogous functions. Sequences along the EF are like gene sequences on a chromosome. They code more complex VABI into outgoing representative behaviours (EF-out sequences) and other sequences code/ interpret the meaning of more complex incoming/ observed behaviours/ stimuli (EF-in sequences) as values expressed by the self or another communicator. In-out sequences are not commutative. For example, it is possible that when another person does the same as you, you give it a different meaning than when you do it. That is, the same observable behaviour outgoing might express different values than when it is incoming, perhaps because of changed contexts - 'a king can do no wrong'. These codes give meaning to behaviour in terms of the values they are

interpreted to represent – and vice versa. These are meanings we have learnt to associate with stimuli such as observations, and actions (VABI-Stimulus associations – think 'Behaviorism').

In the literature, the process of 'reflection', which is central to teacher education, is not well explained and so guidance on how to reflect is correspondingly vague (Akbari, 2007; Arrastia, Rawls, Brinkerhoff, & Roehrig, 2014; Freese, 2006; Von Wright, 1992). Interestingly, the most recent meta-analysis of the current literature on reflection (Beauchamp & Thomas, 2009), which also reviews the 'persistent emerging criticisms related to reflection and reflective practice' (pp. 126-127), concludes that reflection has two prominent issues of context and identity. In culturometrics, appositely, 'context' and 'identity' is 'cultural identity'. Beauchamp and Thomas also note that some literature suggests that 'mentors and cooperating teachers need to learn how to facilitate and support reflection' (p.136). This is particularly important as Callens and Elen (2015), have shown that reflection with structured guidance is more effective than unstructured reflection. In response to (i) the positive results of structuring reflection, (ii) the stated need for structuring and (ii) the literature vagueness on how to structure guidance for reflection, Figure 2, Culturometric Communication shows 'Reflection' as communication with the self – 'A' communication with 'A'. Inquiry-based learning through reflection – whose purpose is 'Know thyself' – has thus three well-structured attributes that guide teacher's reflection inquiry-based learning.

(i) *The calibration/ knowledge of one's own EF-in sequences*. That is, being aware of what observed internal and external stimuli bring to mind which associated contexts;

(ii) *Awareness of one's own deeply conditioned context cueing*. This refers to the instigation of core values that are consistent with, and associated with, the context by conditioning and dependent physiological needs. This deep conditioning is particularly hard to change because of the physiological components (addictions).

(iii) *Choosing behaviours - The calibration/ knowledge of one's own EF-out sequences*. That is, being aware of the likely behaviours chosen to represent one's own cued values in specific contexts. The outgoing function of the EF is to select actions:
   - Symbolising the changeable fluid peripheral values whose function is to communicate your context (context of the communicator) and
   - Symbolising stable values whose function is to describe your core identity (identity of the communicator)

Collaboration extends reflection from 'reflection of the self' to 'reflection of the self in relation to others'. When we collaborate we need to also be aware of the appropriateness of our chosen behaviours in evoking our context and cueing our values in the communicatee. When we collaborate with another person we need the communication between us to affirm each other's values in context - CId. We call this application of communication 'Committed Communication' because the

communication is also committed to affirming the other's cultural identity. When this affirmation is applied in teaching and learning contexts we have the Identity Affirmation Model (I.AM) for teaching and learning – as in the title of this chapter.

However, the fundamental cross-cultural problem with communication behaviours, like 'A' communicating with 'B' in Figure 2, is ensuring that the behaviours chosen by the communicator 'A' to signify his/ her values will be interpreted as such by the communicatee 'B' (i.e. establishing the invariance of cultural coding of values into behaviours with the decoding of the behaviours back into 'exactly' the same values). This invariance is more likely to happen naturally within a life co-habiting nuclear family because persons from the same cultural group will have learnt the same or similar behaviour/VABI associations. They will have similar EF in and out sequences. But, such intuitive understanding is less likely to happen naturally as the socio-cultural divide between the communicator and communicatee increases – as is the case in high-diversity schools.

The first lesson in Collaboration inquiry-based learning is to realise that people may not share the same context and EFs. Hence, the same observed behaviour can have different meanings, e.g. people show 'caring' in different ways – 'Spare the rod and spoil the child'. And, different behaviours can have the same meaning across cultures/ contexts; e.g. and 'there are many ways to skin a cat'.

An incoming function of the EF is to interpret/ decode incoming stimuli, e.g. from a communicator as:

(a) Changeable fluid peripheral values whose function is to identify the communicatee's context and
(b) Stable values whose function is to describe the communicatee's core identity in that context

If an incoming communication reinforces your current identity (evokes the same context and core values) this is felt as positive affirmation (rapport) and is the purpose of communication. The assumption is that you share each other's interests and will support each other because you are from the same cultural group - experiencing the contextualised role.

If, however, the incoming information evokes a different context and/or cues different core values, this requires you to change cultural identity and you feel estranged by the communication and the communicatee is labelled as a non-cooperative, even dangerous, out-grouper to be avoided.

Slippage in communication - miscommunication and failed collaboration

As mentioned above, the purpose of communication is to affirm CId (Tenet II). This can and does go awry when there is miscommunication. The model helps us to identify where and why miscommunication inadvertently happens and to correct it. The model also shows how to deceive in communication by posing as an in-grouper or as an out-grouper (devil's advocate).

The most common cause of miscommunication is an evolutionary and ontological artefact. For tens of thousands of years when people communicated, they shared the same face-to-face context. Also, during our childhood enculturation we shared the same immediate communicative context as our nuclear family. Hence, we now tend to assume that the person with whom we are communicating shares our context and so we skip the first part of affirming identity which is to confirm that we share the same context – that we are 'both on the same page'. Instead we jump straight to the second part where we choose actions that symbolise our core identity values. These actions can then symbolise values that are 'out of context' and estrange the communicatee. This is the source of much situational comedy where we, as observers, are aware that people are communicating/acting 'at cross purposes'.

The context has different levels of generality and these also need to be factored into the actions evoking context. For example, taking the role of tourist and asking directions while referring to a street map is an appropriate level of generalisation, but holding a globe of world creates too generalised a context. A teacher who claims to love children is appropriately admired, but a teacher who claims to love 12-year old boys is creating a context that is inappropriately too specific. Our need for affirmation leads us to evoke our preferred specific contexts from overtly generalised stimuli – e.g. speech overloaded with nominalisations, lost performatives, unspecified nouns and verbs, missing referential indices, simple and comparative deletions, etc. - we see what we want to see and hear what we want to hear to match our needs for identity affirmation. In NLP (Neuro-Linguistic Programming), this process of evoking an affirmative context from ambiguous stimuli has been labelled 'trans-derivational search'. In linguistics, it has been termed 'reader response theory'. In politics, it is known as 'spin'. Examples abound – Ted Cruze's generalised 'political-speak' affirmation of supporter identity at his July 2016 'non-nomination' of Donald Trump (Fox News, 2016) https://youtu.be/orX-rWiMPCE?t=22

> "If you love our country and love your children as much as I know you do, stand and speak and vote your conscience, vote for candidates up and down the ticket who you trust to defend our freedom and to be faithful to the constitution… and I will tell you it is love of freedom that has allowed millions to achieve their dreams"

Once we need to collaborate with one or more cultural groups of different ilks – with students, parents, colleagues, education administrators, employers, local interest groups, media representatives, etc. – we need to manage others' collaborations. Management inquiry-based learning for teachers is learning the management of collaboration, learning to match the values of the medium with the values of the message to tune the changing values of administrative process to the evolving values of the collaborators.

Reflection on our own needs for affirmation in relation to affirmation needs of others and the management required to educe affirming communicative behaviours defines a range of management contexts in which teachers must be competent from Classroom Management to Committees, SIG (school improvement grant) negotiations and Parent Club Management. Reflection includes being aware that one's needs for affirmation causes biased selective interpretations of incoming information – seeing what you want to see and hearing what you want to hear. For example, in the context of a temporary or trainee teacher's need for self-protection when facing a new unruly class, a student's benign behaviour could be interpreted as threatening to one's professional identity – as rude, insulting - especially behaviour that is ambiguous/ unclear because the teacher's attention was elsewhere, perhaps dealing with, from his/ her perspective, the genuinely rude behaviour from other students. To collaborate with the unruly children towards a win-win conclusion of mutually affirmed identities the teacher needs to understand their context, the values of their ideal identities in this context that they intend their 'rude, insulting' behaviours to express. And, the teacher needs to affirm the ideal identity of the student(s) who show benign behaviours. This is class management.

For management inquiry-based learning we need an overall guiding purpose and this is one of the major purposes of tenet III.

Tenet III: One belief: *Culturometrics is a Humanist philosophy*

The philosophical foundations of this tenet are expounded by Boufoy-Bastick (2014) "Culturometrics is an empowering humanistic philosophy whose intentions largely coincide with Max Weber's original anti-positivist agenda of *Verstehen* and Abraham Maslow's subsequent programme for Self-Actualization" (Boufoy-Bastick, 2014).

Tenet III guides us to question whether the topics we research or the syllabus we teach are appropriate roads to informed self-actualisation (Maslow, 1943) or if we are merely training students and ourselves to conform to someone else's template for identity, such as an exploitive employer's ideal of an employee, e.g. neoliberal CId of *employee-ment* (Boufoy-Bastick, 2014).

Tenet III also leads us to the radical cultural relativist interpretation of a dictum attributed to Protagoras of Abdera (490-420 BC) that 'man is the measure of all things'. "He *(Protagoras)* emphasized how human subjectivity determines the way we understand, or even construct, our world, a position which is still an essential part of the modern philosophic tradition." ('Protagoras | Internet Encyclopedia of Philosophy', n.d.). That dictum subsumes the culturometric self-norming approach to measurement methods in social science applications as 'The measure of man is man' - attributed to Confucius (551-478 BC). These self-norming processes are person-centred rather than being based on statistical assumptions of Classical Test Theory like traditional variable-centred measures. Using these self-norming methods to

collect intersubjective data for subsequent variable centred analysis is Culturometrics' effort to resolve the longstanding *Methodenstreit* (see explanation by Nerlich, 2004), in support of "The New Science" (Vico, 1725). Not only do these culturometric self-norming measures empower teachers and students, they also enable objective comparisons of subjective self-evaluations of identity so that we can accountably measure subject-based students' learning outcomes of increased self-actualisation as mathematicians, as musicians, as authors, etc. or vocationally based teacher development outcomes such as 'professionalism' (Boufoy-Bastick, 2016c).

Applications of I.AM for teaching and Learning – Identity inquiry-based learning examples

Education vs Training: What is the difference between education and training?
Culturometrics clearly and usefully distinguishes between Education and Training

- **Education** gives students informed options of who he/she wants to be so that students can select and/or creating contexts they value and populating them with their current and/or amended core values. So, for example, the teacher can encourage students to experience different cultural identities – roleplay or invite experts and practitioners to talk and demonstrate, teach the inspiring history of leaders in different fields, arrange school visits and guided school tours that encourage aspiring students to identify and create heroes to live-up to and surpass, e.g. rewarding an 8 year-old by allowing them to sit in the teacher's chair is a punishment to children who hate teachers.
- **Training** accepts one identity and trains the student in identifying relevant contexts and practising standard behaviours that express the standard core values for those contexts. In practice, the values are often implicit, assumed or ignored by the trainer who is concerned mainly with the speed and accuracy with which the student can recognise relevant contexts and perform consensus behaviours. For example in primary maths: Remember that 1+1=2 and practice writing one-half as '½'; assessed by time-limited reproduction of 'correct' facts and processes.

Note that when education includes training, as the honing of skills associated with one's chosen identity, the peripheral values are given as explicit guides for identifying relevant contexts and creating others; just as the core values are given with an explanation of the behaviour range for communicating those values appropriately to different cultural groups, i.e. the 'why we do it" is made explicit so that students can innovate and justify alternatives. For example in primary maths: Give examples of when 1+1 is not 2 and if you were a half how would you walk and talk - assessed by probable justifications of why.

An important Education vs. Training difference is trainers want to instil the standard behaviours but educators need to work with the VABI that the behaviours

represent. So, 'education' without VABI justification is training, and 'training' that explains the VABI justification is education. Obviously, if students impute abhorrent VABI to training, they will not learn.

Belief-path motivation: Motivation determining the success of teaching methods

A teacher can package content material to affirm the student's identity so that material has a privileged learning priority for given students (i.e. it is easier for them to learn). A concrete example of this application would be if school teacher wanted children to practise calculating averages. John wants to be the captain of the school football team so the teacher frames the calculations as calculating team goal averages over the session for different teams. Jill is in the same class but hates everything to do with football. So, who is more motivated to do these exercises, John or Jill, and why?

Presumably, John interprets the exercise as affirming his ideal identity. He believes the captain of the school football team needs to be able to do this – the teacher might even had said that when giving the exercise. John wants to be the captain of the team so he believes if he can do this exercise then he, the teachers and others in the class will recognise that he is closer to being what he wants to be. That's John's belief-path. Jill raises her hand for permission to go to the toilet.

Following from Tenet II 'The purpose of all chosen behaviour is to affirm cultural identity', there is a path of successive interpretations (stepping stones) directed from a stimulus/ observation to an affirmation of identity that answers the self-actualisation need 'I believe my response to this stimulus gets me much closer to affirmation of what I want to be'. The belief-path defines how motivating an intrinsic motivator or extrinsic motivator can be. For example to intuitively know what is more motivating, say, (a) some important people confirming how good you are or (b) receiving a cash sum for what you do, you will create and compare two belief-paths. Note that both intrinsic and extrinsic motivation lead to identity affirmation. Extrinsic motivation usually has a longer path as it eventually requires conversion to the intrinsic motivation of identity affirmation. The motivation to act at each step on the path depends on at least four major parameters that a teacher as communicator can explore and possibly influence – as in our example of explaining how a team captain needs to be able to calculate team averages. Note the culturally relative acceptance of the following parameters and their parallel to economic investment criteria in the field of behavioural economics (Altman, 2012; Hood, 2014) vis (i) the relative contribution of the role to one's total identity (how much of me – my wealth - is involved), (ii) the immediacy of affirmation (short path – instant gratification/ quick payment), (iii) certainty (high probability of successful next-step outcome) and (iv) value (number of people and/ or number of authoritative representatives offering affirmation). Short paths with highly probable large affirmations are obviously more motivational.

Subjectivist teaching: Enculturation and Empowerment in the classroom

Subjective teaching is a methodology that uses specific identity inquiry-based learning techniques for creating classroom activities that promote affirmation of students' identities. (Boufoy-Bastick, 2008).

Subjective teaching has overarching pedagogic humanistic aims of Enculturation and Empowerment which enhance learning. It focuses on orchestrating joint cognitive and affective experiences of learning - the subjective experiences of the learner during learning - and utilizes the natural affective-cognitive enculturation processes that children experience in learning the skills, understandings and values of their society. These affect-laden processes of enculturation are transplanted to the classroom where they become the teaching techniques of the subjectivist teacher. The aims of subjectivist teaching are to empower students and enculturate them into the skills, understandings and values of their subjects. Enculturation techniques centre on needs-driven social communication activities. These value-laden activities are designed to accentuate the students' needs to communicate at the limits of their abilities. Their successful communication validates attainment of socially agreed skill levels and confirms the affirmation of their identities implicit in the activities. Empowerment techniques teach students self-cuing coping strategies and ensure that students take credit for their own success. Empowerment by Enculturation, and Enculturation by Empowerment, are the twin humanistic intents of the Subjectivist teacher. The teacher's curriculum goals become 'hidden' pedagogic purposes. They are 'hidden' by engaging activities called surface purposes designed using three affect structuring methods - an emotional anchor, cognitive direction and a motivator. These classroom activities are planned to guarantee that each learner will succeed. They can range from simple rote-learning games to complex needs-driven social communication tasks. These surface purposes afford inevitable success which is judged so by social/peer approval – not by the authority of the teacher - thus evidencing identity affirmation by their peers.

Transitioning from 'Teacher Training' to 'Teachers' Professional Identity Development'

The literature contains many worthy suggestions for piecemeal improvements to teachers' professional development by enhancing teachers' identity (Akkerman & Meijer, 2011; Berg, 2015; Canrinus, Helms-Lorenz, Beijaard, Buitink, & Hofman, 2011; Izadinia, 2013; Martel, 2013; Mockler, 2011; Stenberg, 2011). However, as shown above, what is called for is a coherent theory completely integrating the development of teacher identity with professional development. It would be economically prohibitive and take too long to re-train faculty and to re-write teacher training materials for teacher professional identity development programmes. Fortunately all, or nearly all,

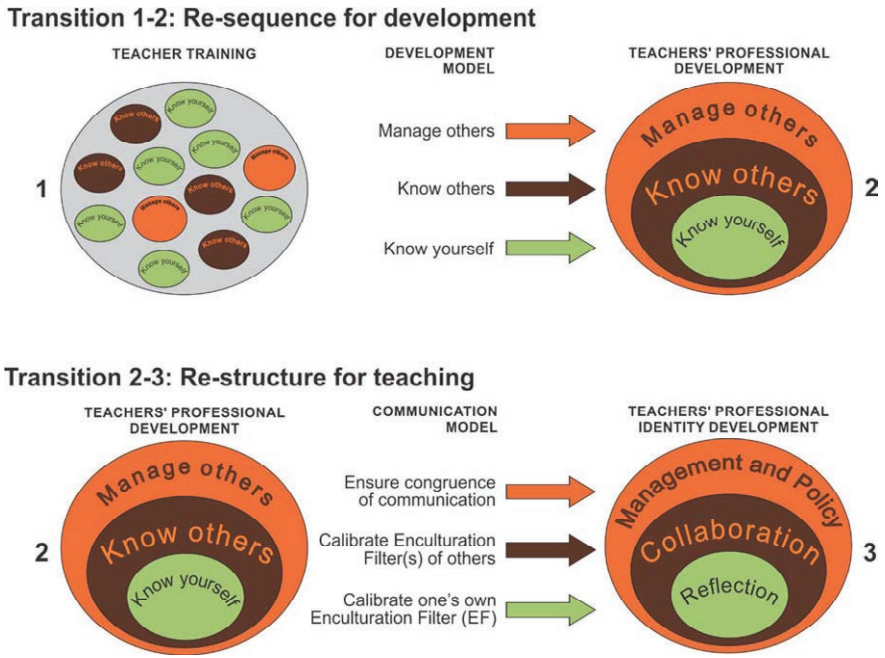

Figure 3: Creating the new Teachers professional identity Development programmes by restructuring current Teacher training programme content and faculty expertise

materials and expertise is already available on current courses. All that is required is to restructure these resources and materials into holistic science-based programmes. Three natural increasingly inclusive stages of teacher professional development that is common to all Teacher Professional Development is the following spiral curriculum structure: (i) to know oneself, (ii) to know oneself and to know others, (iii) to know oneself and to know others and to manage others. It is a relatively inexpensive and rapid exercise to identify programme content that falls into each of these overlapping categories so that they can be allotted to three successive developmental phases of a teacher professional development programme. This first transition phase from *ad hoc* training to professional development is illustrated in the top panel of Figure 3.

However, a theoretical structure is also needed to integrate and guide this natural development – an operational scientific structure that gives specific professional education guidance for the teaching and learning of these successive developmental categories. In teacher professional development the purpose of these three stages match the three ability levels needed for communication proficiency with the culturometric Identity Affirmation Model namely, Reflection, Collaboration, Management and Policy. Further, a prerequisite for proficiency is a developed professional Identity. Hence, the I.AM for teaching and learning

offers an ideal integrative scientific structure satisfying the needed requirements for structuring Teachers' Professional Identity Development Programmes. This second transition phase from professional development to professional identity development is illustrated in the lower panel of Figure 3.

Table 1 summarises the restructuring for each of the three chronological embedded stages (years 1 to 3) of teacher development.

Programme Restructuring

Programme Development

Year Stage (Embedded Content)	Current generic content re-categorised & re-sequenced for professional development	Current content re-categorised as professional developmental applications	Course delivery restructured as Professional Id development – Culturometric communication abilities
1 : (1)	Know yourself	Reflection inquiry-based learning	Calibrate one's own Enculturation Filter (EF)
2: (1+2)	Know others	Collaboration inquiry-based learning	Calibrate Enculturation Filter(s) of others. (Confirm context before expressing core values)
3: (1+2+3)	Manage others	Management & Policy inquiry-based learning	Ensure congruence of communication
Embedded content / spiral curriculum	Generic content re-categorised and re-sequenced	Identity inquiry-based learning	Teaching professional Id development

Table 1: Summary of the new Teacher professional Identity Development programmes from re-categorising, re-structuring and delivery of current programme content and expertise at each of the three stages (3-years) of programme development

A fourth stage (4th year) postgraduate extension for education administration professionals is outlined in Boufoy-Bastick 2013b, pp. xxxii- xxxiii.

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"Writing a reflective report is like listening to your thoughts and your feelings": How student teachers with learning disabilities use reflection to enhance learning through inquiry

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Abstract

One cannot overlook the fact that more and more young people with learning disabilities (LD) choose teaching as their future career. This chapter discusses the specific difficulties of student teachers with learning disabilities through the lens of a mandatory course, titled: "Researching instruction in education: Self-study using reflection", which is rooted in the practicum. The course is based on keeping a reflective pedagogic diary and it culminates in a small scale research paper. The diary calls for expressive and reflective writing and higher order thinking. Quotes taken from the students' reflective diaries are used to illustrate the important role reflective processes have in the development and growth of student teachers with and without LD. The first need more time to accomplish their academic duties and require on-going mediation of their instructors. Differences between student teachers with and without LD are discussed at length.

Keywords: Inquiry-based learning, Student teachers with learning disabilities, reflection

Introduction

At the core of this chapter is a mandatory course for third year student teachers titled: "Researching instruction in education: Self-study using reflection". As is common in this era of inclusive education, the student body includes both students with and without learning disabilities (LD). The contents of this course include the development of skills for self-study through the use of reflection as the major inquiry tool. The authors of the chapter are teacher educators who are the instructors of this course and writing it was an opportunity to study processes of inquiry amongst student teachers with LD in order to gain a better understanding about the ways they deal with the courses' requirements. The first part of this chapter unfolds the theoretical infrastructure: student teachers with

LD, their characteristics and specific difficulties and inquiry-based learning and reflection. The second part portrays a detailed picture of the course. In the third and last part we rely on the students' pedagogic diaries to present conclusions about the importance of using reflection in inquiry-based learning in particular for student teachers with LD.

Learning disabilities (LD) and student teachers

The term learning disability refers to a group of disorders that affect a broad range of academic and functional skills and impact academic achievement. It has been defined differently in various parts of the world. In this chapter we utilize two widely used classifications that complement one another i.e., DSM-5 (American Psychiatric Association 2013) and ICD-10 (WHO, 2010). Both definitions point out to persisting difficulties in the 3R's (Reading, wRiting and aRithmetics) including the ability to speak, listen, read, spell, reason and organize information. As learning disabilities are lifelong and do not diminish with time, students with LD in higher education continue to face difficulties. These include (Skinner & Lindstrom, 2003) (a) deficits in study skills, (b) problems with organizational skills, (c) difficulties with social interactions and (d) deficits in specific academic areas where proficiency of reading and writing is crucial to success. Other challenges include the characteristics and the level of severity of the specific disability, one's self-awareness and ability for self-advocacy, usage of learning strategies and acceptance of the disability. Typical characteristics of people with LD include low self-esteem and self-efficacy, external locus of control, lesser ability for self-regulation, difficulty in discerning between incidental and essential information and impaired metacognitive skills. In addition, they have a constant need for mediation. (Zwart & Kallemeyn, 2001; DaDeppo, 2009; Sharoni & Vogel, 2007; Skinner & Lindstrom, 2003).

Higher education nowadays has a commitment to be accessible to everyone including students with learning disabilities (LD) and the growing number of students with LD has been documented all over the world. This is due to changes in societal attitudes towards people with disabilities; the need to comply with laws that promote the rights of individuals with disabilities including the right to higher-education; campuses have become more accessible and more welcoming to a diversified student population. Reasonable accommodations are provided for these students to facilitate completion of any degree program (Leyser, Greenberg, Sharoni & Vogel, 2011; Vogel, Fresko & Werthiem, 2007).

Students with LD choose to pursue higher education for a variety of reasons including the will to prove their school teachers wrong, the drive to make amends and the motivation to acquire skills to function appropriately in the "adult world" (Vogel, Vogel, Sharoni, & Dahan, 2003). Many of them opt to study human service type disciplines such as social work and special education and opt for teacher

education programs with the goal of becoming a teacher (Baldwin 2007). In the case of becoming a teacher they may wish to help others and to "save" them from experiencing the same difficulties they had during their years in school. Thus, their personal history influences the choices they make and affects their performance as student teachers and as teachers (Rodgers & Scott, 2008; Moores, 2005).

Teacher education programs are being held accountable to train youngsters to be quality teachers i.e., master basic skills to the fullest and be able to teach all children to read, write and calculate. Faced with growing numbers of applicants with LD, many teacher training institutes (in the United States for example) have adopted standards for entrance (Baldwin, 2007). Whether or not student-teachers with LD can be competent teachers, remain an unanswered question.

Student teachers with LD are fully included and they study the different courses with their peers. Gaining knowledge about their inner processes of learning and knowledge acquisition may contribute to improve teaching and learning in teacher training programs.

Using reflection for inquiry-based learning

Inquiry-based learning

The term 'inquiry' usually refers to a process of asking questions, generating and pursuing strategies to investigate those questions by generating data, analyzing and interpreting this data, drawing conclusions from them, communicating those conclusions, applying conclusions back to the original question, and following up on new questions that arise (Sandoval, 2005). Inquiry based learning (IBL) draws on constructivist ideas of learning. Constructivism's central idea is that learning is an active process in which learners are encouraged to construct new ideas or concepts based upon their experiences and prior knowledge. In IBL the students are responsible for constructing their own meaning and understanding from the learning activities (Rooney, 2012). Baron and Darling-Hammond (2008) relate to inquiry-based teaching and learning as a student-centered, active learning approach focusing on questioning, critical thinking, and problem solving. A growing body of research suggests that students learn more deeply and perform better on complex tasks if they have the opportunity to engage in projects and activities that require them to employ subject knowledge to solve real-world problems. It has prompted teachers including teacher educators to incorporate IBL into their pedagogics (see for example Rooney, 2012).

Using IBL projects in teacher training programs demonstrates the deeper level of understanding that developing teachers reach when they conduct inquiry about their teaching dilemmas. Inquiry provides teachers an opportunity to transfer their knowledge of teaching and learning into practice using a process of merging ideas and practice and thus reaching a higher level of self-awareness and evidence-based decisions (Stern, 2014).

Reflection in teaching

Reflection is considered to be an important aspect of the development of teachers and student teachers. Dewey's work on reflective practice was developed by scholars such as Donald Schon (1983) to mean how professionals think in action. Schon went on to distinguish between two forms of reflection: reflection in action and reflection on action. The first involves the teachers' ability to instinctively resolve situations while they are happening whereas the latter is where teachers are encouraged to bring their acquired knowledge to the level of consciousness and thereby, based on analysis, take their teaching actions directly under their own control (Singh & Mabasa, 2013). Teachers' reflective thinking includes attitudes, beliefs and perceptions as well as professional self-image of teachers as change agents. Reflection on action enables a thorough conscientious analysis of the situation at hand including deliberation and consideration of different possibilities (Pellerin & Pauker, 2015; Singh & Mobasa, 2015). Reflective thinking together with the ability to work in teams, to solve complex problems, and to apply knowledge gained to other circumstances are increasingly important twenty-first century skills.

Reflective learning coupled with IBL encourages students to truly explore and understand the learning process and its impact upon them, leading to new understandings, deeper learning and enhancement of the learning experience

In order to reflect upon and review educational events and experiences it is necessary to identify those events perceived as significant by the student (Supyk & McKenna, 2005/6). There is evidence to show that reflective techniques such as reflective diaries can help students to consolidate and assess their learning of a discipline and its practices (Smith, 2011).

"Researching instruction in education: self-study using reflection"

This mandatory course is taken by student teachers who major in special education in their third year of studies. In the academic year 2015-2016 the cohort included 45 students. Of them, 5 (10%) presented valid diagnoses for LD and were entitled to receive support and accommodations. All five met the entrance criteria.

The objectives of this course are twofold: (1) a self-study of instructional processes to improve one's own practice and (2) writing a small-scale research paper. The research draws on the student teachers' experiences in the classroom during the practicum. The student teachers are expected to use an inquiry-based strategy i.e., to determine and formulate a question or hypothesis; to gather data and to examine, analyze and reflect on it; to generalize and determine recommendations and solutions to the original query (Colburn, 2000). The reflection required calls for a high ability of conceptualization and a high level of verbalization. This combination of IBL with practice contributes to the development of more sophisticated levels of

intellect and practice, as is common in research based inquiries (Healey, 2005). The student teachers are asked to explore, look for, search and identify an issue that is of interest to them, an issue they deem to be worthy of research.

An updated literature review (Koster & van den Berg, 2014) points out that self-study by teachers intended to improve their own practice, has developed rapidly in recent years. It is often considered the study of one's own practice by the systematic exploration of what is happening, what participants think about their own practice, and what they want to change in their practice. Self-study in education is based on the premise that teachers are involved in two realms – practice and research. It is sometimes viewed as a specific form of action research, focusing on self-study research as understanding one's own practice (Koster & van den Berg, 2014). Thus, self-study is part of the action research tradition in education and is seen as an effective way of learning by doing and changing one's own teaching practice. Similarly, in this course, the call for self-study is rooted in the student teachers' practicum.

Action research involves systematic inquiry and self-reflection, which integrates into changing processes, making people examine their chosen issues in order to find a proper solution and improve their practices (Stern, 2014). Self-study is a genre of research concerned with examining the role of the educator within professional practice settings. It has to do with one's own personal and professional identity and a variety of meanings has been associated with the term "self-study," including self-directed learning. In action research, the researcher is part of the phenomenon being investigated as opposed to traditional research. Reflection is of primary importance in action research since the researcher him/herself is concurrently a participant and an implementer in all phases of his/her classroom-based research (Vula & Saqipi, 2015).

Being engaged in self-study enables student teachers to get acquainted with his/her perceptions, beliefs and attitudes and through them reflect on their practice. In addition, self-study functions as a means of better understanding the complex nature of teaching and learning. In self-study, researchers focus on the nature and development of personal and practical knowledge through examining, in 'real life' situations, their own beliefs, practices and contexts. The first step of self-study has to do with nurturing the necessary skills of student teachers for systematic observation and scrutiny of their practice and of the learning environment. On the personal level, outcomes of self-study research focus on improvement of self-understanding and enhanced understanding of teaching and learning processes.

One of the main goals of the course is to mentor the student teachers in the process of developing the ability to find out their inner subconscious processes of growth within the profession of teaching, to probe and question it. The essence of this goal is to encrypt the uncertainty in the process of teaching. The student teacher as a researcher involved in self-study, collects data on his own practice via a pedagogical diary utilizing reflective writing. This inquiry, using reflection as a research instrument, leads to further self-awareness and so on.

The course is constructed of several linear modules as follows:

Module 1 – Introduction

This introductory module involves getting acquainted with academic research including structure and referencing with a focus on the methodology of self-study.

Module 2 – The issue to be researched

This module is about the consolidation process involved in the decision about the topic of the research. The student teachers' thoughts stem from their experiences during the practicum as documented in the pedagogical diary in a reflective manner. As a researcher, the student documents and collects data about the different interactions in the learning environment: interactions of the pupils with their peers and interactions of the student teacher with the pupils, the classroom teacher and the support staff as well as with the curriculum and the physical environment of teaching. Thus, the decision on the issue to be researched is a result of the ecological relationships of the student teachers.

Module 3 – The objective/s of the research and the research question/s

Once the issue or topic was decided upon, it is necessary to consolidate the objective/s of the research and to crystallized research question/s. The premise of this module is that a teacher's practice is rooted and dependent on constant inquiry and research of one's own practice. Student teachers are expected to ask themselves what is the objective of their research and then derive the research question/s.

Module 4 – Analysis, discussion and conclusions

The student as researcher keeps a reflective pedagogic diary which contains daily reflective records. These records are analyzed for the purpose of identifying recurring themes or issues with reference to the objective/s and the research question/s. These themes are then consolidated to central themes that provide responses to the research question/s. The discussion and the conclusions are based on inner sources i.e., the reflective records and on outer sources i.e., published research articles.

Module 5 – Writing a small scale research paper

The final module has to do with the composition of the research paper in accordance with the structure and referencing of an academic work as studied in Module 1.

The learning process of the course is gradual: firstly, the students pose the research question; then they infer conclusions following analysis of their reflections and in the third and final stage they consolidate their work in the form of an academic research paper.

The following illustration presents the modules and the structure of the course.

Introduction: learning about self-study research		
A. Formulating the research question Modules 2 & 3: The issue to be researched The objective/s of the research and the research question/s	**B. Inferences and conclusions following analysis of reflections** Module 4: Analysis, discussions and conclusions	**C. Writing an academic paper** Modules 5: Writing a small scale research paper

Illustration no. 1. The structure of the course presented by modules

As a result of their learning difficulties, student teachers with LD have a lot to contend with at every stage of the process. Compared with their peers without LD, they need more intensive mediation, in particular with regard to using their learning skills, discussing an argument and presenting sound conclusions. Student teachers without LD tend to perform more efficiently in these areas.

Student Teacher Reflection

The following section provides a detailed description of the three stages of the learning process illustrated by comments made by the participating student-teachers in their pedagogic diaries and e-mail correspondence with their instructors.

A. Formulating the research question (modules 2 & 3)

The context of this course, as described above, is a self-study of teaching and learning during the practicum where students-teachers constantly reflect in writing on their work in the classroom. Thus, this stage involves several activities: identifying the 'what', the specific topic to be researched; formulating the 'why', the objective/s of the research and phrasing the research question. The identification occurs as a result of reading and re-reading their reflective reports trying to identify recurring themes and issues.

These activities require high-order thinking skills such as deductive reasoning, comprehension of abstract concepts, being able to make a distinction between core and incidental issues, self-regulation and using common sense efficiently. In addition, the accumulated data has to be organized in a way that will lead to the research question.

The following citations were extracted from reflective diaries prepared by student teachers with LD and are presented here to demonstrate their difficulties:

> "Even though I concentrated on a topic I would like, and it is in fact a part of me, it was not very easy to get it written down".

> "Being a student with LD myself, I could easily identify with those of my students who expressed feeling inadequate. Therefore, in my teaching I made a point to create experiences of success which will elevate their self-esteem and sense of self- efficacy. I remember how I felt at their age".
> "I heard so much about inquiry and research! It was always described in detail using long sentences. It always tired me! I was sure this will bring me down! I know all about failure – ever since I started first grade. No one was talking about learning disabilities then. I was the smart girl who was too lazy to bring her abilities to good use, who was capable of leading the whole class in no time if she didn't like what the teacher said but what it means to succeed academically I didn't know then".

Some student teachers with LD are so absorbed in their personal narrative that much mediation, on the part of their instructor, is needed in order to move on. With time, they are able to use their past to perform better:

> "My research involved youth with LD, much like I was. I remember how difficult it was for me to concentrate in class and to be motivated. I am able now to identify when they are less motivated and do something about it. They become restless, they ask to get out and they are busy with other things".

Student teachers without LD are able to separate their past experiences from the present, they are less bothered by possible difficulties and they have less trouble in adapting and performing as required. Following are two examples extracted from the reflective diaries of student teachers without LD:

> "I've never worked with children with LD. My knowledge was based on theory and research articles I read. I was worried when I first arrived to the school and I didn't know how I will be able to teach them. The purpose of my study was to examine how personal attention of a teacher to a student can contribute to student's success. I examined different situations – individual lesson, group session and informal opportunities".
> "My research question is related to self-efficacy of student teachers and possible changes in self-efficacy when using different teaching methods – whole-class teaching and individualized teaching".

Student teachers with LD are less skilled in using high-order thinking skills and very often they have memories of unpleasant past experiences in school situations. Compared to their peers without LD they tend to have more difficulties to differentiate between core and incidental issues, they find it difficult to generalize and to formulate a research question and most important have difficulty in self-regulation of thoughts, emotions and behavior in the context of learning (Zimmerman & Schunk, 2011).

In summation, students with LD have difficulty identifying a topic and formulating a research question. Very often they tend to be absorbed in their own past experiences in school. This kind of tendency to deal with past experiences and difficulties encountered in childhood correlate with findings of previous studies (Vogel & Sharoni, 2011).

In module A the student teachers with LD had great difficulties with formulating the research question. Mediation and assistance to students with learning disabilities was required. It was necessary to instruct the students how to draft a reflection describing the experiences objectively and offer interpretation from current perspective. Developing, writing, and re-writing research questions are all part of a dynamic, reflective qualitative inquiry process.

B. Inferences and conclusions following analysis (of reflective diary) (Module 4)

The written reflections portray processes of meta-cognition - thinking about teaching. It is very important how they are written. Reflective thinking includes the beliefs and perceptions as well as self-efficacy. Some student teachers with LD find meta-cognitive thinking as well as writing in general and expressive writing in particular, too difficult. This is also the case when asked to express their practicum experiences. It may have to do with their typical difficulties in self-regulation and writing regulation where one is expected to regulate one's emotions and thoughts in order to focus on the assignment. Self-regulation in writing includes three domains: the physical and social environment; the behavioral and apparent motoric activities; the perceptive, cognitive and emotional state of the writer (Graham & Harris, 2000). The main difficulty of student teachers with LD is in the personal domain as expressed by one of the students:

> "Writing the reflective diary is both annoying and upsetting. One has to take into account that others would evaluate and judge it, especially the spelling errors and the style let alone the insecurity demonstrated during the actual teaching. Some of the others in class wrote their reflective reports very quickly. Even though I like to write and I don't have a problem with corrections or editing, I know it is not like this with many of my friends who have LD. With them it is like an open wound".

Other differences between students with LD and students without LD have to do with the ability to describe meta-cognitive processes. The first write a brief, 'down to earth', practical and concise report whereas the latter are able to elaborate and develop new understandings. For example: One student teacher with LD wrote:

> *"During the next few lessons it is important for me to finish teaching the topic XXX and move on to the next topic"*.

Her friend without LD wrote:

> "My individual work with this child, which lasted all day long, made it clear to me, unequivocally, that listening to the child is the key to it all… as for the quality of my work with the group, it was obvious that the sensory activities were meaningful and promoted both interest and comprehension".

However, as in many other areas, practice and exercises improve performance. This course involves much writing which in turn contributes to a development of writing skills including expressive writing. This development is relevant to all student teachers but those with LD gain an additional benefit – they improve their abilities to verbalize their thoughts and their feelings, to self-analyze their teaching and to conclude what needs to be improved. The following citation is an example:

> "Writing a reflective report is like listening to your thoughts and your feelings recorded at one point. Re-reading what I wrote makes me understand where and what went wrong and what I would do differently today".

Student teachers without LD are quick to identify and formulate their ideas at this stage. For example:

> "This paper presents my work in school, how I handled myself with the homeroom teacher and my personal and professional relationships with her. My objective is to examine how it affected me as a student-teacher and as a future teacher".
> "Throughout the practical training I felt that there are significant gaps in my sense of capability among the various teaching methods, frontal teaching and individual instruction. When we were asked to choose the subject of this study, I chose to do a research that examines the issue of disparities in feelings of self-efficacy among various teaching methods".

The skills required to identify recurring themes in accordance with the research question, include the ability to organize data; reading and comprehension abilities; conceptualization and the ability to draw plausible conclusions. At this stage, an extensive mediation was required. The instructors held individual conferences with their student teachers with LD in which they focused on direct instruction of strategies needed such as flow charts, tables and other graphic designs, as well as efficient use of information resources, digital data bases and the like. The student teachers with LD seemed to benefit from direct instruction and from mediation with regard to conceptualizing the identification of the main themes, as testified by one of the students:

> "One of the learning strategies I have picked up early on was to arrange everything in bullets as it makes it easier to draw out when needed. This strategy has been very helpful to me in the past. Writing a flowing, homogeneous passage and integrating the references as required is very difficult for me. It was very hard to be focused, precise and well versed".

One of the student teachers (with LD) wrote to her instructor:

> *"I am not sure that my research question is appropriate for the objective of my research. I will be happy if we could work on it together and you could help me to phrase my research question".*

This sheds light on another typical difficulty that is coupled with low self-efficacy. Both call for more mediation.

In summation, writing inferences and conclusions following an analysis of the reflective diary is not an easy task for students with LD. At this stage their difficulties become more obvious. Individual work, using direct instruction, was needed to discuss ideas, to keep focused, to simplify and organize information gathered as well as crystalizing the concepts and ideas and putting them down in writing.

C. Writing an academic paper (Module 5)

The act of writing an academic paper where the study is presented encompasses several abilities - deliberation, re-conceptualization, dwelling deep into the meaning of the findings. At the same time it involves tying together prior knowledge, beliefs and perceptions to intuitive knowledge and new concepts acquired while adhering to formal academic requirements. In addition, the student teachers are expected to focus on the contribution of the research performed on their practice. The understandings are presented in writing and they portray the construction of new knowledge. The student teachers are expected to integrate the information learned in the introductory modules (1) about the structure of an inquiry-based self-study report. Unlike students without LD, those with LD are characterized with difficulties in getting started, postponing the deadline (or trying to) and an overall aura of inability to complete the task. While during the course, student teachers with LD report they have difficulties and are unsure of their abilities, analysis of the documented reflections (Module 4) point out to a sense of pride on being able to contend with and overcome their innate difficulties. In addition, they report that self-study and the use of inquiry strategies contributed to a better understanding and a deeper comprehension of texts as well as pedagogic situations.

The following excerpts from e-mail correspondence are a good example:

> *"I was sitting down to get started and I don't know what to do now. What should I write? Can we please schedule a meeting?"*

The process ends once the research paper is complete. For all involved, this is a turning point. The following citations reflect the students' insights – IBL and self-study was an opportunity to learn about themselves in general and as teachers in particular. Those with LD develop an awareness and understanding of the reasons they prefer one method of teaching over another and how it is connected to their own difficulties.

> "Arranging the list of references systematically was most difficult! All those commas, full stops and indents….. I used several systems of learning strategies and a variety of reinforces together with a detailed timetable including specific dates. I couldn't 'run away' from it. I sat myself down and did the work".
>
> "This self-study made me aware how important the teaching methods I use are; how important it is to teach in a way that is different from 'pouring' the contents on the students. I learned it is important to get the students actively involved and to create experiences of success and of meaningful learning. All this will make the learning effective and meaningful".
>
> "Doing this kind of research made me face my own difficulties – the dyslexia, the dyscalculia and my challenging attention deficit".
>
> "I learned to be able to develop my thinking processes in a creative fashion; I learned a lot from the home-room teacher and from my instructor. Both helped me to prepare the lesson plan and to use whatever is needed to improve the students' motivation to learn. Writing the research report help me to learn about myself and what kind of teacher I want to be".

In summation, using reflection for learning through inquiry is meaningful and it promotes high-order thinking. The process of drawing conclusions at the end enables the student teachers to practice generalization and to form new understandings with regard to their teaching. Of particular challenge to student teachers with LD is writing the research report, beginning with a decision on a topic, then the identification of an issue through reading and re-reading one's own reflections, moving on to additional reading on the topic and culminating in a written paper. Much mediation of the instructor is needed for these student teachers.

Conclusions

The main characteristic of this course is that it begins with sorting out an issue, following an analysis of a reflective diary then moving on to pose a research question. The issue chosen is relevant and meaningful as it relies on experiences reported and reflected upon. This process calls for higher-order thinking and facilitates inner comprehension and self-awareness with regard to the profession

of choice - teaching. The teaching of reflective skills offers a way for practitioners to gain insight into their own professionalism and the knowledge and power of the disciplines they align themselves with (Smith, 2011). The course relies on self-study and uses the reflective (pedagogic) diary as a vehicle to enhance inquiry. Reflective diaries are a common practice in teacher training as well as in health-care training of nurses and physiotherapists for example and in science studies (Supyk & McKenna, 2005/6). The specific structure of this course enhances the contribution to students with LD as they are required to contend, heads on, with their difficulties.

The literature on students with LD in Higher Education is scant and is inclined to examine students' expectations, faculty attitudes and environmental factors rather than the academic performance of these students. This course is meaningful to any student teacher but the specific difficulties of those with LD were evident during the different stages of this course and called for response on the part of their instructors.

During stage A (Modules 2 and 3) the differences between student teachers with LD and students without were with regard to how they began their self-study and the level of mediation required. Those students with LD had more difficulties in identifying the 'what', the topic to be researched and the 'why', the reasoning for choosing this topic. Mediation by the instructors included extensive email correspondence and many individual conferences. A large part of the mediation was devoted to the encouragement of students with LD to read and re-read their reflective diaries in order to develop meta-cognitive thinking skills so that they could discern meaningful issues as required. Zimmerman & Schunk (2011) argue that difficulties in self-regulation, typical of student teachers with LD, may be the source of their weakness in meta-cognitive thinking skills.

Stages B (Module 4) and C (Module 5) have to do with writing. A self-study report, like other research reports, calls for high-order reasoning skills including analysis, distinguishing between core and incidental, conceptualization and generalization of main themes as well an academic style of writing.

Differences in the writing processes between student teachers with LD and students without included the following: difference in style, amount and type of information documented, and the attention given to the sequence of events and occurrences during a lesson. The reflective diaries of student teachers with LD were quite concise and restricted to factual description with little analysis and conclusions whereas their peers not only described the lesson but looked for possible reasons to explain why it went the way it did. Very often they ended the diary insert with a recommendation for the future. Difficulties in syntax coupled with impaired self-regulation and thinking processes is also a characteristic of LD. Writing is a complex process that entails regulation of thought and emotion as well as syntax and language (Graham & Harris, 2000).

Another difference has to do with the time needed to complete the requirements of the course.

Compared with their peers, student teachers with LD have to put more time into planning, organizing, writing and any other activity needed.

However, much like any other student, systematic mediation helps student teachers with LD to reach high-level thinking and to produce a good research paper based on their self-study. At the end of the course, once the research paper is written and handed in, the students with LD reported a sense of empowerment and greater self-efficacy. Overall, this was an experience of success on both levels – the cognitive and the practical. The understandings achieved through writing the reflective diary influenced the practice.

Our understanding is that students with LD, in particular in inquiry-based courses, need more attention coupled with extensive mediation. At the same time, in spite of their difficulties and the extra burden on their instructors, such courses empower and enhance their academic skills and offer an opportunity to perform as well as their peers. The personal involvement in this course and the fact that the issue chosen for inquiry is based on personal experiences makes this course meaningful and empowering, in particular for student teachers with LD.

Lately, one of the instructors received this e-mail from a former student teacher (with LD):

> "Keeping a reflective diary was quite a burden at the time but as time goes on and I don't remember exactly what went on, I stumble on a well written paragraph and by now, with my experience, I know I should have done differently and better".

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Epilogue: Student Teacher Inquiry

Pete Boyd and Agnieszka Szplit

In the twelve chapters of this book the authors have provided insight into their pedagogies for teacher education and how these relate to the theme of student teacher inquiry. Rather than reporting on the well-established approach of 'teacher action research' most of the chapters provide insight into a very wide range of creative learning activities used by teacher educators under the broad banner of 'inquiry-based learning'. In this epilogue, reflecting as editors on the rich range of chapters within the text, we will offer some thoughts around the characteristics of student teacher inquiry, the focus of student teacher inquiry, the language of teacher inquiry and the possibilities for teacher inquiry to contribute to new knowledge.

The characteristics of student teacher inquiry might reasonably be considered to include some or all of the following:

- Sustained focus on learning (of pupils and / or of teachers)
- Developing a meaningful and challenging question
- Enactment in a classroom or school (or simulation) with an element of experimentation
- Critical engagement with both public knowledge and practical wisdom
- A theoretical framework or perspective
- Ethical collection and analysis of some evidence of learning (data)
- Development of pedagogical knowledge but within the context of a curriculum subject
- Reporting on findings to peers

And it is interesting to consider to what extent these characteristics are demonstrated by each of the strategies described in detail within the preceding chapters. In many of the approaches evaluated it appears that the tutor provided much of the shape of the inquiry rather than allowing student teachers to develop their own questions. This structured approach seems reasonable provided that student teachers are developing understanding and skills in inquiry and working towards a capstone professional inquiry assignment. Four of the chapters focused on teacher identity and again this seems worthwhile, assuming that elsewhere on the programme students pursue inquiry that is focused on children's learning. Chapter 9 by Femke Timmermans and Gerda Geerdink puts down a warning to

us all, as teacher educators, that efforts to develop students' research skills do not necessarily translate into their adoption of inquiry as stance.

In relation to the focus of student teacher inquiry, if our aim as teacher educators is to develop inquiry as stance (Cochran-Smith & Lytle, 2009) then it seems important to consider the *authenticity* of the inquiry-based tasks that we set for student teachers. Considering a pedagogy for teacher education that is informed by a clinical practice model (as proposed in Chapter 1) then the inquiry should focus on a 'core practice' of teaching (Grossman, Hammerness & McDonald, 2009). A pragmatic list of teacher core practices might include the following: planning lessons; planning sequences of lessons; explaining; designing learning activities; facilitating classroom learning; setting high expectations; responding to individual learning needs; questioning; assessing and giving feedback; grading, monitoring, recording and reporting. An inquiry focused on one or more of these seems likely to feel authentic to student teachers because of its relevance to classroom practice. But a higher level list of professional core practices might include: collaborating within a teaching team; evaluating teaching and learning; critically engaging with public knowledge (theory, research evidence, professional guidance and policy); and leading change in practice. In designing student inquiry the teacher educator might focus the activity on one or more core practices, and at some point in their programme the student teacher needs to develop the skills of designing an inquiry more independently. Related to the focus for student inquiry is the organisational challenge for many teacher education programmes around the sequencing of student opportunities for enactment of core practices in the classroom whilst retaining the space for them to plan, complete and follow-up an inquiry.

In reflecting on the 'language' of teacher inquiry a useful starting point is to consider the difference between 'teacher inquiry' and 'teacher research'. This might seem straightforward in that research would perhaps be more systematic, more formal in terms of methods, more theorised, more engaged with the research literature, and less focused on simply improving local change in practice. But language is important in shaping practice and it is important that educators develop a shared language of 'inquiry'. This seems to be particularly important in the current context of education, dominated as it is in many nations by Neoliberal policy that emphasises students and parent 'choice' of school or university within a quasi-market. Some language has been appropriated, for example in schools in England the term 'data' is now widely taken to mean quantitative test and examination scores used to track student progress. If a research mentor suggests 'collecting some data' by which they mean a wide range of possible sources and types of information, then unfortunately teachers and especially school leaders will take that to mean test and exam results. In this case a work around is to use the term 'evidence of learning' in place of data but even that alternative term perhaps reflects the context as it still might imply a focus on measurable outcomes. Developing a shared language for teacher inquiry will require activity at local and

national levels but perhaps some progress is also possible across international networks. Most importantly it will be a language that needs to be developed in the context of application, meaning in schools.

Finally we should consider the possibilities for co-creation of new knowledge through teacher inquiry and reflect on the position of student teacher inquiry within that bigger picture. The concept of 'Mode 2 Knowledge' is contested but certainly has resonance for teacher educators committed to supporting teacher inquiry. Mode 2 means knowledge that is developed within the context of application and is seen as strongly contextualised and socially robust (Nowotny, Scott & Gibbons, 2001). In educational research generation of Mode 2 knowledge therefore happens in schools or other educational settings and the position of a university-based researcher is one of boundary-crossing agent collaborating with expert teachers as co-researchers. The collaboration of university-based educational researcher with school-based practitioners reflects the kinds of scientist, engineer, designer collaborative research teams identified by Ben Shneiderman as capable of producing breakthrough research in technology fields (Shneiderman, 2016). The student teacher might be considered to be a boundary-crossing agent and student teacher inquiry therefore offers possibilities for teacher educators to build collaborative research with school-based teachers. This pursuit of co-creation of mode 2 knowledge perhaps all seems rather ambitious. It requires university-based teacher educators to be active confident researchers and generous collaborative partners for teachers. It also requires teachers to find time and develop capacity for inquiry. Kurt Lewin, the founder of action research, commented wisely that 'Experience alone does not create knowledge'. As university-based teacher educators and expert school teachers we should collaborate through professional inquiry, and student teacher inquiry is an important opportunity for such collaboration.

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All the discussion in the Chapter 7 related to these issues is part of her PhD thesis.

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ISBN 978-83-65644-07-7