Re-imagining Initial Teacher Identity and Learning Study

Final Report

Paul F. Conway, Rosaleen Murphy & Vanessa Rutherford

School of Education
University College Cork

An Irish Research Council-funded study
(Advanced Colaborative Research Award, 2012-13)

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Disclaimer

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During the course of RIITILS, the IRC funding provided the opportunity to strengthen existing links with two projects: (i) the US-National Science Foundation-funded TEDS & FIRSTMATH projects based at Michigan State University (Prof. Teresa Tatto, PI, MSU). The *Trends in Mathematics Education Conference* held in UCC 26th Nov 2012 was co-funded by FIRSTMATH, the School of Education, UCC and the

RIITILS. We were also then able to host the four-day FIRSTMATH research planning meeting (27-29 Nov 2012) in UCC; (ii) the *Re-designing Initial Teacher Education: Deepening Engagement with Pedagogy Conference* held in June 2013 with the keynote by Prof Aki Murata, University of California, Berkeley, USA, on Japanese Lesson Study in mathematics education, made possible through collaboration with a 1.25 million euro Norwegian Research Council-funded study on Lesson Study in Initial Teacher Education under the PRAKUT programme. We express our appreciation to Prof. Raymond Bjuland (PI) and Prof. Elaine Munthe, Dean of Education and Social Sciences – both at the University of Stavanger, Norway.

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1st October 2013

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0.1 Abstract

The aim of this research, the *Re-imagining Initial Teacher Identity and Learning Study* (RIITILS) was to continue writing from and to extend the *Learning to Teach Study* 1 (LETS1). LETS1, funded by the Department of Education and Skills (DES), was the first study of its kind on the Postgraduate Diploma in Education (PGDE) in Ireland, and involved the development and implementation of a study of initial teacher education in the PGDE in post-primary education, in one School of Education. Its aim was to identify the individual and contextual dynamics of how student teachers develop curricular and cross-curricular competences during initial teacher education (ITE). Within an overall framework that explored how student teachers develop their skills, competences and identity as teachers, it focused on curricular competences in mathematics, science and language teaching, and on the cross-curricular competences of reading and digital literacy and the development of inclusive teaching practices. LETS1 was the first programme level research on the PGDE, familiarly known to generations of student teachers and teachers as '*the Dip*' or '*the HDip'.* Similarly, RIITILS involved a programme level study of the 'Dip', since renamed the Professional Diploma in Education (PDE). We use LETS 2 to denote data collection on undertaken in this second study. LETS 2 utilised and extends three key findings from *Learning to Teach Study 1* (LETS 1): post-primary teachers struggled to enact the meaning of 'real world' experiences in maths, had limited understanding of how reading literacy impacted their subject and while they felt ready to teach did not feel able to promote inclusion. Using LETS 1 as a unique data set, LETS 2 updated it by collecting data from the 2012/2013 PDE cohort, and extended it by focusing on student teacher development (through interviews, survey and artefacts) to examine how mathematics student teachers engaging with reform-oriented Project Maths, in particular, engage with the 'real world', reading literacy and inclusion.

Drawing on research on teacher education both in Ireland and internationally, the RIITILS report is divided into four main sections: (i) an introduction and overview of the study, (ii) a summary of RIITILS activities including conferences (one in collaboration with US National Science Foundation-funded FIRSTMATH study; and another on the reform and redesign of initial teacher education through deepening engagement with pedagogy, which featured keynote addresses on Japanese Lesson Study in mathematics), as well as participation in local (Institute for Social Sciences in the 21st Century: ISS21) and international (e.g. US National Science Foundation-funded TEDS/FIRSTMATH) networks (iii) findings from the four strands of the research: Teacher education policy, mathematics, literacy in subject areas and school university partnerships, and (iv) a list of publications in the form of book chapters,

conference proceedings, articles – both published and in progress - from LETS 1 and this IRC-funded study during 2012-13.

The IRC-funded RIITILS provided essential support to bring a large number of co-authored publications to conclusion, as well as initiate a number of others. Prior to this IRC-funded study, in addition to the main report and executive summary, two journal articles based on LETS 1 were published: 'Novice teachers as invisible learners' (Long et al, 2012, *Teachers and Teaching: Theory and Practice*), 'Authoring oneself and being authored as a competent teacher' (Hall et al, 2012, *Irish Educational Studies).* Publications based on data from LETS 1 and LETS 2 that have been published from work undertaken during the life-cycle of this 2012-13 IRC-funded Advanced Collaborative Research Award focus on: a critical discourse analysis of teacher education policy (Conway, 2013; Conway & Murphy, 2013), teacher education programme design (Conway et al, 2012), literacy in initial teacher education (Murphy et al, 2013, in press), teacher identity (Rutherford, et al, 2013, in press), workplace learning and initial teacher education (Conway, Murphy & Rutherford, 2014, in press; Conway & Munthe, 2014, in press), pilot of FIRSTMATH (Conway, et al, 2014, in press). A number of other articles, involving co-authorship by various configurations of LETS 1 and/or LETS 2 researchers, have been submitted for review and focus on: inclusion and 'othering' in teacher education (Kitching et al), current practices and future directions in school-university partnerships in initial teacher education (Connolly et al), the changing construction of literacy from LETS 1 to LETS 2 among student teachers (Conway et al), a Bernsteinian analysis of curricular emotions among student teachers of mathematics (Rutherford et al), a case study, employing a Bakhtinian-framework, of one student teacher's construction of reform-oriented Project Maths (Rutherford et al), an analysis of changing conceptions of adolescent literacy and their significance for initial teacher education (Curtin et al), student teachers' construction of modern language teaching (McKeon et al). A number of other manuscripts are well developed and are due for submission shortly and are detailed in the report.

Like LETS 1, RIITILS is framed within a socio-cultural perspective on learning, and adopted a mixed methods research design. RIITILS involved four work strands: (i) policy analysis of the rapidly changing teacher education landscape in Ireland, (ii) an analysis of student teachers' understanding and teaching of mathematics (particularly problem solving in the context of reform-oriented Project Maths), (iii) an analysis of student teachers' understanding and teaching of literacy in their subject area and (iv) one-to-one and focus group interviews with three schools that have well-developed practices for supporting PDE students. Building directly on LETS 1, LETS 2 data collection on the PDE involved a survey of PDE student teachers, as well as interviews. Nine (n=9) students, who first or second subject was mathematics were interviewed at intervals over the course of the PDE programme, a focus group drawn from the wider group of mathematics pedagogy students was held, and one hundred and two students (n=102) responded to and completed a detailed survey on their

learning to teach experience which had been distributed to the entire PDE 2012-2013 cohort.

Among the dimensions of learning to teach addressed in the findings are the rapidly changing teacher education policy landscape in Ireland (Strand 1), significantly shaped by both new Teaching Council regulations as well as a policy step change in response to the results from the OECD's PISA 2009. Strand 2 findings on the teaching of mathematics draw on two theoretical frames to present findings on mathematics teaching in an era of reform: (i) a Bernsteinian analysis of the classification and framing of emotions in mediating student teachers' construction of mathematics pedagogy, and (ii) a Bakhtinian analysis of the discursive construction of problem solving narrated through a detailed case study of one student teacher who though, he *'knows maths and likes maths'*, as the article title indicates[1], grapples with teaching Project Maths given the significant leap it represents from his own experience of learning of mathematics as a student at second and third level. This case conveys the vivid manner in which PDE students are typically experiencing the difference between their own experiences of learning mathematics in second and third level compared to what is now expected of them in teaching Project Maths. Strand 3 provides an analysis of how PDE students constructed literacy in their subject teaching, drawing on data from both the 2008-09 and 2012-13 cohorts and suggests both continuity and some important changes over time. In particular, whereas in LETS 1 student teachers typically associated literacy with support for students for whom English was a second language or had literacy difficulties, there was a notable emphasis on, and sense of responsibility by student teachers for, the wider role of literacy in their subject teaching for all - not just some - students.

Strand 4 focuses on school university partnerships, a key aspect of initial teacher education, and as with LETS 1, the role of observation, mentoring and support in schools for PDE students was the focus of analysis. There was a significant increase in observation opportunities for student teachers from LETS 1 to LETS 2, and these opportunities, as was the case in LETS 1, were significantly associated with the presence of school level coordination. From LETS 1 to LETS 2, there was a small decline in the presence of school level coordinators, while assigned and sought after mentoring opportunities were similar, and there was a small increase in the number of student teachers that had no mentor, that is, school level, assigned or sought after, available to them in their school. In addition, LETS 2 identified a range of generative practices in some schools including: (i) discussion between cooperating/mentor teacher and PDE student after university tutor visits, (ii) a school resource book for mentor teachers, passed on year-to-year by the staff person designated to provide overall school coordination for PDE students, and (iii) a planning notebook shared between PDE students and their subject mentor teacher.

[1] *'Knowing Maths, Liking Maths & Reform Dilemmas in One Classroom: a Bakhtinian perspective on learning to teach mathematics'* (Rutherford et al, 2013: currently under review for publication)

Many of the findings from the *Learning to Teach Studies* are not unique to the PDE or to UCC but reflect perennial dilemmas and emerging challenges in the changing landscape of initial teacher education in Ireland and internationally. This fact is important in setting a context for the wider dissemination[2] of the findings from *Learning to Teach Studies 1 and 2*. In conclusion, the purpose of this report was to present the main outcomes of the *Re-imagining Initial Teacher Identity and Learning Study* in terms of focus, activities and publications. In doing so the report presents work completed as well as on-going analysis and writing given the scale of both studies. Four ideas emerged as important in thinking about the implications of this study: (i) **connected maths and reconfiguring** experiences past and present, (ii) **broadening engagement with literacy** within subject teaching, (iii) **deepening engagement with pedagogy** in schools between PDE student and school mentors, and (iv) **bridging between school and university and brokerage within both institutions**. These four 'big ideas' are, we argue, worthy of attention at two levels, that is, both in terms of the redesign of initial teacher education and in the research on those reformed practices.

[2] Publications from the DES-funded *Learning to Teach Study* 1 (LETS1) and IRC-funded *Learning to Teach Study* 2 (LETS2) are available through the Cork Open Research Archive (CORA): http://cora.ucc.ie/ and via the Project website: http://www.ucc.ie/en/LETS/

Re-imagining Initial Teacher Identity and Learning Study: Final Report

1.0 Introduction

The *Re-Imagining Initial Teacher Identity and Learning Study* (RIITILS) was funded, by the Irish Research Council, through the Government of Ireland Collaborative Research Projects Scheme 2012-13. The title of this project was inspired by the challenges associated with re-imagining teacher education in the context of recent review and reforms of teacher education in Ireland (Kellaghan, 2002; Byrne, 2002; Coolahan, 2007; Conway, Murphy Rath and Hall, 2009), particularly since the establishment of the Teaching Council (Ireland) in March 2006. Consistent with trends internationally, teacher education has become the focus of policy maker attention to a degree unprecedented in the past (Darling-Hammond & Lieberman, 2012).

In Ireland, for example, this trend is reflected in the *Re-imagining initial teacher education: Perspectives on transformation* 2011 conference and associated edited book (Waldron et al., 2012) that brought together many current issues in the field of teacher education in Ireland. The word "re-imagining" brings with it connotations of creativity and possibility - it invites us to take a fresh look at traditional ways of doing things, and it opens up possibilities for the future. What we mean by imagination here is the capacity to perceive and appreciate current realities and yet invite plausible, rather than fanciful, possible worlds (Bruner, 1986). As such, re-imagining the professional education of future teachers needs to consider the pedagogy, psychology and politics of teacher education (Conway, 2001). As Greene reminds us, we are "preparing the young 'for the task of renewing a common world' (Arendt, 1961, p. 196)" (Greene, 1995, p. 3).

RIITILS follows, and builds upon, a DES-funded programme-level study of the Professional Diploma in Education (PDE) that was undertaken in the School of Education, University College Cork from 2007 to 2010. The *Learning to Teach Study (LETS1): Curricular and Cross-curricular competences in Initial Teacher*

Education[3], was funded by the Research and Development Unit in the Department of Education and Skills and by the School of Education itself. One of the issues explored in LETS1 was how participants on the Professional Diploma in Education understand and develop their identities as neophyte teachers as well as acquiring the skills and knowledge they need to function as competent teachers. We were anxious to explore further this issue of identity formation during the PDE programme. We also wished to look in greater depth at some other issues raised in LETS1: the teaching of mathematics at a time of curriculum reform, the role of language and literacy across all subjects, and the challenges inherent in facilitating the learning needs of a diverse student population. In addition, we noted several additional areas in which changes had occurred between LETS1 in 2008-09 and RIITILS/ LETS2 in 2012-13. Among these were:

- recent significant changes at policy level with regard to initial teacher education
- greater awareness of literacy as an issue for teachers for teachers of all subjects, but for maths in particular
- the significant influence of Project Maths and consequent changes in mathematics teaching methodologies, including more emphasis on teaching through problem-solving
- the emerging newly configured partnerships between schools and university in initial teacher education, including mentoring and observation opportunities for student teachers. As in LETS1, the school in which placement took place had a huge influence on the overall experience of the beginner teachers in our study, and it appeared that there was still a wide variation in the level of support available to them.

We explore all of these issues in more detail later in this report. The core team members on the RIITIL study were Dr Paul Conway (Principal Investigator), Dr Vanessa Rutherford (Post-Doctoral Research Fellow), and Dr Rosaleen Murphy (Research Fellow). Dr Tracey Connolly, Dr Alicia Curtin and Michael Delargey, all from the School of Education, UCC, also contributed to gathering the interview data..

[3] Conway, P.F., Murphy, R., Delargey, M., Hall, K., Kitching, K., Long, F., McKeon, J., Murphy, B., O'Brien, S., & O'Sullivan, D. (2010). *Learning to Teach (LETS): Developing curricular and cross-curricular competences in becoming a 'good' secondary teacher*. Cork: School of Education, UCC.

In the three years since the completion of LETS1, there have been a number of significant developments in teacher education in Ireland, not least the radical reform of the Professional Diploma in Education programme for second-level teachers that will be necessitated by its transformation into a two-year programme from 2014 onwards. While this is still in the pre-implementation stage, changes have already taken place in various aspects of the PDE, influenced not only by the coming reform but by policy documents from the Department of Education and Skills (DES, 2011; Sahlberg, 2012) and the Teaching Council (2009, 2011a, 2011b, 2011c, 2012), the on-going quality review processes in teacher education institutions, and the body of research into teacher education that has appeared in recent years, including the LETS1 report (Conway et al, 2009). The concern with levels of literacy and numeracy fuelled by the results of the 2009 PISA assessment (Hislop, 2011; Conway & Murphy 2013) along with the roll-out of Project Maths in schools and consequent public debate on the topic have focused attention in particular on the teaching of mathematics and on literacy as a concern for all teachers, whatever their subject specialism.

The RIITIL study utilises and extends three particularly significant findings from the *Learning to Teach Study (LETS1)*: that (1) post-primary teachers struggled to enact the meaning of 'real world' experiences in maths, (2) that they had limited understandings of how reading literacy impacted their subject and (3) while, as they neared the end of their PDE programme they felt ready to teach, they did not yet feel confident about their ability to be truly inclusive in the classroom. The RIITIL study makes use of the existing unique data set collected during the LETS1 study, and extends it by focusing on student teacher development (interview, survey and artefacts) to examine how student teachers of mathematics, in particular, engage with the 'real world', reading literacy and inclusion.

The aims of the RIITILS /LETS2 project were:

- To undertake further analysis of the existing LETS1 data set in the context of reform in teacher education in Ireland and internationally
- To systematically extend LETS1 by gathering new data, using a mixed methods design, on how student teachers learn to teach

- To disseminate the findings from both the original and the extended research projects so as to contribute to and to impact upon policy, theory and practice in the field of initial teacher education.

The specific objectives of RIITILS were:

- Building systematically on LETS1, to gather additional data on the three focal issues: (i) student teachers' difficulties in enacting 'real world' examples to foster student learning, (ii) student teachers' narrow views of reading literacy and (iii) perceptions that being ready to teach is separate, in many respects, from doing inclusion
- Using a mixed methods approach, to conduct a survey of all PDE students in the 2012-2013 cohort, to undertake one-to-one interviews with a smaller number (11) of student teachers over the course of the year, and to conduct a series of interviews and focus groups with principals, vice-principals and teacher mentors in three schools where PDE students are on placement.
- To re-evaluate the survey data from LETS1 in light of subsequent analysis of the RIITILS/LETS2 survey
- In gathering data, to focus in particular on artefacts such as (i) teacher work samples, (ii) portfolio and other coursework-based data that will provide evidence of how student teachers' thinking and practice is changing
- Building significantly on LETS1, to produce publications in the form of journal articles, a textbook and an academic research book
- Dissemination to policy makers and other teacher educators via seminar, website and research conference presentations

1.1 Central Research Questions:

The research questions of both LETS1 and RIITILS/LETS2 are informed by socio-cultural theories of human learning and development. A socio-cultural perspective on competence in initial teacher education (ITE) emphasises the situated, relational and political dimensions of competence (Lave & Wenger, 1998; Claxton & Wells, 2002; Hall, Murphy & Soler, 2008; Korthagen, 2010), and draws our attention to key issues such as the opportunities available in the culture and immediate environment to become competent. LETS1 was guided by two research questions:

- What are the individual and contextual dynamics related to the development of teaching competence in the PDE?
- In the context of the PDE, what are the challenges and supports in developing teaching competence in mathematics, science, language teaching, inclusion and reading and digital literacy?

RIITILS/LETS2 sought to extend and elucidate three findings from the Learning to Teach Study (LETS1): that post-primary teachers struggled to enact the meaning of 'real world' experiences in maths to promote student learning, had limited understanding of how reading literacy impacted their subject and while they felt ready to teach did feel able to promote inclusion. As such, the three focal questions in RIITILS/LETS2 were:

- How do student teachers' understanding and enactment of 'real world examples', reading literacy and inclusion interact?
- What factors (within and between schools and university) support the optimal development of student teachers vis-à-vis the three focal issues?
- What factors (within and between schools and university) constrain the optimal development of student teachers vis-à-vis the three focal issues?

Drawing on research on teacher education both in Ireland and internationally, the RIITIL report is divided into four sections:

Section 1 gives an overview of the project actions and outcomes from RIITILS /LETS2, and outlines its impact on teacher education at policy and pedagogical levels.

Section 2 lists the publications arising from RIITILS/LETS2 and other disseminations of its findings.

Section 3 sets out the guiding framework of the study, the study aims and the research methodology

Section 4 gives an **overview of the findings from RIITILS/LETS2 under four headings**:

i. The changing policy environment in teaching and teacher education
ii. Developing a curricular vision for mathematics teaching in the context of Project Maths
iii. Literacy and inclusion
iv. School-university partnership.

2.0 Project Outcomes

The outcomes envisaged for the RIITILS project, as set out in the original proposal, were:

1) Publications:
    a. Peer reviewed publications based on the three focal themes informing the proposed study based on LETS1: meaning of real world, reading literacy and inclusion,
    b. A pedagogical text targeted to student teachers and tutors in post-primary teacher education in Ireland,
    c. An academic research book.
2) Policy and pedagogical impact in teacher education, given the current reforms of initial teacher education in Ireland
3) Strengthening the collaboration among lecturers involved in LETS within the context of the proposed project.
4) Create a platform, based on collaborative writing, for subsequent funding bids.
5) A productive post-doctoral experience for the persons involved.

Funding for the project has enabled considerable progress to be made under each of these headings. It has enabled both the core research team and colleagues from the School of Education who took part in the previous *Learning to Teach Study* (LETS1) to utilise the data from that study in new ways and to build on it during the RIITIL project in order to achieve new insights. The outputs in terms of publications (Objective 1.a) include book chapters, peer-reviewed journal articles and conference publications, conference presentations and posters. Those already published and those either pending publication or currently in the process of being submitted are listed below, and in more detail at the end of this report. The proposed pedagogical textbook (Objective 1b) is in preparation, and a proposal for the academic research book (Objective 1c) has been submitted to a publisher. The project website www.ucc.ie/en/LETS/ gives an overview of the project and includes links to project publications and to conference presentations.

In terms of influencing policy and pedagogy in teacher education (Objective 2), as well as the presentations at national and international conferences made by members of the research team (see below under *Publications* for details), two major conferences (*Trends in Mathematics Education* Conference, 26 November, 2012; *Professional Learning and Lesson Study* Conference, UCC, 12-13 June 2013) were held in UCC during the course of the RIITILS/LETS2 study. The first focussed on trends in mathematics education, and the second on professional learning. These were attended by a wide variety of people in influential positions in relation to teaching and teacher education in Ireland, as well as by international colleagues. Further details are given in the next section, and the conference publications are enclosed as separate documents. They can also be accessed via the LETS website (www.ucc.ie/en/LETS/) The November mathematics conference *Book of Abstracts* is also available on CORA, the UCC open research archive, and IRC funding is acknowledged in full: see http://cora.ucc.ie/handle/10468/881?show=full

The Executive Summary of the first *Learning to Teach Study* (LETS1) report is also on-line at http://cora.ucc.ie/handle/10468/880 and via the LETS website. Print copies have been widely distributed to teacher educators, policy makers and other stakeholders nationally, and on request, to international colleagues in Scotland, Northern Ireland, Norway the USA and elsewhere.

Objective 3, strengthening collaboration between colleagues, is manifest in the number of co-authored papers and presentations that have arisen from the project. The findings from LETS and the preliminary findings from RIITILS/LETS2 have also informed discussion and dialogue in relation to the major reforms about to be implemented in initial teacher education and the PDE in UCC in particular. Some changes have already taken place in the PDE as a result of this professional dialogue between colleagues. LETS1 and RIITILS publications and conferences have also influenced national debate on the subject of initial teacher education.

RIITILS has served as the basis for a further collaborative funding bid, submitted in September 2013 (Objective 4). This further project has enlisted collaborators from the Mary Immaculate College, Limerick and NUI Galway in Ireland, and has an

international dimension through the proposed links with several international researchers involved with the IEA's *Teacher Education and Development Study in Mathematics* (TEDS-M) (Tatto et al., 2008; Tatto, 2012)

Objective 5, a very productive post-doctoral experience was successfully achieved. The post-doctoral researcher worked with an expansive research team, archived and catalogued all tangible materials associated with the project, drew on different research techniques and methodologies, collaborated when writing up findings, produced research papers and book chapters and had them accepted for publication, organised conferences locally and presented at workshops and conferences elsewhere, interacted with colleagues, while being mentored by an experienced researcher and supervisor. The career goals and particular objectives of the post-doctoral researcher were formalized, revisited and evaluated throughout the project tenure. Combined, these experiences contributed to immensely valuable development opportunities that were integral to this project.

2.1 Impact on teacher education research, policy and practice

2.1.1 Conferences

Two **conferences** were held in University College Cork under the aegis of RIITILS. The *Trends in Mathematics Education Conference* was held in UCC on 26 November, 2012, in conjunction with a research planning meeting of US National Science Foundation-funded FIRSTMATH study involving researchers from eleven countries. The Conference was co-funded by the US National Science Foundation (NSF), the School of Education, UCC and the Irish Research Council-funded study: *Re-imagining Initial Teacher Identity and Learning.* A number of prominent international experts in the field of mathematics education gave presentations at this conference. (see programme in Appendix 3 and the Conference Proceedings, Conway, Rutherford & Delargey, eds., 2013). The attendance included representatives from the Teaching Council, the State Examinations Commission, Education Research Centre, NCCA, Project Maths and the Dept. of Education and Skills. Also in attendance were colleagues from other third-level colleges in Ireland including St Patrick's College Drumcondra, University of Limerick, Cork Institute of Technology, Mary Immaculate College, NUI Maynooth and NUI Galway. International conference presenters and participants came from Michigan State University, University of Minnesota, University of Prague, University of Chile, Secretariat of Education Brazil, University of Sofia, Philippines Normal University (PNU), the World Bank and CP University in Nitra, Slovakia. Also attending were teachers from local second level schools, as well as current PDE and Cohort PhD students from UCC. The conference programme is to be found in Appendix 3, and the book of abstracts for the conference is attached as a separate document.

The *Professional Learning and Lesson Study* Conference was held in UCC on 12-13 June 2013. See Appendix 3 for details of the programme for this conference. (The book of abstracts is attached as a separate document). Attendance at this conference included representatives from the DES, the ASTI, the Inspectorate, colleagues from other Departments and Schools in UCC, from other third-level institutions, as well as current post-graduate and doctoral students from UCC and elsewhere. The keynote

speaker was Professor Aki Murata, of the University of California at Berkeley. Colleagues from MIC, UL, NUIG, St Angela's College Sligo, Stranmillis University College, Project Maths, SPD, National Induction Programme, the DES Inspectorate, TCD, the West Cork Education Centre and local 2nd level schools attended, as well as doctoral students from the Cohort PhD in Education in UCC. Also participating in the professional learning workshops were colleagues from other departments and schools in UCC including Applied Social Studies, the School of Medicine, the School of Law, and the School of Nursing and Midwifery. Presentations at both conferences were captured on video using Panopto for future use in lectures, seminars, etc.

2.1.2 Publications

The IRC-funded RIITILS provided essential support to bring a large number of co-authored publications drawing on both LETS1 and LETS2 data to conclusion, as well as initiate a number of others. Publications include book chapters, journal articles, conference proceedings and conference presentations.

Publications from LETS 1 and LETS 2 that have been published from work undertaken during the life-cycle of this 2012-13 IRC-funded Advanced Collaborative Research Award focus on: a critical discourse analysis of teacher education policy (Conway, 2013; Conway & Murphy, 2013), teacher education programme design (Conway et al, 2012), literacy in initial teacher education (Murphy et al, 2013, in press), teacher identity (Rutherford, et al, 2013, in press), workplace learning and initial teacher education (Conway, Murphy & Rutherford, 2014, in press; Conway & Munthe, 2014, in press), pilot of FIRSTMATH (Conway, et al, 2014, in press).

A number of other articles, involving co-authorship by various configurations of LETS 1 and/or LETS 2 researchers, have been submitted for review and focus on: inclusion and 'othering' in teacher education (Kitching et al), current practices and future directions in school-university partnerships in initial teacher education (Connolly et al), the changing construction of literacy from LETS 1 to LETS 2 among student teachers (Conway et al), a Bernsteinian analysis of curricular emotions among student teachers of mathematics (Rutherford et al), a case study, employing a

Bakhtinian framework, of one student teacher's construction of reform-oriented Project Maths (Rutherford et al), an analysis of changing conceptions of adolescent literacy and their significance for initial teacher education (Curtin et al), student teachers' construction of modern language teaching (McKeon et al). A number of other manuscripts are well developed and are due for submission shortly.

A comprehensive list of publications arising from RIITILS is to be found near the end of this report, immediately following *Section 5: Conclusions* and preceding the References and the Appendices. There is also a Publications link on the project website: www.ucc.ie/en/LETS/

2.1.3 Seminars and networking

As well as presenting at national and international conference, members of the research team attended and made presentations at events hosted by the Institute for Social Sciences in the 21st Century (ISS21) during 2013. These events were also attended by researchers in the humanities and social sciences from other schools and departments in UCC and enabled the mutual sharing of research across disciplines.

Institute for Social Sciences in the 21st Century (ISS21) Events

The RIITIL project was presented at:

- ISS21 Networking meetings on 6th February, 22nd May
- ISS21 *Educating for the Professions* Research Cluster 16 April 2013
- Institute for Social Sciences in the 21st Century Seminar, 15 May 2013 (Presentation by Paul Conway: *New accountabilities in teacher education in Ireland*).

2.1.4 Other Activities

- Research Showcase day UCC: 1st March 2013: New Frontier Social Science Research Panel (presentation by Paul Conway**)**
- Vanessa Rutherford attended the ESRI 'Growing up in Ireland' conference, Children's Engagement in Education, 8 May 2013.
- Vanessa Rutherford attended a Survey Data Analysis course, School of economics, UCC, 2 May 2013.

- Rosaleen Murphy attended the OMEP Ireland Annual Conference, 28 April 2013.
- Numerous other conference presentations by members of the research team are listed below in the *Publications* section under *Conference Publications* and *Conference Presentations.*

3.0 Socio-cultural theory and a mixed methods research design

3.1 Guiding Framework: Socio-cultural theory

The RIITIL study, (like LETS which preceded it) adopts a socio-cultural approach to learning as our preferred stance. A socio-cultural perspective on competence in initial teacher education (ITE) emphasises the situated, relational and political dimensions of competence (Lave & Wenger, 1998; Claxton & Wells, 2002; Conway & Artiles, 2006; Hall, Murphy & Soler, 2008; Korthagen, 2010). The experiences and learning opportunities available to student teachers are both facilitated and constrained by the particular environment in which their initial teacher education takes place as well as by the wider culture. Taking a socio-cultural perspective enables us to address the teacher archetypes, supports and challenges that are part of the 'learning to teach' process. These include participation structures, developing a deep and flexible knowledge of subject domains, access to resources, critical reflection at a number of levels including technical, practical and critical levels, and adaptive expertise among others. In RIITILS, there were opportunities to explore in greater depth the nature of the environments, and in particular the school placement settings, in which learning to teach takes place. A feature of second level teaching is the focus on being a teacher of a particular subject or subjects, and in RIITILS/LETS2, we focused on the influences, attitudes and supports that helped or hindered the acquisition of knowledge, skills, dispositions and competence in the case of beginner teachers of mathematics.

The principles guiding this study were that:

- Teacher competence encompasses knowing-in-context and doing-in-context to enhance teacher and student learning in schools
- Competence in teaching evolves and develops over time and is optimal when directed towards the development of adaptive expertise
- The development of competence across the continuum of teacher education requires support and guidance, and this is especially important during initial teacher education

- The specification of teaching competences acts as a powerful 'message system' within the profession for policy makers, teacher educators, student and practising teachers as well as researchers.

Within this framework, we also draw on five key socio-cultural themes, as summarised in the work of Van Oers (2010), in our discussion of learning in context:

i. Meaningful learning
ii. Participation in cultural practices
iii. Help of more knowledgeable others
iv. The nature of the learning activity
v. Communication

3.1.1 RIITILS and mathematics teaching

The RIITILS/LETS2 study took place at a time when the Professional Diploma in Education was in a transition phase, with a new programme to be introduced in 2014 which will, among other reforms, spread the teaching placement element in particular over two years rather than one. The existing one-year model, however, was still in place at the time of this study (2012-2013). A survey of this cohort gave us an up-to-date picture regarding the supports and resources available to student teachers while on school placement, an element of the programme which will be even more crucial in the new programme. It should be noted also that the school placements were almost exclusively with first year or transition year classes, rather than senior or exam classes.

The study was also conducted at a time when the roll-out of Project Maths in schools had begun to have a noticeable and widespread effect on the teaching of mathematics in second level schools. This significant change in both the content and the methodology of the mathematics syllabus means that there was an unprecedented opportunity to look at the challenge of learning to teach in a way that is very different to that which the neophyte teachers had experienced themselves at second level.

RIITILS focused in particular, therefore, on how student teachers of mathematics begin to develop competence in teaching their subject. How do they communicate their own understanding of the subject, and how do they transform that understanding into the skills, knowledge and competence needed to teach it successfully? How do they acquire the specific pedagogical content knowledge they need? How do they tackle issues like the negative attitudes that some of their students bring to the subject? To what extent are they aware of issues of diversity and difference that they encounter in the classroom, and how do they manage these? What synergies and tensions are there between their teaching of mathematics and their second teaching subject? What are the challenges they face in bringing a more interactive style of teaching and learning to the mathematics classroom?

The RIITIL study, as noted above, took place at a time when the roll-out of Project Maths was changing both the content and the pedagogical approaches required to teach mathematics at both Junior and Senior cycle. The context in which the student teachers in our study were developing competence as beginning teachers of mathematics was therefore changing also. The acknowledged power of the 'apprenticeship of observation' in learning to teach (Lortie, 1975; Sugrue, 2004) means that when under stress, there may be a tendency to revert to "teaching as you were taught" rather than trying out new approaches. In mathematics, the traditional approach was teacher demonstration and explanation followed by pupil practice and drill. Project Maths challenges this model, but its introduction has not been unproblematic. Some schools and teachers have greeted it with enthusiasm, but there has been resistance from some experienced teachers and educational commentators, and from some parents (for example, discussion on the Liveline radio programme, RTE Radio One, 6th and 7th March 2013 was almost entirely negative in nature). There is perhaps also some confusion about the nature of problem-based learning; one of the participants in the RIITIL study said that mathematics has always been about problem solving - which is entirely true. However the approach now being introduced is not teaching how to solve mathematical problems but rather teaching mathematical skills through searching for solutions to problems. This makes it possible- and indeed almost inevitably entails- the use of collective approaches such as peer and group work in the classroom.

Analysis of the literacy and inclusion data from LETS2 is at a preliminary stage, but we are already noting a greater emphasis on literacy in the classroom, reflecting an increased whole-school emphasis on literacy across all subject domains in many schools, while inclusion continues to be a challenge for many of our pre-service teachers.

There were three particularly significant findings from the first Learning to Teach Study (LETS): that (1) pre-service post-primary teachers struggled to enact the meaning of 'real world' experiences in the context of the reform-oriented Project Maths then soon to commence, (2) that they had limited understandings of how reading literacy impacted their subject and (3) while, as they neared the end of their PDE programme they felt ready to teach, they did not yet feel confident about their ability to be truly inclusive in the classroom. RIITILS makes use of the existing unique data set collected during the LETS1 study, and extends it in LETS2 by focusing, through interview, survey and artefacts, on how student teachers of mathematics, in particular, engage with the 'real world', problem-solving, reading literacy and inclusion.

3.2 Research design

The *Learning to Teach* Study (LETS1) (Conway et al., 2011), was a three-year programme-level study of the Professional Diploma in Education (PDE), funded by the Department of Education and conducted by a team from the School of Education. This report focuses on findings from the follow-up study *Re-Imagining Initial Teacher Identity and Learning (RIITILS) 2012-2013*, funded by the Irish Research Council. Both LETS1 and RIITILS/LETS2 used similar mixed methods research design, combining a survey of the entire year cohort with a series of in-depth interviews with a smaller number of student teachers. (For more details of LETS1, see Conway et al, 2011). The aim in RIITILS/LETS2 was to build on, and update, the findings from LETS1 while focusing in particular on the teaching of mathematics.

The methodology used in RIITILS/LETS2 was a mixed methods approach based on that used in LETS1, but with some additional elements. Methods used were semi-structured interviews with 11 student teachers and with school principals, PDE coordinators and mentor teachers in three selected schools, analysis of documents and a survey questionnaire of all students in the 2012-2013 PDE cohort.

3.2.1 The Interviews

Using a multiple-case study research design, 11 student teachers (7 Male, 4 female), all with mathematics as one of their two teaching subjects, were interviewed. The students who participated in the series of interviews were all volunteers drawn from PDE year group. Students who were unable to take part in the interviews were invited to take part in a focus group in May, 2013. An outline of the interview topics and examples of the informed consent forms used are to be found in Appendix 1. The PDE students who volunteered to take part were assured of the confidentiality of their responses, and that their participation or otherwise would in no way influence their own assessment or examination marks. The interviews were complemented by a survey of the entire 2012-2013 PDE cohort asking about some of the prior experiences and beliefs (e.g. about learning) that student teachers bring to the PDE, and about their current experiences during school placement.

Table 3.1. RIITIL Interview and focus group participants 2013

PDE Student *(alias)*	**Teaching subjects**
Donagh	Science, Mathematics
Simone	Mathematics, Music
Andrew	Mathematics, Business Studies
Kendra	Mathematics, French
Stephen	Mathematics, Science
Sophia	Mathematics, Science
Eamon	Mathematics, English
George	Mathematics, Science
Catherine	Science, Mathematics
Aidan	Mathematics, Science
James	Mathematics, Business Studies

The student teacher interviews were held at intervals over the school year, and the timing was designed to capture growth and change over the year, and to focus on particular concerns expressed by the student teachers at each stage. After each set of interviews, the research team met to discuss emerging issues and to identify issues to be explored in subsequent interviews. This repeated cycle of data collection and analysis is characteristic of an interpretive approach to research (Borman et al. 2006, Mertens, 2005). The semi-structured format ensured consistency between interviewers, while still allowing any individual issues that might arise in the course of the interview to be followed up. The interview schedules used are to be found in Appendix One.

A shared understanding of the broad principles of the overarching socio-cultural framework that informed this analysis was reached through a lengthy process of discussion and debate among the members of the research team, who nevertheless were enabled to view the data through the lens of their own experiences and expertise. Analysis of the data consequently included several themes that emerged during the research process, in addition to those envisaged in the initial design. Not surprisingly,

many of these related to the pre-service teachers' experiences during their teaching placements.

The team also visited and interviewed principals, vice-principals, PDE co-ordinators and mentor teachers in three of the schools that take students from UCC on placement. The schools were selected because of their excellent reputations based on feedback from both current and former student teachers and visiting supervisors. From the LETS1 study, we were aware that the school placement experience can vary very widely between schools, and indeed even within the same school, depending on individual relationships with mentor teachers, that is, school level, assigned and/or sought after mentors (see section 4.5 of this report). However, it was felt that documenting good practice would be of most value in this context, and that the three selected schools would provide some interesting data in this regard. The three schools we approached initially all agreed to participate, and we are most grateful to them for their co-operation and enthusiasm. A loose, semi-structured format was used for these interviews, beginning by asking them to consider three broad questions (see Appendix 2) as a starting point, and following up on points raised in discussion. Artefacts were also collected in the course of the school visits: copies of timetables, folders, shared teaching resources, etc.

All interviews were digitally recorded and transcribed. Participants were given copies of their own transcripts before the next interview, so that they could make any clarifications or corrections. Identifying details of schools and individual teachers were then removed from all transcript excerpts.

Table 3.2: Overview of Semi-Structured Interviews with Student Teachers (2013)

Part	Interview domains: January/February 2013	Interview domains: March/April 2013
1	**TELL ME ABOUT YOURSELF** Background, motivation	**Teaching placement experience (1)** How teaching has evolved since last interview
2	**SCHOOL PLACEMENT** Supports? School-based mentor(s)?	**Teaching placement experience (2)** Sample Lesson Plans: example of a good maths lesson that happened recently
3	**UNDERSTANDING OF SUBJECT PEDAGOGY** 3.1 Own attitudes to/enthusiasm for subject: 3.2 Maths: Pedagogical content knowledge 3.3 Assessment *of* and *for* learning	**Transfer of techniques between subjects** (tools, resources, support) Transfer/sharing between teaching subjects of: a) Knowledge b) Pedagogical strategies c) Knowledge gained in other contexts
4	**Understanding literacy issues and**	**Language and literacy: Dilemmas of difference** **Inclusion** Exploring dilemmas associated with difference and diversity What strategies? Examples of differentiation (worksheets etc) Effects of with-class grouping
5	**Understanding of inclusion**	
6	**SWOT 1** (Strengths, Weaknesses, Opportunities, Threats- *see below)*)	**SWOT 2** (Strengths, Weaknesses, Opportunities, Threats)
7	**FINALLY:** **Summing up**	**FINALLY:** **Summing up**

Section 6 of the interviews asked participants to complete a SWOT analysis (*Strengths, Weaknesses, Opportunities, Threats*) (see Appendix 1d for an example of a SWOT grid). SWOT is a well-known technique used in strategic planning of projects, but it can also be used in a personal context (Bennett, nd; Buttles, 2006; Kempe & Nicholson, 2002). *Strengths* and *Weaknesses* are personal factors, while *Opportunities* and *Threats* are external factors that can help or hinder the desired objective. Here, we adopted it as a useful way of summarising the student's own view, at a particular point in time, of the factors influencing his/her development as a

teacher, in a way similar to that suggested by Kempe and Nicholson (2002). As well as giving us a snapshot of their development at the time of each interview, it enabled the students to reflect on their position at critical points during the year.

As they began teaching practice early in September, mid-way through the course and as the academic year neared its end. By looking at the three completed grids in the course of the final interview, the student could look back on her/his growth and development as a teacher over this period. Under *Strengths*, they were asked to list the things that they were good at that would help them as they began to teach. Prompts were given as necessary, e.g. enthusiasm, subject knowledge, setting goals etc. Under *Weaknesses*, they were asked to identify areas of teaching that they felt less confident about, or that they found most challenging in the beginning. Under *Opportunities* they were asked to identify things that would help them to make the most of their strengths and to become more confident in areas of difficulty, while *Threats* were those elements (personal or situational) that might hinder them in this. The interviewer then talked through what the student had written, asking for clarification as necessary, and the student was given a copy of the completed SWOT grid to take away. The feedback from the participating student teachers was that they found the SWOT a useful tool for summarising how they felt about learning to teach at each stage, and that it helped them with their reflective portfolio.

3.2.2 The Survey

To rely exclusively, however, on a single type of evidence (i.e. interviews) would be to depend on a narrow evidentiary base. Consequently, a survey was completed by 102 of the students of the 215 in the 2012/2013 PDE cohort (a response rate of approximately 47%). All survey responses and comments were anonymous. The survey focused on the prior experiences and beliefs (e.g. about learning) that student teachers bring to the PDE, including their own views of their efficacy as teachers and their knowledge about reading literacy and inclusion. It also asked them about their current experiences while on the PDE programme, including their experiences on school placement. This survey was similar to that administered to the 2009 PDE cohort, which allows for comparisons to be made. A summary of the survey findings is to be found in Section 4.5 of this report.

3.2.3 Ethics

The proposed research design for RIITILS was submitted to, and approved by, the Social Research Ethics Committee of University College Cork in July 2012. All participants were provided with information in writing as well as orally about the project, and informed consent was obtained in writing. No student was interviewed by his/her own teaching practice supervisor. All interviews were professionally transcribed. Participants were given the opportunity to correct any errors and make clarifications and transcripts were then anonymised before being circulated beyond the three-person core research team. Participating students, teachers and schools were all assured of anonymity, and consent was understood to be on-going, that is, they were free to withdraw at any time from the study.

3.2.4 Analysis

Analysis of the interview data consisted of the team individually and collectively reading and annotating the transcripts data and identifying (tentatively) the key themes emerging from the evidence. These themes were then explored further in subsequent interviews. Transcript analysis was based on the methodology used in a smaller study in Australia by Huntly (2008, p. 131), but adapted to make it usable by a team rather than a single researcher. The data collected provides grounded evidence for the identification of robust findings by revealing important aspects of the students' developing understanding of the process of learning to teach.

The survey data was first entered into an Access database by a professional transcriber, then transferred to an Excel file for initial analysis. Qualitative data from the survey (comments, sentence completion tasks) was then exported to a Word file. Comments under each section were grouped into a single document, then coded into categories which were analysed by emerging themes. Quantitative data was first analysed using the tools available in Excel and comparisons were made with the corresponding data from the 2009 survey. More complex analysis was then carried out on relevant sections using IBM SPSS20 (Statistical Package for the Social Sciences).

4.0 Findings

4.1 Progress in research and practice from LETS 1 to LETS 2

The first Learning to Teach Study (LETS1) made a major contribution to the knowledge base regarding initial teacher education in general and the particular. It provided opportunities for reflection and debate among members of the research team; it also meant that they gained a greater appreciation and knowledge of one another's work. The sharing of expertise by different members of the team (for example with regard to literacy, inclusion, subject pedagogies, mathematics reform, research methodologies, etc.) was beneficial to all. The findings from LETS1 were influential both nationally and locally in the re-design of the PDE, and some of the changes that have already occurred in the PDE programme in UCC may be attributed, directly or indirectly, to it. LETS1 also identified some areas that deserved and needed further research, particularly in a time of change for education in general and teacher education in particular. RIITILS is founded, and builds, on LETS1. We have therefore focused and extended our work on these aspects in RIITILS, particularly in respect of:

- teacher education policy,
- the context and challenges of developing curricular vision of mathematics in a reform-oriented era,
- the increasing salience of literacy in teacher education, particularly in the light of the National Literacy and Numeracy Strategy, and the introduction of Project Maths in schools.
- the partnership between schools and university in initial teacher education at a time of change and reform

Revisiting the LETS1 data, and in the light of the additional material gathered during RIITILS/LETS2, has also lead us to some new and unanticipated insights, and we are currently documenting these in a series of research papers and publications (see section 2.0 of this report and the *Publications* list that follows Section 5.).

4.2 Changing policy environment in teaching and teacher education

During the life-cycle of this IRC-funded study there were very significant and unexpected developments in teacher education policy in Ireland, notably the convening by the Minister for Education of a national review of teacher education provision in Spring 2012. The outcome of the consultation with all providers is beyond the scope of our work, but the *Report of the International Review Panel on the Structure of Initial Teacher Education Provision in Ireland* (Sahlberg, 2012), submitted to the Minister by the three-person international review committee in July 2012 unequivocally signalled the increasing policy focus on teacher education that has been occurring over the last fifteen years in Ireland. In order to understand the changed policy environment within which we are now both being asked to, and are asking ourselves as teacher educators, to *'re-imagine teacher education'*, we undertook two linked policy analyses, both of which have been published (Conway, 2013; Conway and Murphy, 2013). Both articles focus on the politics of policy in teacher education (Cochran-Smith, 2013).

4.2.1 A rising tide meets a perfect storm: new accountabilities in teaching and teacher education

Cognisant of accountability's deep historical roots and its different forms, the first policy article (Conway & Murphy, 2013) focuses on the dynamics of new accountabilities discourses in teaching and teacher education in Ireland between 1997 and 2012 against the contemporary backdrop of education reform globally (Tatto, 2007; O'Donoghue and Whitehead, 2008; Cochran-Smith et al., 2013; Furlong, 2013). As such, adopting an historical perspective, the 'Rising tide meets a perfect storm' paper (Conway & Murphy, 2013) examines the emergence of new accountabilities in teacher education in Ireland in the fifteen years period 1997-2012. Framing accountability in terms of the three main approaches to it globally in education systems, that is, compliance with regulations, adherence to professional norms and attainment of results/outcomes, we identify significant changes, particularly in compliance- and results-driven accountability. A 'rising tide' of accountability, (see Table 4.2) due to the interrelated influences of the European

higher education space, education legislation and professional self-regulation policies (i.e. Teaching Council) in Ireland, is evident since the late 1990s. This was punctuated by a 'perfect storm' (see Table 4.3) in 2010, comprising 'bad news' from PISA 2009, the economic bailout and strategic leadership at a system level. The cumulative impact of the 'rising tide' and 'perfect storm' is evident in how they reframed both 'to whom' and 'for what' accountability in teacher education relates. Significantly, the new accountabilities in teaching and teacher education reflect a move toward the dominant global education reform movement (Sahlberg, 2007) with its emphasis on standardization, narrow focus on literacy and numeracy and higher stakes accountability.

Both this and the second policy article ('*A cultural flashpoint…'* Conway, 2013) adopted a discourse analysis perspective. In doing so, we distinguished this perspective from a 'policy science' or 'rationality project' (Stone, 1997) approach (Cochran-Smith, 2013). Whereas the policy science/rationality project approach focuses on implementation of objective policy goals in a top-down fashion, the discourse approach assumes that policy is typified by multiple meanings reflecting the complex engagement by various actors at various levels of a system. Discourse then is a "complex entity that extends into the realms of ideology, strategy, language and practice, and is shaped by the relations between power and knowledge" (Sharp and Richardson, 2001, p. 195). Following Stone (1997), the discourse approach places argumentation about key ideas and values at the heart of the policy cycle. In focusing on the policy cycle (Ball, 1994), that is, contexts of influence, production and practice/effects, we examine how the definition of both problems and solutions or remedies are framed and contested (Stone, 1997).

4.2.2. A cultural flashpoint in the politics of teaching and teacher education

Focusing on the policy directions in the very recent past (2009 to the present), the 'cultural flashpoint' article (Conway, 2013) sought to understand how it was that the publication of the PISA 2009 reading literacy results heralded a crisis of confidence in educational standards in Ireland. The article examines the national and international context of teacher education reform and the politics of the policy response to the perceived crisis. In essence, this response represents, we argue, a system shift toward the global education reform movement (GERM) characterized by standardization, narrowed curriculum focus and stricter accountability.

Table 4.1: Some aspects of global education reform trends and education policy principles in Finland since the 1980s

Global education reform movement (GERM)	Education reform in Finland
Standardization Setting clear, high and centrally prescribed performance standards for schools, teachers and students to improve the quality of outcomes.	**Flexibility and loose standards** Building on existing good practices and innovations in school-based curriculum development, setting of learning targets and networking through steering by information and support.
Focus on literacy and numeracy Basic knowledge and skills in reading, writing, mathematics and natural sciences as prime targets of education reform.	**Broad learning combined with creativity** Teaching and learning focus on deep and broad learning, giving equal value to all aspects of an individual's growth in terms of personality, morality, creativity, knowledge and skills.
Consequential accountability The school performance and the raising of student achievement are closely tied to the processes of promotion, inspection and ultimately rewarding or punishing schools and teachers based on accountability measures, especially standardized testing as the main criterion of success.	**Intelligent accountability with trust-based professionalism** Adoption of intelligent accountability policies and gradual building of a culture of trust within the education system that values teachers' and principals' professionalism in judging what is best for students and in reporting their learning progress.

SOURCE: Based on Sahlberg, 2007

We use what Sahlberg describes as the two dominant logics underpinning educational reform to inform our analyses in both articles (see Table 4.1). He argues that an important reason for Finland's educational success in recent years has been the policy logic (shaded above) underpinning its teacher and teacher education reforms over the last thirty years. These have been characterized by flexibility and loose standards,

with trust in local, well-supported networks of teachers and other education professionals, an emphasis on a broad curriculum and a holistic focus vis-à-vis student learning and development, as well as what he terms 'intelligent accountability' rooted in trust-based professionalism (Sahlberg 2007). Sahlberg also identified a dominant countervailing policy logic, what he terms the 'global education reform movement' (GERM). Given the relatively moderate and incremental level of engagement in teacher education policy and reform over the preceding decade and a half (when compared to curriculum reforms, for example), the period since late 2010 to 2012 represents a watershed in teacher education policy in Ireland, following the publication of PISA 2009 results in late 2010 (Perkins et al. 2010) in tandem with the Department of Education and Skills (2010)' 'Incidental Inspection Findings 2010' on the teaching and learning of mathematics in the primary school and 'The 2009 National Assessments of Mathematics and English Reading' (Eivers et al, 2010). However, the role of PISA emerged as increasingly significant subsequently, both in the media and in DES press releases, presentations and the amended strategy published in July 2011 following consultation. Very quickly, key findings from PISA 2009 permeated media debate. They repeatedly pointed to what was the largest decline in reading literacy scores (down 34 points) as well as in ranking (down from 5th to 21st). It was in this context that the Department of Education and Skills' draft national strategy was read by those education stakeholders who participated in the consultation process. It not only raised alarm bells about declining standards and specified remedies for numeracy and literacy teaching in schools in very definite and detailed terms, it also addressed the role of teacher education providers and the whole continuum of teacher education.

The 2011 national strategy (Department of Education and Skills, 2011, 2011b, 2012) itemized far-reaching actions in relation to attainment targets vis-à-vis numeracy and literacy at primary and post-primary levels, expressed in terms of national assessment and percentages attaining higher levels in PISA, teacher education across the continuum and the required use of, and reporting on the results of, standardized tests (i.e. the percentage of students attaining various STEN scores within each school to be reported annually to the DES; see DES 2011, p. 87, DES 2011b) Further changes included increasing the duration of teacher education at primary level (from 3 to 4 years for the undergraduate route; 18 to 24 months for the postgraduate route) and at

post-primary level (from 1 to 2 years for the dominant postgraduate route). Furthermore, an increasing focus on numeracy and literacy was to be required for all teacher education programmes, with the content of such modules across the continuum specified by the DES in its strategy document. As we note elsewhere in this report, the increased focus on literacy is now evident in interviews conducted with PDE mathematics student teachers as part of this study.

The highly specific nature of the required changes are noteworthy in terms of their implications for all schools and teacher education providers. These changes build upon but nevertheless, in our view, significantly re-orient the work of the Teaching Council in terms of how it prescribes, monitors and accredits regulations for initial teacher education, induction and continuing professional development. For example, the national strategy specified that each school will be required to set, and monitor progress in achieving, its own demanding but realistic targets in numeracy and literacy. At a system level, key targets were identified including that the percentage of children in the top performing levels of the national assessments in reading and mathematics would be increased by at least 5% by 2020 and the percentage of students in the poorest performing levels would be decreased by at least 5% by 2020. In terms of primary teacher education, in addition to lengthening the B.Ed. degree program for primary teachers to four years, it also required the dropping of many arts and humanities subjects (i.e. student teachers' double major in Primary Education and an Arts degree subject) in colleges of education in favor of the study of education and numeracy and literacy teaching. In terms of post-primary teacher education, in addition to lengthening the one-year postgraduate Professional Diploma in Education to two years from 2014, it also specified that all post-primary teachers will be required to take modules and undertake associated projects on school placement that involve a significant focus on understanding and planning for literacy (including digital literacy) and numeracy with a range of learners. Crucially, with regard to continuing professional learning it also stipulated that continued teacher registration will be contingent on completion of a minimum number of hours annually in literacy and/or numeracy coursework (DES 2011). All of these proposed changes in teacher education have associated accountability processes.

Table 4.2: Rising tide of accountabilities

	Professional code of conduct	**Quality assurance**	**Learning Outcomes**	**Programme accreditation**	**Registration of teachers: initial, induction and ongoing**
Source & Timing	Teaching Council (2009)	Legislation (1997) Systems: early 2000s	Noted in Bologna Process (2000) Systems: mid 2000s	Teaching Council (2009; 2011) Systems: 2009-12	Teaching Council regulations for ITE providers (2011); for induction (2011) and continuing professional development
For what?	Professional/ethical behaviour	Unit mission, aims, efficiency, coherence across teaching, research and service	Programme and module LOs	Individual teacher education programme: aims, inputs, process and outcomes	Professional qualifications (ITE) Undertake induction programme (Induction)
From whom?	Profession as a body; Teacher(s)	Schools of Education	Schools of Education	Schools of Education	Individual teachers
To whom?	Profession; Wider society	University QA office	University central admin Professional body (Teaching Council)	Professional body (Teaching Council)	Professional body (Teaching Council)
How and how much?	Reflected in on-going practice; Tied into some regulations	Documentation at unit level across broadly focused across multiple unit aims	Documentation at module and programme levels	Pro forma documentation, site visits by TC peer-review panel	Initial: transcript from ITE programme Induction: completion of programme CPD: minimal number of CPD hours
What next?	Context for advancing moral, pedagogical and political role of teaching in society and reference point for TC 'fitness to teach' procedures.	Feedback (oral and written) from peer view panel and written report published on university website. Some mandatory follow up by unit.	Feedback from central admin or professional body with possibility of required revisions to align with local, national emphases	Feedback (oral and written) from peer view panel and written report published on TC website. Programme accreditation awarded (or not)	Non-compliance leading to denial, withdrawal or delay in registration.
Form of accountability	Adherence to professional norms	Compliance with regulations	Compliance with regulations	Compliance with regulations	Compliance with regulations

Source: Conway & Murphy, 2013, pp. 22-23

Table 4.3: Perfect storm accountabilities

	Students' numeracy & literacy attainment	**Teacher education programme content and duration**	**Registration of teachers: initial, induction and on-going**
Sources & Timing	Department of Education and Skills (2011)	Department of Education and Skills (2011) Teaching Council (2011) Systems: 2011-12	Teaching Council regulations for ITE providers (2011); for induction (2011) and continuing professional development Systems: 2011-12
For what?	Student attainment in numeracy and literacy	Individual T Ed programme re-design: aims, inputs, process and outcomes	Professional qualifications (ITE) Undertake induction programme (Induction)
From whom?	Schools	Schools of Education	Individual teachers
To whom?	Department of Education and Skills	Professional body (Teaching Council)	Professional body (Teaching Council)
How and how much?	Documentation of STEN scores (% at each) annually based on May testing	Pro forma documentation, site visits by TC peer-review panel	Initial: transcript from ITE programme Induction: completion of programme CPD: minimal number of CPD hours
What next?		Feedback (oral and written) from peer view panel and written report published on TC website. Programme accreditation awarded (or not)	Non-compliance leading to denial, withdrawal or delay in registration.
Form of accountability	Attainment of results Compliance with regulations	Compliance with regulations	Compliance with regulations

Source: Conway & Murphy, 2013, p. 25

4.3 Developing a curricular vision for Project Maths

The teaching of mathematics in our schools has, we think, never been quite so much to the forefront of public discussion and debate nationally. This is hardly surprising, as the roll-out of Project Maths, the biggest change in the mathematics curriculum at second level for many years, begins to make itself felt. With the introduction of Project Maths, students in schools are encouraged and expected to investigate and explore mathematics in the so-called 'real world'. Though problem solving by no means encompasses all of mathematics, problem-solving is central to the approach advocated in Project Maths. The emphasis shifts from teaching *how* to solve problems (a largely procedural approach) to teaching *through problem solving*, (Taplin, 2006), i.e. learning through looking at problems and working out a solution in an enquiry-oriented environment. Mathematics becomes more 'connected[4]' - the mathematical language and techniques necessary are still taught, but become more relevant to the student who has seen a real-world application for them.

The current generation of student teachers are therefore learning to teach mathematics at a time of change both in the maths syllabus for second level and in the recommended approaches to teaching it. This presents a fundamental challenge for student teachers and schools (Lubienski, 2011) - as well as for university-based teacher educators. The challenge revolves around the difference between student teachers' experience of learning maths during their own schooling (what Lortie in 1975 termed the 'apprenticeship of observation') and what is currently being implemented in schools. At one level, this raises questions about mathematics teaching: how do we now define what mathematics is, and how should it be taught? At another, it is one of the fundamental dilemmas of teacher education (Ball, 1996; Boaler, 2002): how should the next generation of teachers be educated and assessed in a reform-oriented era?

[4] We use the term 'connecting maths' or 'connected maths' to convey the strong problem solving, realistic mathematics focus of Project Maths with which student teachers were enacting in classrooms. This emphasis in Project Maths, for example, echoes 'Connected Maths', a mathematics curriculum for grades 6-8 in US schools which strongly emphasizes problem solving: see http://connectedmath.msu.edu/

In RIITILS/LETS2, we focused in particular in the interviews on the teaching of mathematics. All of our student teacher interview participants were learning to teach mathematics, although their second teaching subject varied (see table 3.1 earlier). Findings from this part of the study are still at a preliminary stage; nevertheless some interesting insights have begun to emerge from it. It should be noted also that the school placements were almost exclusively with first year or transition year classes, rather than senior or exam classes.

We now draw on this interview data for insights into how beginner teachers of mathematics develop competence in teaching their subject: How do they communicate their own understanding for the subject, and how do they transform that understanding into the skills, knowledge and competence needed to teach it successfully? How do they acquire the specific pedagogical content knowledge they need? How do they tackle issues like the negative attitudes that some of their students bring to the subject? To what extent are they aware of issues of diversity and difference that they encounter in the classroom, and how do they manage these? What synergies and tensions are there between their teaching of mathematics and their second teaching subject? We also discuss their views on mathematical learning in the classroom, particularly in the light of Project Maths.

4.3.1 Understanding mathematical learning

The reform-based ideals in mathematics education espoused by Project Maths advocate the use of contexts and real life examples as central. Reflecting significant influences from the emphasis in the OECD's conception of mathematical literacy in its Programme for International Student Assessment (PISA), that is, "an individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgements and to engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned and reflective citizen" (OECD, 2006, p. 72), Project Maths similarly emphasises the everyday framing, understanding and potential utility of mathematics. To what extent do the pre-service teachers in these studies understand and use the concrete, 'every day of things, problems and applications of mathematics" and move to the abstract world of

"mathematics symbols, operations and techniques" (Schroeder & Lester, 1989, p.33) in their classroom teaching?

The mathematisation envisaged by the Realistic Mathematics Education movement (Freudenthal, 1991), which lies behind both the PISA definition given above and Project Maths, is a level above the simple application of real life examples in conventional teaching. Thomas, a science and mathematics student teacher in the LETS1 study in 2009, thought that such an approach would be a lot more difficult in mathematics than in science because "science is a lot more close to real life" (Thomas, LETS1 participant, 2009), although many of the student teachers in both our studies brought examples from science into their maths classes. The challenge for those involved in teacher education is to show student teachers that mathematics *is just as close* to real life as science is. There is also a distinction to be made between 'realistic' and 'real world' in mathematics education. While all problem solving in mathematics neither is, needs or ought to be, 'real world' focused, nevertheless there is considerable potential in rooting much school-based mathematics in so-called 'real world' contexts. As Donagh (RIITIL interview 1) put it:

> With maths there are some things that are always going to be difficult or unreal but we still have to make those relationships count or to make them at least more visible or bring them into the light.

We draw on five key principles of socio-cultural theory as articulated by Van Oers, (2010) to understand mathematical learning in a reform-oriented context, and illustrate these with quotes taken from transcripts of interviews with eleven beginning teachers of mathematics who participated in RIITILS/LETS2: Donagh, Simone, Andrew, Kendra, Stephen, Sophia, Eamon, George, Catherine, Aidan and James (all aliases). We refer also to the various papers written or currently being developed by the research team which discuss each of these themes in greater detail. Van Oers's (2010) five principles are: (i) meaningful learning, (ii) participation in cultural practices, (iii) help of more knowledgeable others, (iv) learning activity and (v) communication.

1. Meaningful learning

Meaningful learning combines cultural and personal dimensions. Culturally, mathematical actions, objects, goals and tools speak to students. Personal meaning relates to activities and practices that make sense to them. They can participate in activities, reflect on situations, debate outcomes and address problems. The students, instead of being the receivers of ready-made mathematics, are considered as active participants in the teaching-learning process, in which they develop mathematical tools and insights. As Kendra tell us, a good maths teacher 'engages' students:

> I think chalk and talk is just gone. You need enthusiasm…You need to be creative, you need to come up with questions that are different, applied to real life, something that really captures them and brings it back to the history of maths… So it is more about engaging them and being enthusiastic (Kendra Interview 1).

Kendra got her students involved in a 'real life statistical investigation':

> They got to choose whatever they were interested in…one group were all into sport, so they decided to ask people about sport and the questions they came up with in that questionnaire were very interesting… there was another group that were researching about pets and their question was do old people feel safe with pets? …[other investigations included] movies and reading … social networking … healthy eating…make-up… (Kendra Interview 2).

Similarly, when Simone was teaching about sets, she began with a practical demonstration:

> I brought in a ball of wool and I traced out a circle onto the floor and we split the class into anyone who liked salt and vinegar Taytos and anyone who didn't like salt and vinegar Taytos. And then they were to get into their place in the set. If you can use anything that they are doing without thinking too much about it but it will click with them. ..It is not always easy to think up examples of how to do it but I think if they can do something that they can remember, like the sets, they will remember that better than if they are just practising a lot of questions on paper. I think it is better to be innovative and do something different. (Simone Interview 1)

Practical exercises such as these, where mathematical ideas are literally 'embodied', lead on to abstractions based on the same ideas and generally, it was expected, would make the latter more meaningful. Some second-level students however still find it

difficult to make these connections. Our pre-service teachers consistently noted that they found it challenging to help students at different stages in the development of their higher-order thinking to extract and reinforce the mathematical ideas inherent in such embodied representations of mathematics. Two quotes from our interviewees are typical:

> When they don't get it you just have to approach it from a different angle. Like at maths now, I am teaching ratio and proportions and I'd prepare different explanations. So today, the kids inside in the class, I was trying to explain proportions but the way I was explaining it, it didn't click with them. So now after finishing the class I just told them I would come back in and work on it from a different way for tomorrow and try and figure out a new way of looking at it with science. It is a case of inside in the class, if somebody doesn't get it, afterwards I try and come up with a different example or a different story to illustrate the point. And I might have to take it from three or four different approaches because every child has their own different thing they are interested in. .. Sometimes it can be difficult for kids to see a page full of numbers and then not to connect with those numbers… Kids can have a bad experience and they might find it difficult and then they might be forced to engage with something without understanding how they have already seen that engaged with….The abstract is difficult, the practical is understandable and if you can't make maths practical it is very tough to get kids into it. There are some people who naturally have the ability for whatever reason, either family background or just the way it clicks with them, people have natural talents and some people are just naturally able to grasp the abstract and then just work with it. But then other people mightn't be able to grasp the abstract right away so you have to make it physical and then go from the physical to the abstract. (Donagh, interview 1)

> I guess going at it from a project maths angle, it (maths) is the use of numbers and problem solving techniques to solve real life problems. That is a really high level what I would love it to be about. Because in class it ends up just being about getting the answer to the sum, which isn't what I want it to be. It is developing a logical thought process to solve problems I think is what ideally it should be about. And the methods to solve different types of problems as well. .. Like ideally you want them to understand why they do the steps they do, and that is what they need…That they can understand why I did this and then why I did the next step. Not because 'I remembered to do it' but because it is the logical thing to do next. But yes you are going to have those kids who are just, they have to do it because it is on the syllabus and they are told to do it. (Aidan, interview 1)

Meaningful learning occurs in the classroom when personal meaning (intrinsic objective meaning of the mathematical activity) and cultural meaning (outer mechanical performance of actions) merge. In a reform context, transmitters and acquirers link up outside and inside – experience, performance, visions, sounds, and

touches, aromas; to authenticate their own actions, strategies, and discuss their thinking. Mathematical emotions, rules, practices, ways of knowing and doing, energy, interactions and evaluations constitute the student through their history with schooling and their out-of-school experiences in families, communities and peer networks. The challenge for pre-service teachers is to be alert to the cultural knowledge and personal meaning and feeling that students bring to mathematics, and to anticipate the ways students can draw on this knowledge, meaning and feeling in learning and understanding mathematics. From a teaching perspective, this entails flexibility in understanding the relationship between cultural knowledge and domain knowledge (Grossman, Schoenfeld & Lee, 2005). It involves mapping knowledge, meaning and feeling onto the demands of the academic mathematical domain.

Catherine sums up the challenge,

> I just feel that if the government are going to enforce these new topics and new ideas [Project Maths] I think they should also look at the schools as a whole. It is not just one maths class that you are dealing with, you are dealing with 30 students, a system a timetable, a history (Catherine Interview 1).

Students come into the classroom with an already formed concept of what mathematics is, and should look like, based on their previous experiences. James found, when he implemented more activity-based learning that

> …some of the lads would have got huge benefit from it, other lads would have left the class and gone, 'Well, what was the point in that?' Because that is not what they think of [maths] ... (James Interview 1).

When student teachers implemented activity-based learning in their classrooms, this also required support and a positive attitude towards innovative forms of teaching and learning from their placement school. This was generally forthcoming, but occasionally, there was some resistance on the part of established teachers:

> So as far as I can tell the two qualified teachers aren't really taking on board the Project Maths ideals and they are still doing it from the book. Whereas today I brought in cardboard and scissors and the kids made spinning tops with different number sides and they had coins and we flipped a coin and we spun the spinner to make out the probability, the graph afterwards. So myself and the other student teacher, we are doing a lot of the hands on activities, and as far as I can tell, the other two teachers and doing 'chalk and talk', 'sit down and repeat' (Aidan, Interview 2)

Though this was not the general experience of our pre-service teachers, it is not unknown in schools elsewhere. The most recent reports from the Inspectorate (Department of Education and Skills, 2013) found that while most of the schools visited were whole-heartedly adopting the new approach, there were still some teachers who were not using the methodology and resources available from Project Maths.

Mathematics and emotions

The occasion of a significant reform in mathematics curriculum also provides a window on the under-appreciated and under-researched aspects of meaningful learning such as the emotionality of learning to teach mathematics. We explore this aspect in our paper *Looking like a Teacher: fashioning identity through images, artefacts and dressage* (Rutherford, Conway & Murphy, 2013a). Bodily sensations, feelings and states of mind, are evoked and named in specific mathematical social and cultural contexts, as emotions. Teacher emotions are embedded in the school culture amid spaces, people, practices, ideologies and power relations. In this paper, we analyse the emotional experience reported by pre service teachers when learning to teach reform-oriented mathematics within the secondary school setting. We employ Bernstein's concepts of classification and framing of educational knowledge (1971) to explore the production and reproduction of mathematics discourse, anchored in emotion. The paper deploys Bernstein's classification and framing in the context of emotions, mathematics and professional education to inform our understanding of initial teacher identity and learning.

2. Participation in cultural practices

Changing patterns of participation in cultural practices defines learning from a socio-cultural perspective (Lave & Wenger, 1991; Sfard, 1998). Cultural practices may afford or constrain meaningful learning. In the case of mathematics education reform one of the key aims is to create new cultural practices that will make meaningful learning in mathematics more likely be these practices in real or simulated forms. The developmental outcome of the learning processes in any of these practices depends on the format of the activity that takes place within the practice. Each format is

characterised via rules, level of involvement of the participants, degrees of freedom re objects, actions, tools, goals and obedience to the rules (Van Oers, 2009, 2010).

In our paper entitled '*Knowing Maths, Liking Maths & Reform Dilemmas in One Classroom: a Bakhtinian perspective on learning to teach mathematics*' (Rutherford, Conway & Murphy, 2013b), we argue that genres are created in each 'area of human activity' (Bakhtin, 1986) and are shared amongst members of 'expert discourse communities' (Swales, 1990). In the context of student teachers framing of mathematical practices in schools, we present a particular configuration of 'register variables' (Martin and Rose, 2007) namely, their representation of their observance of particular rules, use of particular tools and engagement with certain norms that define the mathematical community and the enactment of social practices of the given mathematical cultures in second level schooling.

In this paper, through a case study of one pre-service teacher, Stephen, we explore the complexities of learning to teach reform-oriented mathematics within the post primary school setting. At the title of the paper makes clear, Stephen knows and likes mathematics, yet began the year with a highly sceptical view of Project Maths. His own school maths experiences had been in an older tradition:

> …waiting outside the door to go into the maths class and you would be in fear and dread just in case you had any of the questions wrong.
> (Stephen, Interview 1)

Coming from this background, his image of a successful maths teacher was of a strict disciplinarian, an emphasis on didactic learning and a highly competitive classroom atmosphere. Notwithstanding this, his passion for and enjoyment of mathematics was evident throughout his interviews. His concept of how it should be taught, however, had changed by the time of his later interviews. Stephen was grappling both with connected[5] mathematics (Romberg, 2000) and with reconfiguring his experiences of mathematics, both past and present. Combined with the input from his PDE maths methodology classes, Stephen's classroom experiences meant that he had

5 . We use the term 'connecting maths' or 'connected maths' to convey the strong problem solving, realistic mathematics focus of Project Maths which student teachers were enacting in classrooms. See footnote, p. 42

significantly changed his stance, finding that the greater emphasis on teaching for understanding, with more group work and collaboration on problem solving, as emphasised in Project Maths, was more effective in reaching his students. The tensions experienced by Stephen, despite his exemplary background in terms of knowledge of and enthusiasm for mathematics, is informative in terms of complexity of promoting reform-oriented teaching in teacher education and in schools.

Stephen's case illustrates the personal tensions of teaching in a reform-oriented environment. He truly believes in the essence of mathematization and in the conventional school of mathematics teaching. Our case study exposes the complex dilemmas that exist in new reform-oriented mathematical contexts where the ingredients and recipes that make up mathematical structures are changing dramatically. The challenge for beginning teachers is becoming conversant and comfortable with new reforms that demand new pedagogical practices which are often at odds with their own classroom experiences; the implications of these new reforms; what the new curricula look like, how they differ from the conventional ones, how they are assessed, that they work when they are taught right, and what it means to teach them correctly (Grossman and Schoenfeld, 2005).

3. Help of more knowledgeable others

In sociocultural theory, assisted practice and guided participation are central ideas (Rogoff, 1993). Assistance from adult teachers is important for the provision of cultural tools and supervision of their use within practice in the classroom (Van Oers, 2010). Vygotsky, in discussing his Zone of Proximal Development, emphasises the role of scaffolding and of help from more knowledgeable peers, to enable the area of learning to be extended beyond that which can be can be reached on one's own (Vygotsky, 1978). While Project Maths emphasises learning through and with problem solving, mathematics still has a considerable body of knowledge and skills that need to be acquired and practised. This is where the role of the teacher, and sometimes of the more knowledgeable peer with the class comes to the forefront.

Kendra recalls how she asked her students to write up their learning outcomes in groups at the end of the class:

> The first time I did it they didn't get it at all. They kind of grasped it a little bit but couldn't put it [learning outcomes] into a proper sentence like I would but I suppose that is difficult for them. The second time, then they got it and they were like, '*reconstructed angle. What type of angle? Obtuse*'. They were able to tell me that. And '*we learned that a regular polygon has the same number of sides as axis of symmetry'*. That is the way they worded it and everything.… So I think that really helps and they were like, '*yes, we did learn that*' (Kendra Interview 1).

Kendra enacts a repertoire of classroom practice that leads students to make connections which supports their development of mathematical content and understandings. Mathematics education for Kendra gives students the 'guided' opportunity to 're-invent' mathematics by doing it. The focal point is not on mathematics as a closed system but on the activity, on the process of mathematization (Freudenthal, 1968).

> …you [the adult teacher] have to bring it back to them all the time. Like sets as well- it is all about, what is a set? …That is how they define (a set): '*Our class, we are a set, [and] we are a collection of people*'. So that is how I think they remember it (Kendra Interview 1).

> When I was doing integers as well with them I gave each of them a little flashcard that had [a number] from -11 to +12 or something and they all stood in the number line and then they are able to see the number line and where 0 was and when it started to become negative and when it was positive. And then I projected onto the board and whoever had the answer to the question would come out of the number line and show the class. I think with my maths class, and especially if I have them doing anything like that, if they are actually up and about and getting involved in it they work better than actually sitting down and trying to think about it. (Simone, interview 1)

Our data reveals the complex ways in which pre service teachers' draw on different tools and practices to help sharpen their ability to listen and identify student performance and learning via informal and formative assessment (Grossman and Schoenfeld, 2005).

Simone uses a traffic light system as a means of formative assessment; it allows her to see which of her students has grasped what she is teaching. She also uses it to pair her students so that they can help one another:

> In our tutorial group they were emphasising assessment for learning, and they suggested that we the traffic light system, [to check for understanding]…they have traffic lights on their lollipop sticks, a green, an orange and they have one for red. So I would say, 'How are you doing?' And they would put either up a green flashcard that means, '*I know exactly what we are doing'*. And the orange means, '*I could do with a little bit more explanation, I am not 100% sure'*. And then the red means, '*Miss, I have no idea what is going on'*. And then I would always try and pair a green with a red and then maybe put two ambers together. Maybe what one of them wasn't understanding, maybe they could help each other work it out. And the green, who thought she knows everything about it, would help the red (Simone, interview 1)

Interestingly, here, we can see a second layer of learning at work; Simone herself is a learner and is using the traffic light system because her tutor suggested it. She continues to because she finds that it works, in her classroom. Mentoring by, and observation of, experienced teachers is another important element of learning to teach. According to Lieberman & Pointer-Mace (2009), accomplished teachers can greatly assist the novice through uncovering aspects of practice and enabling leadership within a professional learning community. However, as Aidan's quote earlier illustrates, this is not always unproblematic. In section 4.5 below (School-university partnerships) we discuss the importance of an integrated learning culture (Moore-Johnson, 2004) if schools as to be 'learningplaces' for all (Conway, Murphy & Rutherford, 2013).

4. Learning activity

The nature of the mathematical activity and the ability to learn from it depend on the developmental level of the student (Van Oers, 2010). According to our RIITILS participants, they have found that student performance is enhanced with help from others and stimulation to a higher level of functioning:

> I do group work a lot with my 1st year class …and I always mix their ability. Because I find they sit together, the poor ones, they don't want to show another person their weakness, who is better than them. So I actually have set groups made out…I change them every month but I stick with mixed ability and that definitely helps because they help one another (Kendra Interview 1).

The group technique of having students engage meaningfully with each other and with the mathematical content takes cognisance of the importance of distributed

expertise in acquiring deep content knowledge. This links with the previous theme, that of help from more knowledgeable others:

> I try and put one or two of the very able students with one or two of those that are in the middle or on the lower end (Simone Interview 1).

According to Van Oers, students prefer to be involved in activities that support and stimulate intentional learning of cultural facts and understandings (Van Oers, 2010, p.27). An Australian study of how different types of tasks contributed to mathematics learning (Sullivan et al., 2013), in a survey of students' opinions on the type of maths lessons that they preferred and learned most from, found that both pedagogy and content were important. The most frequent characteristics mentioned were that a lesson should be fun and interesting, and that they also liked learning something new and challenging. Sophia in LETS2 found this also:

> I think at the end of every class I feel like I have accomplished something. After my first inspection I remember my tutor saying to me, 'every class you have to teach them something different. You can't be on the same thing for two classes.' And I thought that was really interesting and I have been trying to do that. (Sophia, interview 1)

An example from James mentions how one of his students reacted much more positively to problem solving (which many students find challenging) than to 'old-fashioned' maths:

> One student, at the start of the year I was giving him more old fashioned maths questions, but now when I started bringing in more problem solving he was just answering them at a whole higher level. He would come up with really smart ways of figuring out the answer so I was really impressed (James, interview 1).

A problem-solving approach brings with it the challenge of finding and designing suitable problems (Crespo, 2003, 2008). Problems need to be challenging, yet achievable. Finding suitable resources was a constant challenge for our pre-service teachers. They often found that they had to supplement the material in the textbooks chosen by the school.

A typical quote comes from Donagh:

> I try to come up with the problems myself. We had a test on area and perimeter and I gave it to them and we had been working on what type of shape house you would have to have. Or one of the teachers in the school is a PE teacher, so what kind of shape house would he need to have if he wanted to be able to run a 100m track around it, that kind of thing. And just getting them to make those connections. The textbook isn't very good for that… you do still have to go looking for examples and things like that because the textbooks just don't have it. Well I find the ones that I have used, they don't have the resources to make maths engaging and you just have to go out and find an example yourself. (Donagh, interview 1)

An important task is getting their students to relate the problem they are trying to solve back to the maths they have been learning, and this is another challenge, especially since the double period lessons typical of science are unusual in maths timetables. Typically, maths lessons covered a single period:

> I also found they could not relate back the activities we were doing to, like 'This is our activity and now we are going to go back and look at what we did mathematically'. And they couldn't relate the activities they were doing to the maths then afterwards. … I feel the school structure doesn't lend itself well to what project maths wants us to do. So if you have a 35 minute class and you need to get them all into groups, all into their activities, reflect on their activities, then actually learn about what maths they have learned from that activity. I found it extremely difficult to time my classes and so I found that I was splitting up, you know, you do the activity and the bell would go. Maybe it is because I am a novice teacher that I couldn't do that pacing correctly. So you'd be reflecting on Monday's class on Tuesday or Wednesday and the learning is gone. (Karen, student focus group interview).

Learning activity unfolds around various forms of group work within the RIITILS classrooms. The design and orchestration of classroom practice is teacher and student specific. Individual teachers draw on specific pedagogical repertories that are predominantly culturally responsive. This brings forth a new relationship between students and mathematics that is distinctly different from that enacted in conventional school mathematics.

5. Communication

Communication is a principal force in knowing, doing and learning (Van Oers, 2010). According to Sfard (2000) mathematical thinking should be conceived as a form of

communication rooted in discursive construction, transformation of mathematical objects and development of mathematical practices and education. Mathematics is a discourse 'from outside' and 'from inside' that operates 'not only in the mind or consciousness of individuals, but in discourse itself; they operate therefore, according to a sort of uniform anonymity, on all individuals who undertake to speak in this discursive field' (Foucault, 1972, p. 63). The challenge for pre service teachers is to move beyond their own experiences as mathematicians and understand how to communicate maths to a diverse group of students in a reform-oriented context.

Student's 'are now expected to participate in both verbal and written mathematical discourse practices, such as explaining solution processes, describing conjectures, proving conclusions, and presenting arguments' (Moschkovich, 1999, p. 6). Our data highlights that pre-service teachers bring an awareness of specific uses of mathematical language to their classrooms. It exposes the efforts to support children in the discourse of mathematics, to scaffold the development of mathematical language and conceptual development. Julie, a participant in LETS, notes,

> I keep trying to tell them that maths is a language of its own and you have to be able to translate from maths into English and from English into maths. So if I read out the English question, I would say, 'so how do we translate that into maths? (Julie, Interview2).

In order to solve a problem, students must first be able to read and understand it. It can happen that students find the 'wordy' nature of some problems an obstacle, whether because of literacy difficulties which hinder their reading of the problem in the first place, or because they find it difficult to mathematize the problem or to translate into mathematical language. All of our pre-service teachers were conscious of this, and most of them reported that their placement schools are also very aware that literacy needs to be promoted across all subjects. Like other interviewees, James (RIITILS participant) is conscious of the need not only to give his students the necessary comprehension of mathematical terms but also to help his students 'translate' from English into mathematics, especially in the context of Project Maths:

> Sometimes the lads get a bit daunted by the wordy questions in it, but I think a key thing is to set it up properly, by explaining to them that these questions aren't different from what we were doing with the normal maths. When you need to explain the difference between 'solve' and 'evaluate' and 'find', the directional words that set it up (James, interview 1)

Kendra also found that her students had difficulties with:

> …problem solving and literacy skills. They just can't translate the words into a sum. It is just like, what is going on? Because I gave them a test the other day and it was a reading comprehension about statistics, literacy, I have to test it. And they were like, 'this isn't maths, why are you giving us this test?' … It was very basic, just joining sentences to sentences. (Kendra, interview 1)

Mathematics discourse that represents students' lives and experiences, that supports personal goals and equitable achievement allows students to participate in the mathematical community (Darling-Hammond et al., 2005). For example, our pre-service teachers capitalise on linguistic resources students bring to the mathematics classroom by providing multiple mathematical representations and understandings.

According to Kendra, her students 'were engaged immediately' when she used a humorous example in teaching about statistics:

> It was about Danny the dentist or something, and it was about him being a shoddy dentist and he takes out so many teeth. It was humorous but it was about the misuses of statistics as well. He didn't want people to know how many mistakes he made, so which one should he use, the mean, the medium or the mode? Obviously the lowest one. But that was the misuse of statistics and they had to figure that out. Which one should they use, which one should they not use? And there is a lot of problem solving in that as well (Kendra Interview 1).

By negotiating personal philosophies and social contexts (school, family, community, and classroom); and by engaging students and focusing on key issues related to the teaching and learning of mathematics pre service teachers facilitate student understanding and develop responsive curriculum, pedagogy and assessment. This entails analyzing student work to uncover student thinking and understanding.

Donagh's awareness of this appears when he says:

> I might just stop, inside in class, while they were doing something and see how those kids were understanding it or where they were having trouble with. And that would just be an example of where you have to go and figure out another way of approaching a topic. You mightn't be able to hit it head on. Some kids just grasp maths straight away whereas others you have to slide in through something that they already understand and try and link it to what they know. Or link it to something they have used in real life (Donagh Interview 1).

Such activities provide pre-service teachers with the tools that 'foster norms for professional discourse such as respect for evidence, openness to questions, valuing alternative perspectives, a search for common understandings, and shared standards' (Feiman-Nemser, 2001, p. 1019).

4.3.2 Discussion

The current generation of student teachers are therefore learning to teach mathematics at a time of change both in the maths syllabus for second level and in the recommended approaches to teaching it. This presents a fundamental challenge for student teachers and schools - as well as for university-based teacher educators. The challenge revolves around the difference between student teachers' experience of learning maths during their own schooling (what Lortie in 1975 termed the 'apprenticeship of observation') and what is currently being implemented in schools. Our analysis shows the importance of context, of communication, of support in this process. It also pinpoints the shift that is taking place in the culture of mathematics in our school system.

At one level, this phenomenon is only about mathematics teaching but at another, it is one of the fundamental dilemmas of teacher education (Ball, 1996; Boaler, 2002): how should the next generation of teachers be educated in a reform-oriented era? We will return to this question in subsequent sections and in our conclusions.

4.4 Understandings of Literacy and Inclusion

In this strand we provide an analysis of how PDE students constructed literacy in their subject teaching in both the LETS1 (2008-09) and LETS2 (2012-13) cohorts. The findings suggest both continuity and some important changes over time. In summary, and with important implications for inclusion in the classroom, whereas in LETS1 student teachers typically associated literacy with support for students for whom English was a second language and/or had literacy difficulties, by the time of LETS2, there was a notable emphasis on, and sense of responsibility by student teachers for, the wider role of literacy in their subject teaching for <u>all</u> - not just some - students. This is an important finding in that it suggests that for a range of factors we note below, there now appear to be increased opportunities for student teachers to understand and enact literacy in their subject areas – albeit coming from a somewhat less than expansive understanding of literacy as evidenced in both LETS1 and LETS2. The comparison between student teachers' construction of literacy in LETS1 prior to the 2011 National Numeracy and Literacy Strategy, and afterwards through analysis of LETS2 in 2012-13 provides access to a unique data set and, as such, insight into student teachers' changing interpretations and experiences of literacy between 2008 and 2013.

In writing about literacy in LETS 1 (Murphy, Conway, Murphy & Hall, 2013), we situated it within the rising expectations for secondary school graduates worldwide (Darling Hammond & Lieberman, 2013) with literacy and numeracy emerging as the focus political and policy makers' attention. In tandem with this trend, in Ireland literacy across the content areas in secondary education has emerged as a policy priority largely due to the attention afforded to literacy by PISA results and concerns emerging out of whole school and/or subject evaluations (Conway & Murphy, 2013). Written from a socio-cultural perspective, a paper '*The emergence of reading literacy in post-primary teacher education: From the background to the foreground*' has been accepted for publication by the European Journal of Teacher Education (Murphy, B. Conway, Murphy, R. & Hall, 2013/forthcoming). Findings from LETS 1 presented in this paper clearly indicated that the following issues were salient for student teachers and for teacher educators in relation to literacy in the classroom:

- The student teachers' personal literacy competence
- Students' perceptions of literacy and responsibility for literacy development
- Literacy as an SEN and EAL issue
- Students' traditional understandings of literacy
- Limited range of literacy strategies used by the student teachers
- Limited understanding of digital literacy: Teacher ICT use as a resource and motivator for students

Our analysis of student teachers conceptions of literacy in LETS 2 allowed us to compare interview data across the 2008-09 (n=17) and 2012-13 (n=9) data sets. In the 2012-13 survey (n=102), we also included two open-ended questions and undertook a content analysis of both in order to understand the way student teachers were constructing their perceived challenges (Question 1) and expressed professional learning needs (Question 2) associated with literacy.

Findings from the LETS 1 and LETS 2 comparison were presented at the Reading Association of Ireland 2013 conference (Conway, Murphy, Murphy, Curtin and Rutherford, 2013). While echoing those of LETS 1, the findings from LETS2 also point to the increasing salience of literacy, student teachers' perceptions that literacy (more so than numeracy) is a school wide concern, and their adoption of particular strategies to signify the increasing pedagogical attention to literacy.

For mathematics teachers, as well as the general literacy competence that students need in order to be able to read and understand a question, there is a particular need to convey the need for precision in the use of mathematical language. Emphasising and deliberately setting out to reinforce 'key words' is a common strategy, and one that is encouraged through whole-school policies on literacy.

A quote from Kendra (LETS2 interviewee) is illustrative and not untypical:

> Yes for every class, I put up key words that we are going to use that may cause (*confusion)*... for example, 'investigate', 'verify'. 'Verify 2:3 is on the line'. And then I got something like, 'No, it is not'. But I am like, 'But they told you it is, it is like prove.' So we had to discuss the word verify, what does it mean? They were like, 'verify, verification. Yes, prove, that is what it is'. And then 'investigate', the opposite, we are not sure, it could be or not. So that is how you understand a word, verify, investigate, it is just to help them I suppose to guess the questions that are coming at them and that seems to help them. But there are some real literacy issues. I don't know even how to explain such a simple word for me. So I usually just ask the rest of the class 'How would you describe that?' And then we come up with a definition together. (Kendra, Interview 1)

Progression from LETS 1 and LETS 2 with regard to literacy as a cross-curricular concern, evident from interview data, is indicated by student teachers' discussion of the following topics:

- Key importance of vocabulary and the explicit teaching of vocabulary generally (but especially the 'key words')
- Importance of context and language use in building literacy understandings and development – making language real and meaningful
- Importance of active student involvement in building language
- Greater awareness of other issues impacting on literacy
- Attention to literacy as an integral part of teaching

While analysis of the interview data on literacy is on-going and will form the basis of future papers, Box 1 gives some illustrative quotes from the LETS2 interview data with respect to each of these points.

Box 1.

Key importance of vocabulary and the explicit teaching of vocabulary generally (but especially the 'key words')	Firstly I have words of the day: 'We are going to talk about these words'. I know they know the words, like horizontal and vertical, but for example they said to me, 'oh yes there is a line of symmetry'…we go back to our key words; you are not to use these words, that is not proper English. And they are like, 'I meant vertical.' So I put up my key words (Kendra, Interview 1).
Importance of context and language use in building literacy understandings and development – making language real and meaningful	…You can make it as boring or as exciting as you want. When we were learning it [*transformation geometry*], it was the most boring thing ever, I didn't enjoy transformation geometry at all because it was just like, 'this is a transformation'. We were never told where it was used in real life, a soccer pitch or a football pitch which they [*the students*] see every night on TV, automatically they were like, 'oh, ok'. Another method I used was, 'what is translating?' And I was walking around the room. 'Is there anything translating in the room?' And they were looking at the door, looking at themselves and I was like, 'is anything translating?' And they were like, 'well you are kind of moving?' Exactly. So then they were like, 'so you translate every day'. It was a weird concept but it helped them to engage. It was a good lesson…(Kendra Interview 2).
Importance of active student involvement in building language	I found a good way of helping with literacy in the maths class was to get students up to the board but not just complete what they were doing. They had to articulate in words what they were doing, and then the other students would listen and learn from them (George Interview 1).
Greater awareness of other issues impacting on literacy	(Literacy issues) have to be addressed from 1st year because it takes a while to get used to reading a maths problem and extrapolating the information from a text, the information that you need. I would like, and I haven't done it this year, but I would like to even spend a couple of classes of putting complicated sentences or paragraphs up and giving them a list of questions that is the relevant information and having them extrapolate that and practice taking information. (Andrew, Interview 1) Any student with dyslexia or even just with a low level of literacy, they just don't like them (*word-based problems*) at all. They could be quite good at maths but they get angry and frustrated by them. So it is a balance really between the two, they don't like doing those problems. (Andrew, interview 2) I do use word based problems a lot. I have worksheets, like when we were doing percentages, I gave them a worksheet that

	was based on nursery rhymes or fairy tales. And it was like, Rapunzel's hair was 35 feet long, she used the wrong conditioner, now it is only 25 feet long. What was the percentage loss? I have been doing that throughout the year. So I am using the Project Maths style questioning, it is word based problems that I am doing with them. Like I said, the book that we use in class, that the school uses, isn't at all geared towards the word based stuff. It is only at the end there is the Test Yourself …and there is a section called 'For the Problem Solver' which is meant to be for the more able kids. They are the word based problems but a lot of the kids in my class wouldn't be able for the maths that is expected of them in that question. So it is kind of pointless. So I have gone away to find worksheets and I have a big book, it is from America, it is maybe 400 pages of different worksheets, it is brilliant (Aidan Interview 1)
Attention to literacy as an integral part of teaching	…just writing the words on the board a lot of the time is what I do. The school wanted us to do it, for the literacy and numeracy strategy, there is a section at the back of the book where we write down the keywords for each class and we write how it is used in maths context and then maybe if it is a word that is used with a different meaning outside of maths, then write a sentence with that. When I remember I try to do that with them and the kids remind me sometimes. They say, 'is this a word that we should take down at the back of the book?' … (Aidan, Interview 1).

While the interviews in LETS2 focused on literacy in the mathematics classroom, analysis of the larger data set from the survey presents other indications of a more expansive framing of literacy among the LETS 2 (2013) than among LETS 1 (2009) student teacher cohort across the whole range of subjects taught.

The two open-ended questions in the literacy part of the survey were:

> *Q9. Comment about your overall sense of addressing literacy in your subject area(s) in terms of:*
>
> *1. Main challenge(s)*
>
> *2. Aspects of literacy which you think you need to learn about as a teacher:*

Table 4.4 and Table 4.5 below summarise the content analysis.

Table 4.4: Responses to Open-ended Items on LETS 2 Literacy Survey

n	Theme	Number of responses [no response]	Total chunks coded	No of codes
101	Perceived challenges in teaching literacy	72 [29] = 101	125 (72 students)	14
101	Need to learn as a teacher	44 [57] = 101	47 (44 students)	10

Coding and ranking of responses to these two questions (see Table 4.5) revealed that the three most important elements mentioned were:

- A focus on inclusion (ranked first overall combined across both questions)
- Importance of concepts/technical language (ranked second overall combined across both questions)
- General literacy methods for their subject (ranked third combined across both questions)

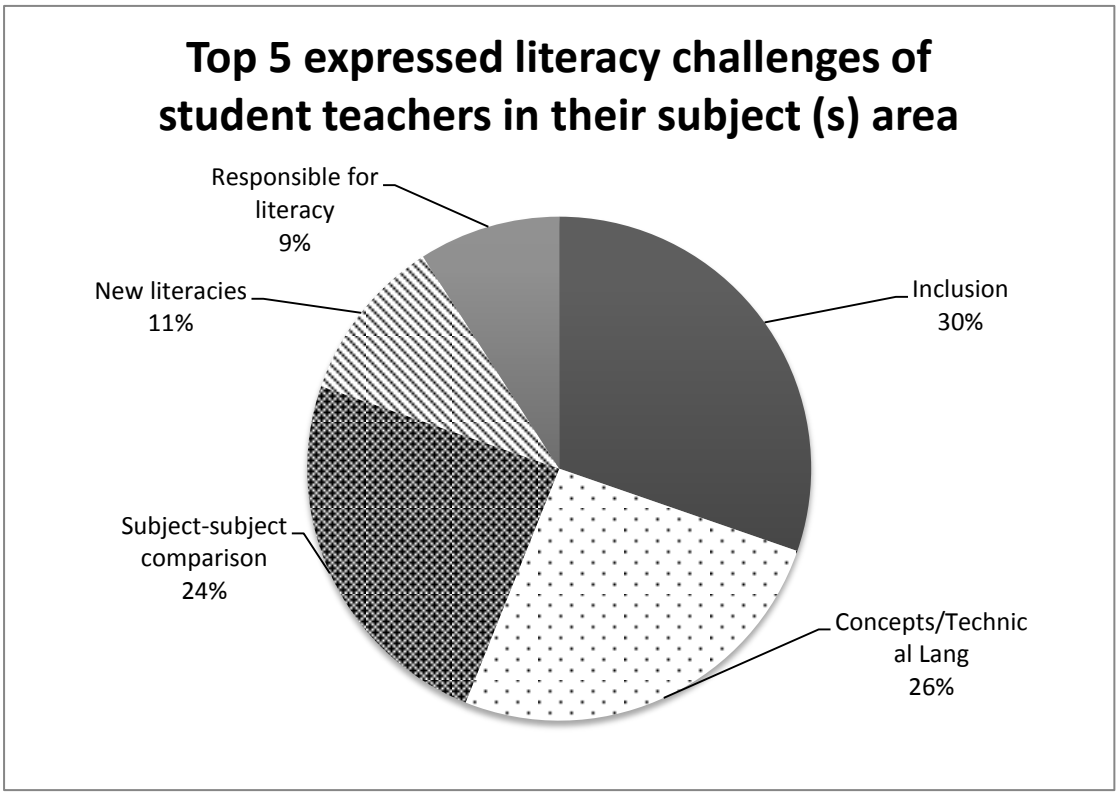


Table 4.5: Perceived literacy challenges in teaching and professional learning needs for student teachers

Code	Challenges [Rank]	Need to learn as a teacher [Rank]	Combined [Rank]
Number of students that did not provide a written response	29 (of 101)	57 (of 101)	
Inclusion	20 [1]	13 [1]	33 [1]
Concepts-technical terms/language	17 [2]	3	20 [2]
Literacy Methods [general]	6	12 [2]	18 [3]
Subject-subject Comparison	16 [3]	0	16 [4]
New Literacies	7	5	12 [5]
Responsible for literacy	6	0	6
Comprehension	2	4	6
Concern about own literacy as a teacher	2	3	5
Subject to subject crossover/links	4	0	4
Curriculum materials: relevance	0	4	
Agency limited in TP school	4	0	3
Grammar/Writing conventions	4	2	6
Student motivation	1		
Standards	1		
Social Context-Disadvantage	1		

Findings vis-à-vis literacy in terms of changing perceptions of and practices in literacy in initial teacher education and in schools will be explored and discussed in greater detail in forthcoming publications related to literacy and inclusion in LETS/RIITIL.

4.5: School-University partnerships in Initial Teacher Education

The overall questions addressed in the area of school-university partnerships were:
(i) What factors (within and between schools and university) **support** the optimal development of student teachers vis-à-vis the three focal issues?
(ii) What factors (within and between schools and university) **constrain** the optimal development of student teachers vis-à-vis the three focal issues?

4.5.1 Experiences while on teaching practice during the PDE

The PDE programme combines university-based lectures with a school placement of a minimum of 100 hours spread over the school year. Students must achieve a pass in this field-based element in order to be awarded the PDE. Not surprisingly, it is seen as the most important element of the programme by many student teachers: in both the 2009 and 2013 surveys, 86% of them rated it as the most valuable part of the programme in terms of learning to teach, while a further 7% rated is as the second most important. Some typical comments from the 2013 survey were:

- *Nothing can compare to first-hand experience in the classroom. Support offered by the programme assisted my classroom experience but it was teaching practice itself that taught me so much*
- *Teaching practice is the most valuable because you learn from you experience, your students & you learn how a classroom works for yourself. You can connect things you've learnt in college to your experience in classroom.*
- *Integration of theory in practice can change values and ways of thinking. Practice is critical.*
- *Working with experienced teachers is invaluable*

The development of mentoring in schools in conjunction with university-school partnerships has become a key feature of re-designed teacher education over the last decade in many countries (OECD, 2005; Donaldson, 2011). It is common for formal partnership arrangements to be developed between higher education institutions and

schools to provide structured support and a gradual increase in classroom responsibility for student teachers. The nature of such arrangements varies considerably between countries and between institutions (OECD, 2005; Maandag et al., 2007), and as we found in this study, even between different programmes in the same institution. A large-scale study of induction in the US, the *Project on the Next Generation of Teachers* (Moore-Johnson et al., 2004) identified three school cultures vis-à-vis teacher learning that have very different implications for the types of support offered to newly qualified (and student) teachers:

- **Novice-oriented professional culture**: beginner teachers support each other with little or no mentoring or opportunities to observe and share practice
- **Experienced/veteran-oriented professional culture**: experienced/veteran teachers are supportive in a general way, yet by and large provide no mentoring, observation opportunities or feedback on classroom teaching
- **Integrated professional culture**: learning to teach is seen as a task for all in the school. Support for newly qualified teachers is generally widespread across the school with peer observation, feedback and a coaching culture centred around sharing professional practice and a deep focus on pedagogy.

A quote from one of our school interviews illustrates this last:

> I [teacher] have gone in to observe a few of them [PDE students]. And I must say from my own point of view, every lesson that I observed I have taken something for myself out of … And I tell them what I am taking and I show them then how I use it in the next class …We are learners ourselves, we are on a journey, I might be further along the journey than they are but we are all on the same journey (School Focus Group, PDE Coordinator School 1)

This 'school culture' model goes some way towards explaining why student teachers can have such different experiences even within a single system. Of particular significance in relation to our own study is the finding in the Moore-Johnson research that it is only in schools with an integrated professional learning culture that newly qualified teachers were in a position to engage deeply and collaboratively with pedagogy, both their own and that of other teachers (Moore-Johnson et al., 2004).

The schools we met during RIITILS represent models of best practice. School focus group interviews (see Appendix 2) indicate the organic growth of joint activity within

school cultures. The development of the use of routine generative practices within a disciplined stance that honours evidence and artefacts are guiding educator conversations and actions within schools. The practices ensure that a 'shared vocabulary for talking about teaching and learning is taking hold within' the school cultures (Miller, 2001, p. 117).

From our transcripts, it is possible to see schools providing rich localised information, orientation and practice within their own school context. All members of the school community are co-producers and learning partners. The school practices reported echo a model of 'instructional rounds' that 'never become a settled set of routines, but always subject to new levels of challenge and learning' (Roberts, 2012).

> …we are trying to encourage practice where people are observing each other, people are sharing resources and people are actually picking up little tips …from each other…(Overall Mentor, School 3, Interview 1).

Teachers report that the role of the university is critical in helping to tackle challenges and raise standards of best practice of teaching and learning. Our data reflects a need for more productive collaboration between the university and school. Teachers express a need for dedicated time for collegial conversation, review and critique, and reflection between the school and university partners

> I underlined the word partnership there. I would mentor the student teachers a lot here and this would be my third year doing it and I find all communications goes through the student teachers themselves. … As far as I am concerned, I wouldn't know who to contact in UCC. … for me there is no official partnership (Overall Mentor, School 3, Interview 1).

> I think the student teacher can sometimes seem to be the go-for between the two [school and university] and I would like that they would get a little bit of help because they are very naive at times and unsure of themselves. And I suppose if we could build a partnership with UCC that would reinforce we are there maybe for them. Because ultimately I think they need the supports from both of us. They go from being teacher here in the morning to being student in the afternoon. And we see them as teachers and UCC see them as students (Overall Mentor, School 3, Interview 1).

Box 2 illustrates some of the generative practices that had been developed over time in these schools, sometimes quite independently of the university:

Box 2.

Generative Practice in Schools	Vignettes from School Focus Group Interviews
Mentor Hand-Over Folder	...this is only my second year doing it … It [mentoring] is well established here… I got a whole big folder of notes when …was handing over to me… I dipped in and I used what I thought I would like to use and then I have added in my own stuff so the next person is getting a kind of a mixed file from my stuff and the previous people as well. So when I get fired I will pass on the file! (laughs) But I think every mentor is going to do things their own way and put their own slant on stuff and their own experiences … (School Coordinating Mentor, School 1, Interview 1).
Talking about University Tutor Feedback	…just from talking to her [*PDE student*] about it [the tutor visit] ... The girl I have, she gives me her report to read and says, 'do you think this makes sense or what could I do here?… I [*mentor teacher*] would just read through it …the first one is always a little to improve on…it is easier to see all the bad things, you know and where you think you can help with where the negative thing was.…[it creates] an openness (Subject Mentor, School 2, Interview 1).
Parallel Teaching File	A number of years ago we sat down with the teachers who would be parallel teachers most often and we defined 13 roles for the student teacher and we give them this at the beginning of the year. Down to things like dressing appropriately or integrating with staff involved in curricular activities, cover the prescribed curriculum, liaise with your parallel teacher or your mentor. Observe lessons are in there as a recommendation. …We designed a booklet where we would liaise more between parallel teachers and structure meetings and identify their needs more. And I was given one period a week to meet them all…They bring their needs to me and we discuss it.… Every meeting is different… (School Coordinating Mentor, School 3, Interview 1). It [the parallel teaching file] is shared between the two [parallel teacher and student] nobody owns it.…It is reflective … The green [pages] was the record of what they had covered, homework given, issues that arose, intentions for coming week, resources needed, and whether they had an observation or observed a lesson … the pink [pages] would be the meetings that we encourage the two to have between them and we just use a template we use for all our staff meetings: what did we discuss, what did we decide, who will do what for next meeting, what we will discuss at next meeting and date and time of next meeting …(School Coordinating Mentor, School 3, Interview 1). …Any investment we make in student teachers, we see that as an investment in our pupils. So what we get from them is very important but what they give to the school and give to the pupils is equally important and that is our motivation.…(School Coordinating Mentor, School 3, Interview 1).

An on-going challenge for the beginning teacher is the integration of theory and practice. Hargreaves (2000) and others point to the danger that beginning teachers may fall back on the traditional classroom methods they themselves experienced as a survival strategy. Being able to engage in professional dialogues which helped them to think about their practice as teachers was a major element in helping student teachers to feel positively about their school-based experiences (Hobson et al. 2006). They perceived that school-based mentors were most helpful when they provided ideas and techniques for teaching; provided encouragement; advised on workload issues; and were accessible and available (Hobson et al. 2009, p. 39).

Findings from the survey

A survey was administered in 2009 and again in 2013 to students on the PDE programme (n=133 in 2009; n=102 in 2013). Question 4 of the survey asked student teachers about their experiences of being mentored while on school placement.

Box 3: Mentoring questions from 2013 Survey

RIITIL 2013 Survey Q4: Mentoring

4a. My teaching practice school assigned a teacher to assist the overall coordination of PDE teaching practice students: **YES** **NO**

4b. In my teaching practice school, I was **assigned a mentor teacher** (an individual teacher assigned to you by the principal/school): **YES** **NO**

4c. In my teaching practice school I **sought out a mentor teacher** (developed a working relationship with an individual teacher to help you in learning to teach): **YES** **NO**

Please circle answers as appropriate.

The first *Learning to Teach Study* (LETS: Conway, et al, 2010) found in response to this question that only a minority of PDE students actually had opportunities to observe another teacher during their school placement. Given the acknowledged importance of this aspect of the PDE programme and the on-going work on building partnerships between schools and university-based teacher educators, both of which will be even more crucial in the context of the forthcoming reforms of the

programme, some of the results in the 2013 survey were both surprising and disappointing, to say the least. It would appear that some schools offer PDE students a lot of support in learning to teach, while others seem to take a less pro-active approach. This variability between schools was borne out by the interviews we did with students and teachers, and are related in many ways to the leadership in and the culture of the school as a whole- see Conway, Murphy, Hall & Rath, 2011, for a more detailed discussion of this point.

Overall results from this section of the survey are shown in table 4.7 and Fig. 4.1 below, with figures from the previous survey in 2009 given for comparison purposes in the shaded columns.

Table 4.7: Prevalence of mentoring in schools, 2013 and 2009

Survey Item	**Responses in Year 2013 (n = 102)**	**Responses in Year 2009 (n = 133)**
4a My Teaching Practice school had an overall coordinator for PDE students	45=Yes, 55 =No, 2=Blank	79= "Yes", 52= "No", 2=blank
4b My Teaching Practice school assigned mentor teacher to me	54=Yes, 46=No, 2=Blank	73= "Yes" 55= "No" 5=blank
4c I sought out a mentor teacher myself	52=Yes, 44=No, 6=Blank	70= "Yes", 51= "No", 12=blank

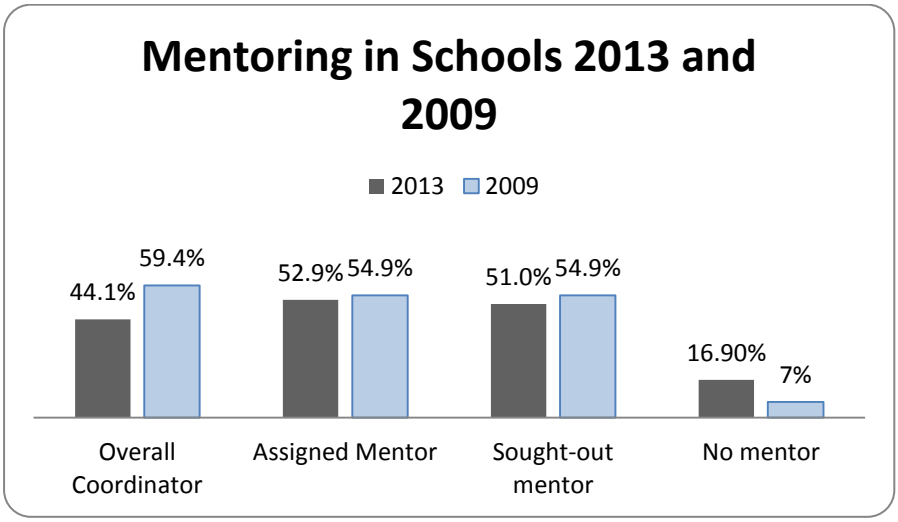
In what way does having a particular type of mentor associated with opportunities to observe other teachers teach during the PDE? In order to address this question, chi-square analysis was undertaken. In other words, the question is, what is the likelihood of having observation opportunities for PDE students in the context of different types of mentoring opportunities in both LETS 1 and LETS 2? (see Table 4.8) In LETS1, only the presence of a school level mentor was significant ($p = 0.05$) and approached significance in LETS 2 ($p = 0.15$). Significantly, in the case of LETS 1, where an individual student teacher said they had all three types of mentors, this was also statistically significant ($P = 0.05$). While we cannot assume a causal relationship, this

finding suggests that when schools choose to appoint a school level coordinator for PDE students, there typically are more opportunities for observation (at least once) of experienced teachers by PDE students.

Table 4.8: Observing a teacher at least once and type of mentoring opportunities in PDE schools

LETS 1 Mentor Type	**Observed a teacher at least once**		**P value/ *significant**
	Yes	**No**	
School mentor: Yes	35	44	0.043*
School Mentor: No	15	37	
Assigned mentor: Yes	33	40	0.26
Assigned Mentor: No	17	38	
Sought after: Yes	30	40	0.318
Sought after: No	16	35	
LETS 2 Mentor Type			
School mentor: Yes	36	9	0.15
School Mentor: No	32	22	
Assigned mentor: Yes	44	12	0.264
Assigned Mentor: No	27	18	
Sought after: Yes	38	14	0.543
Sought after: No	27	16	

Fig. 4.1 Mentoring in schools 2013 and 2009



We now discuss the findings from the 2013 survey section on mentoring (see Tables 4.7, 4.8, 4.9, 4.10 and Figs. 4.1, 4.2, 4.3). More than half of those who responded to this item in 2013 (55 out of 102) stated that their school did not have an overall co-ordinator or supervisor for PDE students. Only 45 stated that there was such a person in their school. In seeking an explanation for this, we hypothesised that perhaps there were very few PDE students in these schools, or that the principal or vice-principal fulfilled this role, or that the person in question had not identified themselves as such to the students. Nevertheless, there seems to be an obvious gap here, and the appointment of such a person in all schools that take students on teaching placement seems an obvious pre-requisite for the further development of partnerships between school and university.

Just over half of the students (54 out of 102) stated that they had been assigned a mentor teacher by their school, and around the same number (52 of 102) stated that they had sought out or formed a relationship themselves with a mentor teacher. There must, of course be some overlap between these figures, with some students both being allocated a mentor and seeking out one, perhaps in their second teaching subject or who was particularly open to sharing and discussion on pedagogical matters.

Most worryingly, 17 of the 102 students (16.9%) in the 2013 survey responded that they did not have any mentor in their teaching practice school, an increase over the corresponding number (7%) in 2009 (see table 4.8 and Fig. 4.2 below). A further 15 (14.7%) only had mentors that they sought out themselves, rather than being offered or allocated one (see table 4.9 and Fig. 4.3). This means in effect that 32 out of the 102 respondents (31%) were not allocated a mentor by the school in which they were doing their teaching practice in 2012-2013.

It is encouraging, however, that over half of the total number of respondents were able to seek out a mentor. This is consistent with the findings from a recent large-scale study in England that informal 'dispersed mentoring' is a significant feature of student teachers' experience (Hobson et al., 2009, p. 41). The situation in our programme is in contrast to recent longitudinal study of teacher education in England

by Hobson et al. (2006, 2009), where it is taken for granted that student teachers will have an appointed mentor in their host school, and the only question is how effective this relationship is in supporting the process of learning to teach:

> One of the key factors reported as having a major impact upon student teachers' experience in schools is the extent to which they enjoy productive relationships with, and feel supported by, their mentors and other teacher colleagues. (Hobson *et al*, 2009, p. 39)

The taken-for-granted aspect of mentoring, as documented by Hobson, and the contrast with the variance in its availability according to responses to our 2009 and 2013 surveys provides further evidence of the dominance of the workplace/host model of school-university partnership in many schools. Where there was evidence (from some of the interviews in particular) of an integrated professional learning culture in the school, the student teachers reported a much more positive teaching and learning experience.

Table 4.9: Mentoring in schools

	Mentors in Schools 2013 (n=102)	**Mentors in Schools 2009 (n=133)**
Had all 3 (school co-ordinator, assigned mentor, sought-out mentor)	17 (16.7%)	21 (15.8%)
Had 2 types of mentor only	32 (31.4%)	53 (39.8%)
Had 1 mentor only	36 (35.3%)	49 (36.8%)
Had none of the above	17 (16.7%)	10 (7.5%)
Total	**102 (100%)**	**133 (100%)**

Fig. 4.2 Frequency of mentoring combinations in schools (2013)

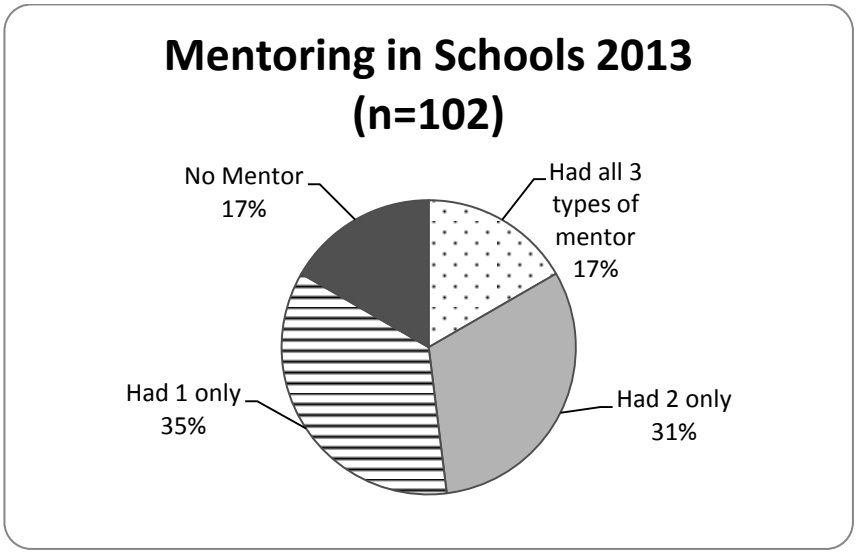


Table 4.10: Breakdown of those who had 1 mentor only, in 2013

Breakdown of those who had 1 mentor only, in 2013 (n=36)	**Number**	**Percentage of total respondents (n=102)**
School coordinator only	9	8.8%
Assigned mentor only	12	11.7%
Sought-out mentor only	15	14.7%

Fig. 4.3a PDE Students (2013) with only one mentor (n=36)

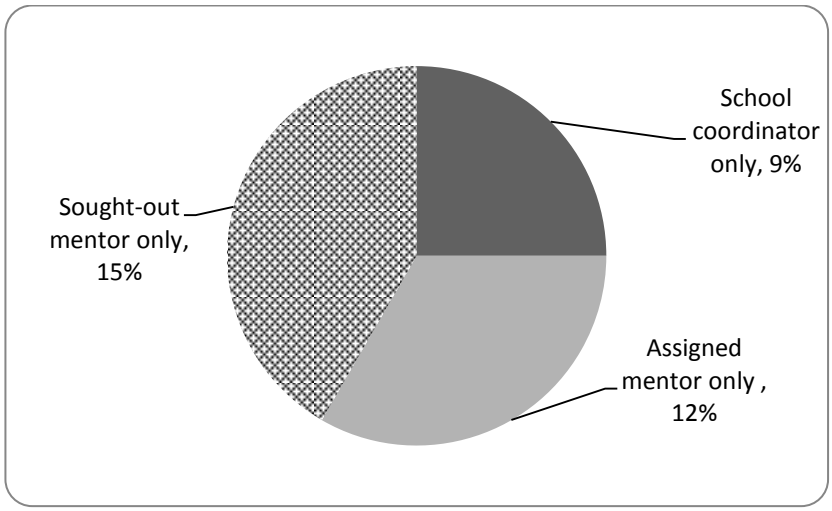
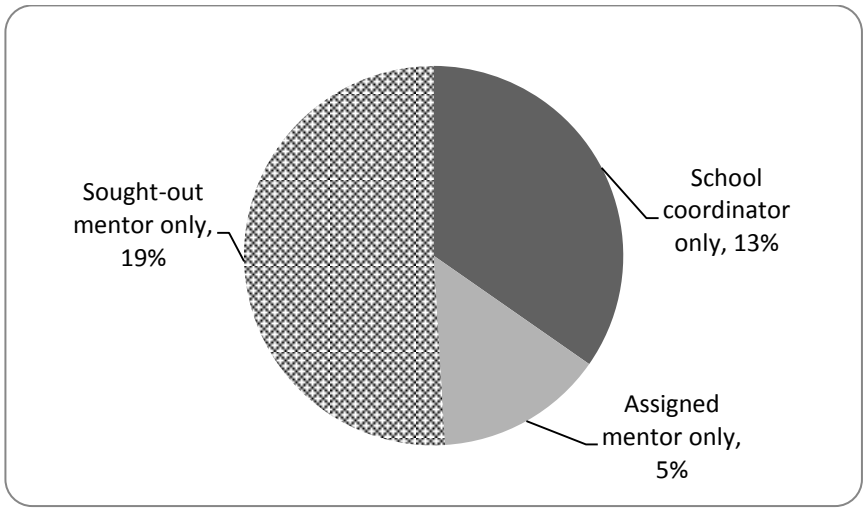


Fig 4.3b PDE Students (2009) with only one mentor (n=49)



A further aspect of learning to teach is the availability (or otherwise) of opportunities to observe experienced teachers at work in the classroom. From a socio-cultural perspective, new learning identities are shaped by the participation structures afforded to learners (Wenger, 2008; Hall, Murphy & Soler, 2008). These include opportunities to observe, to discuss, to engage in guided practice, and to gradually take on more responsibility. In the past, the model of learning for many students teachers for second level has been a 'sink or swim' one; they were frequently given complete charge of a class or classes from the beginning. This differs from the models prevailing in concurrent courses, where teaching practice is spread over several years, and includes more observation in the initial stages

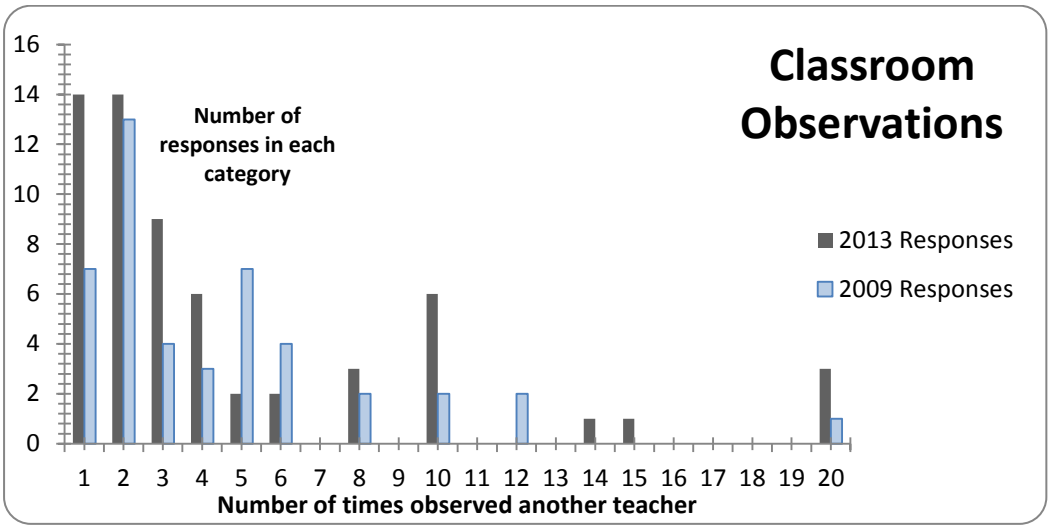
followed by a graduated assumption of responsibility. PDE students are encouraged to ask whether they may observe other teachers in the school; from the feedback we received, the extent to which this happens varies greatly

Table 4.11: Observation in schools

Survey 2013 Observation in schools		**2013**	**2009**
Q. 6a I observed a teacher in my teaching practice school at least once	Yes	70 (69%)	52 (39%)
	No	31 (30%)	80 (60%)
	Not answered	1 (1%)	1

In some schools, it is a requirement at the beginning of the year that the new student teacher sits in on classes, while in others, this does not seem to happen, or happens on a few occasions. The student teachers themselves may be reluctant to engage in observation, if they feel that this marks them out as learners, rather than as fully fledged teachers in the eyes of the student in their classes (see Hall et al., 2012 and Long et al. 2012). However, they are now increasingly being encouraged in lectures and tutorials to seek out observation opportunities, and schools are becoming more aware of the importance of facilitating such opportunities. There was a considerable increase from 2009 to 2013 in the percentage who had observed on at least one occasion, up from 39% in 2009 to 69% in 2013 (see Table 4.11 above), and from their comments on the survey form, it was obvious that many of them found it of great benefit. However many of those who had observed did so on only one or two occasions; see Fig. 2.4 below. There was, however, a considerable increase overall in those who had observed over the corresponding figures from 2009; see Fig 4.4 below. This is encouraging, since the 2009 figures already showed an improvement over the numbers reporting having observed in small-scale surveys carried out by the first-named author with earlier PDE cohorts in 2002, 2004 and 2006.

Fig 4.4. Classroom observations



The literature shows however that observation alone may not be sufficient; ideally it is preceded and/or followed by opportunities to discuss issues relating to what is observed, whether in terms of subject pedagogy or classroom management. (See Conway, Murphy, Hall & Rath, 2011, Conway et al, 2012 and Ni Aingleis et al., 2012, for discussions on making pedagogy visible to the novice and other related issues).

There appeared overall to be quite different school cultures underpinning the practice of observing and giving feedback to PDE students in schools with some students experiencing considerable support and others minimal. Table 4.12 presents the findings from the Support in School subscale of the 2013 survey. While there appeared to be quite a high level of perceived support from the teaching staff in the placement schools, there was still a substantial minority (28 out of 102: 27%) who stated that they rarely had a chance to talk to teachers in the school about professional matters. Further, less than half (50/102: 49%) 'got a lot of help about planning lessons from teaching staff'. This contrasted with the overwhelming number who talked about professional matters with fellow students (90/102: 88%). It is also in accordance with the TALIS findings (Gilleece et al. 2009) that the dominant form of professional collaboration in Irish schools is characterized by "exchange and coordination" activities more frequently than by "more complex professional collaboration", (Gilleece, et al, 2009, p. 84).

Table 4.12 Support in school Subscale

PDE Survey 2013: Section 5 (n=102) Support in School Subscale			
As I think about the PDE so far this year, I…	**Agree/Strongly Agree (n=104)**	**Disagree/strongly disagree (n=104)**	**Undecided/ no answer**
a. Felt the learning to teach was stressful	79	19	4
b. Got a lot of help about planning lessons from the teaching staff	33	50	19
d. Had an opportunity to talk daily about how my lessons went with one or more teaching staff	49	42	11
e. Felt I was supported in learning to teach by the teaching staff	69	18	15
i. Rarely had a chance to talk with my fellow student teachers about professional matters	9	90	3
j. Rarely had a chance to talk with teachers in my teaching practice school about professional matters	28	60	14
l. Felt isolated during my experience of learning to teach	16	71	15
p. Had someone in my school I could talk to on a daily basis about learning to teach	68	20	14

5. 0 Conclusions

5.1 Summary

In this section we summarise the main findings from the RIITIL Study across the four strands of the study, and note some key issues for teacher education in general and for the future of the PDE in particular. Among the dimensions of learning to teach addressed in the findings are the rapidly changing teacher education policy landscape in Ireland (Strand 1), significantly shaped by both new Teaching Council regulations as well as a policy step change in response to the results from the OECD's PISA 2009. Strand 2 findings on the teaching of mathematics draw on two theoretical frames to present findings on mathematics teaching in an era of reform: (i) a Bernsteinian analysis of the classification and framing of emotions in mediating student teachers' construction of mathematics pedagogy, and (ii) a Bakhtinian analysis of the discursive construction of problem solving narrated through a detailed case study of one student teacher who though, he *'knows maths and likes maths'*, as the article title indicates, grapples with teaching Project Maths, given the significant leap it represents from his own experience of learning of mathematics as a student at second and third level. This case conveys the vivid manner in which PDE students are typically experiencing the difference between their own experiences of learning mathematics in second and third level compared to what is now expected of them in teaching Project Maths. Strand 3 provides an analysis of how PDE students constructed literacy in their subject teaching, drawing on data from both the 2008-09 and 2012-13 cohorts and suggests both continuity and some important changes over time. In particular, whereas in LETS 1 student teachers typically associated literacy with support for students for whom English was a second language or had literacy difficulties, there was a notable emphasis on, and sense of responsibility by student teachers for, the wider role of literacy in their subject teaching for all - not just some - students.

Strand 4 focuses on school university partnerships, a key aspect of initial teacher education, and as with LETS 1, the role of observation, mentoring and support in schools for PDE students was the focus of analysis. There was a significant increase

in observation opportunities for student teachers from LETS 1 to LETS 2, and these opportunities, as was the case in LETS 1, were significantly associated with the presence of school level coordination. From LETS 1 to LETS 2, there was a small decline in the presence of school level coordinators, while assigned and sought after mentoring opportunities were similar, and there was a small increase in the number of student teachers that had no mentor, that is, school level, assigned or sought after, available to them in their school. In addition, LETS 2 identified a range of generative practices in some schools, including: (i) discussion between cooperating/mentor teacher and PDE student after university tutor visits, (ii) a school resource book for mentor teachers, passed on year-to-year by the staff person designated to provide overall school coordination for PDE students, and (iii) a planning notebook shared between PDE students and their subject mentor teacher.

5.2 Perennial dilemmas and emerging challenges in ITE, Project Maths and Literacy

Many of the findings are not unique to the PDE or to UCC but reflect perennial dilemmas and emerging challenges in changing landscape of initial teacher education in Ireland and internationally. This fact is important in setting a context for the wider dissemination of the findings from *Learning to Teach Studies 1 and 2*. For example, the tensions experienced by Stephen in grappling with teaching Project Maths, despite his exemplary background in terms of knowledge of and enthusiasm for mathematics (see section 4.3.1), is informative in terms of complexity of promoting reform-oriented teaching in teacher education and in schools. Stephen, like most student teachers and indeed any teacher involved in teaching reform-oriented curricula, was **connecting mathematics**[6] **(i.e. Project Maths) and re-configuring** his past experience of mathematics as well actively making sense of how students were engaging, or not, with his evolving and increasingly Project Maths-based teaching.

The question of how student teachers make sense of literacy within their subject teaching was one of the focal questions of this study. This was based on a key finding

[6] We use the term 'connecting maths' or 'connected maths' to convey the strong problem solving, realistic mathematics focus of Project Maths which student teachers were enacting in classrooms. See also footnote p. 42.

from LETS 1 which indicated that student teachers typically had a limited or reductionist view of literacy (e.g. it is for students with literacy difficulties, does not encompass digital literacies) vis-à-vis their subject. In LETS 2, this somewhat limited and reductionist view of literacy is still evident, but there was also evidence of subject teachers making sense of literacy as a wider issue within their practice in terms of both perceived challenges and their in identifying their own professional learning needs. As such, both LETS 1 and LETS 2 point to the need to **broaden subject pedagogy** so that it encompasses a more expansive and inclusive view of literacy within content area teaching.

In both LETS 1 and LETS 2, a distinct pattern of support for student teachers in schools emerged: there is a considerable degree of mentoring available to student teachers in schools – though it varies significantly in type and intensity across subjects and student teachers – it typically provides somewhat limited access to the pedagogy of experienced teachers (i.e. as evidenced by limited observation opportunities). Significantly, there was a substantial increase in the overall frequency of observation in LETS 2. Nevertheless, the challenge, we think, is one which we can summarise in terms of **deepening engagement with pedagogy**. That is, as school-university partnerships evolve in the planned two-year Professional Masters in Education from 2014 onwards, a focus on mentoring cultures in schools, in which pedagogy is central to the engagement between student teachers and mentor teachers, is vital. As such, mentoring needs to move beyond support and to deepen engagement with pedagogy. In this respect, Japanese Lesson Study (Murata, 2011) provides one very powerful model for how deepening engagement with pedagogy might occur and what it might look like in schools and teacher education.

Whereas in LETS 1 data was only gathered from student teachers, in LETS 2 we also worked with schools in the context of understanding the evolving nature of the school-university partnership with an eye on the emerging re-design of the post-primary initial teacher education consecutive model of teacher education. As noted earlier, in the school interviews the PDE mentor teachers and principals noted and indeed emphasised that the term ‘partnership’ was an area for significant development, as schools perceived themselves as relatively unaware of the content and processes of the initial teacher education programme beyond the immediate

experience of working on a day-to-day basis with PDE students. As such, they perceived the university-based aspect of the PDE as distant from rather than integral to their work with PDE students in schools. They sought greater knowledge of how best to bring both the world of school and university into closer contact. Growing directly from this finding, we see the challenge of **bridging between school and university** and **brokerage within both institutions** as important aspects of future work in initial teacher education in the new two-year post-primary initial teacher education programme. Bridging conveys the cross-institutional aspects of the school-university partnership (e.g. communication channels, artefacts such as programme Handbook, tutor feedback forms), whereas brokerage refers to the harvesting by each partner of its own expertise (Hargadon, 2002) vis-à-vis initial teacher education. By way of example, the generative practices identified by schools to support student teachers (see Box 2 earlier) illustrate some of the existing practices that could be distributed across many schools in the future.

5.3 Baselines for future research in the context of PDE programme re-design

Importantly, the LETS 1 and LETS 2, given their multi-dimensional focus, provide important baseline data with which to undertake further research in the context of the planned re-design of the PDE from a one- to a two-year programme commencing in 2014. As such, these planned changes in the intended curriculum of teacher education as evidenced in very significant changes in teacher education policy, regulations and re-design plans provide an important context for future programmatic research on teacher education in Ireland. Comparing LETS 1 and LETS 2, it is clear in our view, that that have been changes in both the implemented and experienced/received curriculum of teacher education, that is, there is considerable evidence of both continuity and change in mathematics pedagogy as well as in student teachers' perceptions of literacy in their subject area(s).

In conclusion, the purpose of this report was to present the main outcomes of the *Re-imagining Initial Teacher Identity and Learning Study* in terms of focus, activities and publications. In doing so the report presents work completed, as well as on-going analysis and writing, given the scale of both studies. Four ideas have emerged as important in thinking about the implications of this study: (i) **connected maths and reconfiguring** experiences past and present, (ii) **broadening engagement with**

literacy within subject teaching, (iii) **deepening engagement with pedagogy** in schools between PDE student and school mentors, and (iv) **bridging between school and university and brokerage within both institutions**. These four 'big ideas' we have outlined in the conclusion are worthy of attention at two levels, that is, both in terms of the redesign of initial teacher education and in the research on those reformed practices.

6. Publications from RIITILS

Book chapters

Conway, P. F. and Munthe, E. (2014). Opportunities to learn to teach in Ireland and Norway: A workplace learning perspective. In Jens-Christian Smeby and Molly Sutphen (eds.) *Academic drift: Professional Education for the Social Good*. London: Routledge.

Conway, P. F., Leavy, A., Paolucci, C., et al. (2014). Beginning teachers of primary and secondary mathematics in Ireland: Insights from FIRSTMATH pilot, in T. Tatto (ed). Cross-national lessons from FIRSTMATH. Amsterdam: Springer Verlag.

Conway, P. F., Murphy, R., Delargey, M., Hall, K; Kitching, K., Long, F., McKeon, J., Murphy, B., O'Brien, S., & O'Sullivan, D. (2012) 'Developing 'good' post-primary teachers and teaching in a reform era: cultural dynamics in a programme level study of the 'Dip'' In: F. Waldron, T. Dooley, & J. Smith (eds). *Re-imagining Initial Teacher Education (ITE): Perspectives on Transformation*. Dublin: Liffey Press.

Conway, P.F., Murphy, R. & Rutherford, V. (2013) 'Learningplace' practices and Initial Teacher Education in Ireland: knowledge generation, partnerships and pedagogy. In M. Jones, O. McNamara, J. Murray (eds). *Teacher learning in the workplace: widening perspectives on practice and policy*. Amsterdam: Springer Verlag.

Journal articles published/accepted for publication

Conway, P. F & Murphy, R. (2013) 'A rising tide meets a perfect storm: New accountabilities in teacher education in Ireland'. *Irish Educational Studies*, 32 (1). **DOI:** 10.1080/03323315.2013.773227

Conway, P. F. (2013) 'Cultural flashpoint: The politics of teacher education reform in Ireland'. *The Educational Forum*, 77 (1):51-72.
DOI: 10.1080/13540602.2012.746498

Long, F., Hall, K., Conway, P. F. & Murphy, R. (2012) 'Novice teachers as 'invisible' learners'. *Teachers And Teaching*, 18 (6):619-636.
DOI: 10.1080/13540602.2012.746498

Hall, K; Conway, PF; Murphy, R; Long, F; Kitching, K; O'Sullivan, D (2012) 'Authoring oneself and being authored as a competent teacher'. *Irish Educational Studies*, 31 (2):103-117. **DOI:** 10.1080/03323315.2011.649402

Murphy, Brian, Paul F. Conway, Rosaleen Murphy, Kathy Hall (2013/forthcoming) 'The emergence of reading literacy in post-primary teacher education: From the background to the foreground'. Paper accepted for publication in the *European Journal of Teacher Education* (http://www.tandfonline.com/loi/cete20)

V. Rutherford, P. Conway, R .Murphy (2013). 'Looking like a Teacher: fashioning identity through images, artefacts and 'dressage', Forthcoming: paper accepted for publication in *Teaching Education(* http://www.tandfonline.com/loi/cted20)

Papers in preparation/submitted for review

V. Rutherford, P. Conway, R .Murphy (2013). 'Learning to teach mathematics in a reform-oriented context: discursive positioning and curricula emotions', *Educational Studies in Mathematics.*

V. Rutherford, P. Conway, R .Murphy (2013). 'Knowing Maths, Liking Maths & Reform Dilemmas in One Classroom: a Bakhtinian perspective on learning to teach mathematics', *Educational Theory.* Submitted for review.

Karl Kitching, Stephen O'Brien, Fiachra Long, Paul Conway, Rosaleen Murphy, Kathy Hall (2013) 'Knowing how to feel 'about' the Other? The organisation of affects, embodiments and inequalities in learning to teach' Submitted to *Pedagogy, Culture and Society,* Oct. 2013. (It is intended that this paper will form the basis of a chapter in a forthcoming book authored by Karl Kitching).

Alicia Curtin, Paul Conway, Brian Murphy et al. (2013). *Curating Word Worlds - Literacy Practice and Initial Teacher Education.* Paper on Adolescent Literacy drawing on LETS and RIITILS currently in preparation.

Tracey Connolly, Paul Conway, Rosaleen Murphy, Vanessa Rutherford (2013). Paper on School-university partnership, drawing on LETS and RIITILS, currently in preparation

Rosaleen Murphy, Paul Conway, Michael Delargey, Vanessa Rutherford (2013) paper for the Irish Maths Society Bulletin, on learning to teach maths in the context of Project maths – in preparation

Conference Proceedings

Conway, P. F., Rutherford, V & Delargey, M. (eds.) (2012). *Trends in Mathematics Education Conference Proceedings.* Cork: School of Education, UCC.

Rutherford, V., Conway, P. F. & Murphy, R. (eds.) (2013). Re-designing initial teacher education: Deepening Engagement with Pedagogy Conference Proceedings. Cork; School of Education, UCC.

V. Rutherford (2012) 'The enduring legacy of George Boole, 1815-1864: first professor of mathematics at UCC'. In: P. F. Conway, V. Rutherford, M. Delargey eds. *Trends in Mathematics Education Conference Proceedings,* UCC, 26-30 Nov 2012

Michael Delargey, Paul F. Conway & Rosaleen Murphy. '*Learning to Teach Mathematics, Really!*' Abstract, *Trends in Mathematics Education Conference Proceedings*, 26 November 2012, University College Cork

Conference Presentations

V. Rutherford, '*Timbre and Overtones: voice in modern Irish literacies'*, The 21st International Research Society for Children's Literature Conference, University of Maastricht, The Netherlands, 10th-14th August 2013.

Brian Murphy, Paul Conway & Rosaleen Murphy. Conference presentation: '*Developing student teacher under-standings of literacy development in the post-primary classroom*: An enormous challenge for teacher educators'. 18th European Conference on Reading, Jönköping, Sweden, 6-9 August 2013

Paul Conway & Rosaleen Murphy. Conference presentation: *A rising tide meets a perfect storm: New accountabilities in teaching and teacher education in Ireland:* Educational Studies Association of Ireland: Annual Conference, Limerick, 21-23 March, 2013.

Paul F. Conway. 'Education research in a changing world'. Symposium contribution, American Education Research Association Annual Meeting, 27 April-1 May 2013, San Francisco, World Education Research Association Session.

Paul F. Conway, Rosaleen Murphy. American Education Research Association Annual Meeting, 27 April-1 May 2013, San Francisco. Conference presentation*: 'A Rising Tide Meets a Perfect Storm: New Accountabilities in Teaching and Teacher Education in Ireland*'. Educational Policy in Changing Times: Consultation, Implementation, and Impact. Educational Studies Association of Ireland; Invited Session.

Michael Delargey, Paul F. Conway, Rosaleen Murphy. '*Learning to Teach Mathematics, Really!*' Poster presentation and abstract, Trends in Mathematics Education Conference, 26 November 2012, University College Cork.

Paul Conway: *Overview of the Learning to Teach Study and RIITILS*. Conference presentation: Professional Learning and Lesson Study Conference, UCC, 13 June 2013.

Paul F. Conway, Rosaleen Murphy and Vanessa Rutherford. *'Learningplace practices and initial teacher education in Ireland: Knowledge generation, partnerships and pedagogy'*. Conference presentation*:* Professional Learning and Lesson Study Conference, UCC, 13 June 2013

Fiachra Long (presenter), Kathy Hall, Paul F. Conway & Rosaleen Murphy. '*Novice teachers as invisible learners*' Conference presentation*: Professional Learning and Lesson Study* Conference, UCC, 13 June 2013.

Tracey Connolly (presenter), Paul Conway, Rosaleen Murphy. '*LET'S build together: some insights on school-university partnership from the Learning to Teach Study (LETS)*'. Conference presentation: Professional Learning and Lesson Study Conference, UCC, 13 June 2013.

Jacinta McKeon.: Learning to Teach Study (LETS); *Developing cross-curricular competences in becoming a 'good' secondary teacher*. Conference presentation*: Professional Learning and Lesson Study* Conference, UCC, 13 June 2013

Brian Murphy (presenter), Paul Conway, Rosaleen Murphy. '*Reading literacy in secondary teacher education: from the background to the foreground'*: Conference presentation: Professional Learning and Lesson Study Conference, UCC, 13 June, 2013.

Murphy, Brian (Presenter), Conway, P., Curtin, A., Rutherford V & Murphy, R. (2013). *Changed experiences of literacy in initial teacher education at post-primary level: before and after the National Literacy and Numeracy Strategy*. Paper presented to 37th Reading Association of Ireland Conference, MIE, Dublin, 26-28 September 2013

Brian Murphy (Presenter), Paul Conway and Rosaleen Murphy: Conference presentation: '*Not my job! Perspectives of Irish student teachers on literacy development in the post-primary subject classroom*'. Reading Association of Ireland International Conference, 26-28 Sept 2013, Marino Institute of Education, Dublin.

Books in preparation

1. Research book based on LETS1 and RIITILS/LETS2: Outline submitted to publishers, September 2013
2. Pedagogy textbook: Proposal and outline for pedagogy textbook for use in initial teacher education sent to publishers September 2013.

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Appendix 1: PDE Student Interview Protocols and Consent Forms

Appendix 1a: PDE Student Interview Protocol, Interview 1 (Feb/March, 2013)

BEFORE STARTING INTERVIEW with student teacher

Documents needed:

- Informed consent forms (2)
- Interviewee details
- SWOT grid
- Interview schedule (this document)

Check that:

(1) Research project has been explained and assurance of confidentiality as explained on form has been given
(2) **Two** informed consent forms signed and **one** given to student to take away
(3) Interviewee details sheet has been filled out.
(4) Recording equipment is working. Please start interview by stating date, interviewer and interviewee's names (these will be removed from transcript but are needed for follow-up).

First interview: Time: 60 mins, approx.

Overview of Topics Interview One
1. TELL ME ABOUT YOURSELF Background, motivation
2. SCHOOL PLACEMENT Supports? School-based mentor(s)?
3. UNDERSTANDING OF SUBJECT PEDAGOGY 3.1 Own attitudes to/enthusiasm for subject: 3.2 Maths: Pedagogical content knowledge 3.3 Assessment *of* and *for* learning
4: UNDERSTANDING OF LITERACY ISSUES
5. UNDERSTANDING OF INCLUSION
1. SWOT (Strengths, Weaknesses, Opportunities, Threats)
2. FINALLY: Summing up

Appendix 1b: PDE Student Interview Protocol, Interview 2 (March/April, 2013)

Overview of Topics Interview 2

1. Background;

Brief reminder of student's background, teaching subjects and school setting. Is there anything from the transcript of first interview that needs clarifying?

2. Teaching experience/School placement

How has your teaching experience evolved since we talked last?

3. Sample lesson plans

We asked you to bring along two of your lesson plans with a problem solving focus, one from September and one from November. In addition, we asked you to bring along sample student work (anonymous) associated with these lessons. Talk me through these lesson plans and your student work samples.

4. *Transfer of techniques* - comparing subjects: cross over

- Do you see your subjects as similar of different? In what ways?
- To what extent do you see a cross-over between your two subjects? Can you give examples?

5. Language & literacy: dilemmas of difference

- How do you respond when you encounter student (s) experiencing difficulties in learning? *(Ability, SEN, students from different cultures, with different mother tongues, students from disadvantaged backgrounds, gender)* Can you give examples*?*
- **How do you** enable all the pupils in your class to participate in meaningful learning? What are the **challenges / dilemmas** you have experienced?
- What **strategies** have you used to address these? For example, do you organise your class into ability groupings, and if so, how and why?
- Can you give one or two examples
- Do you think ability grouping impacts on student(s) learning and identity?

3. FINALLY: Summing up

Appendix 1c: PDE Student Interview Protocol, Interview 3(May/June, 2013)

Overview of Topics Interview 3

1. **Background;**

Brief reminder of student's background, teaching subjects and school setting. Is there anything from the transcript of previous interview that needs clarifying?

2. **Teaching experience/School placement**

Do you think there was a 'goodness of fit' between you as a PST and your school environment during the past academic year?

> *There is a goodness of fit when the person's temperament and other characteristics such as motivation and levels of intellectual and other abilities, are adequate to master the successive demands, expectations, and opportunities of the environment.*

3. **What do other PDE students that you know think about 'fitting into one's school'? Do they think that 'goodness of fit' matters in school placement?**
4. **Under the new PGDE program all students will be required to teach in two different schools. Do you think this change will make any difference?**

5. **Dilemmas of difference**

I'd like to briefly recap on the ways in which **you** enabled all the pupils in your class to participate in meaningful learning? Specifically, the **challenges / dilemmas** you experienced/overcame? Can you give examples?
How would you rate your influence on student achievement?

6. **FINALLY: Summing up**

Looking back on the past year can you reflect on the highs and the lows of mathematics teaching for you?

Appendix 1d: PDE Students SWOT 1 January (Strengths, Weaknesses, Opportunities, Threats)

Looking back on your experiences so far, and looking forward to the next few months of your course/teaching practice:

STRENGTHS: What are the things you are good at, that helped/will help you as a beginning teacher?	**WEAKNESSES:** What do you feel are the areas where you have difficulty, or feel less confident?
OPPORTUNITIES: Looking back over the first few months of your course/teaching practice, what sort of opportunities did you have to build on your strengths, and to work on areas where you felt less confident? What helped you with these?	**THREATS:** What sort of pitfalls do you think you need to watch out for? What gets in the way of improving your teaching?

Appendix 1e: Informed Consent Form for Student Teachers [Interview] RIITILS

(page 1 of form)

UCC
Coláiste na hOllscoile Corcaigh, Éire
University College Cork, Ireland

IRISH RESEARCH COUNCIL
An Chomhairle um Thaighde in Éirinn

The **Re-imagining Initial Teacher Identity and Learning Study** research project is being conducted by a team from the UCC School of Education and is funded by the Irish Research Council (Advanced Collaborative Research Award, 2012-13). The aim of the project is to study how student teachers develop curricular and cross-curricular competences during their initial teacher education.

As part of this project we will be interviewing 12 students of the PDE course in UCC three times between January 2013 and June 2013. The interviews will be conducted by members of the research team. No student will be interviewed by her/his own teaching practice supervisor, and participation in the interviews will not in any way influence a student's assessment or final marks. Students who participate will however be given a transcript after each interview, and will be free to use this as part of their own reflective practice portfolio.

If you agree to take part in this study, you will be asked to talk to a member of the research team over three interviews (in October 2012, January 2013 and May 2013). Each interview will last no longer than 45-60 minutes. **These interviews will be digitally recorded** and then transcribed. You will be given a copy of the transcript. You may if you wish use this as part of your reflective practice portfolio.

Excerpts from your interview may be used in the research report and/or academic presentations and papers resulting from it. Your name or unique identifying details will not be used in connection with quotes from your transcript at any time. Should you agree to participate in the study, you are nevertheless free to withdraw from the study at any point.

You can discuss any **questions you have about this study** at any time with the research project co-ordinator:

Dr Vanessa Rutherford, School of Education, Tel. 021 490 26 97; Email v.rutherford@ucc.ie

Informed Consent Form for Student Teachers [Interview] RIITILS

(page 2 of form)

Informed Consent: The nature and purpose of the *Re-imagining Initial Teacher Identity and Learning Study* has been explained to me. I have agreed to take part in three interviews with a member of the research team and I understand that **I am free to stop participating** in the interviews at any time and that I don't have to answer all questions if I so wish.

- I understand the information given to me and I am happy to participate in this study.
- I understand that I will receive a signed copy of the information letter and this consent form as well as a transcript of my interviews.
- I understand that anonymity will be ensured in the write-up by disguising my identity (via use of a pseudonym).

Name **Signature** **Date**

UCC Research Team Member:

I certify that the informed consent procedure has been followed, and that I have answered any questions from the participant as fully as possible.

Name **Signature** **Date**

Thank you in advance for taking the time to participate in this study.

RiiTILS Research Team

Dr Paul Conway, School of Education, University College Cork, Tel. (0)21-490-3841;
PConway@education.ucc.ie

Dr Vanessa Rutherford, School of Education, University College Cork, Tel. (0)21 490 26 97; Email v.rutherford@ucc.ie

Dr Rosaleen Murphy, School of Education, University College Cork
Tel. 021 490 26 96; Email murphy.r@ucc.ie

Appendix 1f: PDE Student Focus Group Letter

Dear PDE mathematics pedagogy student,

Thank you very much for volunteering to participate in the Irish Research Council-funded Focus Group on learning to become a teacher. The foci of the study are problem solving in mathematics, literacy (within subject area) and inclusion (again within given subject area).

We are delighted and appreciate that you volunteered to participate in the Focus Group back in January- thank you!

We would like to discuss the emergent and broad findings from our study with two Focus Groups on the 28th and 29th May, 2013, at 3-4pm in the O'Rahilly Building, UCC. Please let us know if either of these days is convenient for you.

We look forward to working with you in advancing our understanding of becoming a teacher.

Regards,

Dr Paul Conway (study PI), Dr Vanessa Rutherford, IRC Post-doctoral Researcher & Dr Rosaleen Murphy, IRC Research Fellow

Appendix 2: School/University Partnership- Interviews with Principals, Vice-principals and Teachers

Appendix 2a: School/University Partnership School Interviews (open-ended)

Principal /Vice Principal Questions

1. How do you structure the current partnership between your School and the School of Education, UCC to support the PDE programme?
2. Can you talk about how working with the PDE programme has changed over time?

Mentor Teachers, Coordinators Questions (1st visit)

1. How would you describe the current partnership between the School of Education, UCC and your school to support the PDE?
2. What kinds of supports do you make available to PDE students? Can you provide some examples?
3. What kinds of supports do you think the School of Education, UCC makes available to PDE students? Can you give some examples?
4. Are there notable supports that could be improved upon?
5. Does your school provide for shared classroom practice and teacher expertise?
6. How would you like to see the partnership develop? And, what would the initial priority be in this development?

School Focus Group / Mentor Questions (2nd visit)

1. What are the resources and sources of support that guide your mentoring role?
2. Can you describe local artefacts such as the parallel file & its role in the fostering of a professional teaching community within the school?
3. Do any factors impede your role as mentor?
4. Do PDE students and collaborating/mentor teachers in schools discuss feedback following observations by tutors'?
5. How would you sum up the emerging observation culture (teacher to teacher; student teacher to teacher; teacher to student teacher) in your school?
6. What is your vision of / expectations for a truly effective collaborative mentoring relationship?

Appendix 2b: Informed Consent Form for School Focus Group [Interview]: RIITILS

The **Re-imagining Initial Teacher Identity and Learning Study** research project is being conducted by a team from the UCC School of Education and is funded by the Irish Research Council (Advanced Collaborative Research Award, 2012-13). The aim of the project is to study how student teachers develop curricular and cross-curricular competences during their initial teacher education.

As part of this project we will be conducting a series of focus group interviews with schools that collaborate with the School of Education, UCC for the PDE program. We are particularly interested in identifying the collaborations that offer successful models of partnership work. The focus group interviews will be held between January 2013 and June 2013 and conducted by members of the research team.

Each focus group interview will last no longer than 45-60 minutes. **These interviews will be digitally recorded** and then transcribed. You will be given a copy of the transcript.

Excerpts from your interview may be used in the research report and/or academic presentations and papers resulting from it. The school name and your name or unique identifying details will not be used in connection with quotes from your transcript at any time. Should you agree to participate in the study, you are nevertheless free to withdraw from the study at any point.

You can discuss any **questions you have about this study** at any time with the research project co-ordinator:

Dr Vanessa Rutherford, School of Education, Tel. 021 490 26 97; Email v.rutherford@ucc.ie

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Informed Consent:
The nature and purpose of the *Re-imagining Initial Teacher Identity and Learning Study* has been explained to me. I have agreed to take part in two focus group interviews with members of the research team and I understand that **I am free to stop participating** in the focus group interviews at any time and that I don't have to answer all questions if I so wish.

- I understand the information given to me and I am happy to participate in this study.
- I understand that I will receive a signed copy of the information letter and this consent form as well as a transcript of my interviews.
- I understand that anonymity will be ensured in the write-up by disguising the identity of the school and teachers (via use of a pseudonym).

Name **Signature** **Date**

UCC Research Team Member:

I certify that the informed consent procedure has been followed, and that I have answered any questions from the participant as fully as possible.

Name **Signature** **Date**

Thank you in advance for taking the time to participate in this study.

RiiTILS Research Team

Dr. Paul Conway, School of Education, University College Cork, Tel. (0)21-490-3841; PConway@education.ucc.ie

Dr Vanessa Rutherford, School of Education, University College Cork, Tel. (0)21 490 26 97; Email v.rutherford@ucc.ie

Dr Rosaleen Murphy, School of Education, University College Cork
Tel. 021 490 26 96; Email murphy.r@ucc.ie

Appendix 3: Conferences

Trends in Mathematics Education Conference

Aula Maxima, Main Quadrangle
University College Cork

26th November 2012
12-6pm

Funded by the US National Science Foundation (NSF), the School of Education, UCC and the Irish Research Council-Funded Study: *Re-imagining Initial Teacher Identity and Learning* (Rii-TIL) Study.

AIMS:

To build a coalition of interest in the **FIRSTMATH** study given its potential to inform both teacher education and mathematics education initiatives in Ireland.

PARTICIPANTS:

20+ Leading Mathematics and Teacher Education Researchers on **FIRSTMATH** and *Key Stakeholders* involved in Mathematics and Teacher Education.

What is FIRSTMATH?

FIRSTMATH is a cross-national study of novice teachers' (i.e. years 1-5) mathematical knowledge for teaching and the influence of previous preparation, school context and opportunities to learn-on-the-job, on that knowledge.

IMPACT:

The results of this study will provide much needed empirical evidence about the influence of school context and on-the-job opportunities to learn on mathematics teachers' knowledge, and on the nature of the knowledge that is useful in and for mathematics teaching students in diverse settings and school contexts.

Contact: Dr. Paul Conway, Michael Delargey, or Dr. Vanessa Rutherford
School of Education, University College Cork (UCC) Donovan's Road, Cork
pconway@education.ucc.ie, m.delargey@ucc.ie, v.rutherford@ucc.ie

Click here to register: http://conferencing.ucc.ie/conference/conference.php?id=167

Programme: Monday 26th November 2012

12.00-1.15: Panel 1: Policy context for FIRSTMATH: Teacher knowledge

- *TIMSS, PISA and student achivement studies*: *Issues for mathematics education in Ireland*, Peter Archer, Education Research Centre (ERC), Dublin
- *TEDS to FIRSTMATH*, Maria Teresa Tatto, Michigan State University
- *Challenges of developing measures for cross-national studies: TEDS and FIRSTMATH as cases,* Michael Rodriguez, University of Minnesota
- Chair: Paul Conway

1.15-2.15: Lunch & poster session

- FIRSTMATH Poster Presentations (x 8)
- *Approaching mathematical problem solving in the Irish primary classroom: Using a constructivist framework to scaffold teachers' explorations*, John O'Shea & Aisling Leavy, MIC
- *Examining pre-service teachers' mathematical knowledge for teaching,* Catherine Paolucci, NUIG
- *Learning to Teach Study* (LETS), UCC
- *Noticing in the mathematics classroom*, Anne O'Shea, NUIM
- *Project Maths*[7]*: Mathematics education reform at the secondary level*, NCCA [TBC]
- "Effects of Calculators on Third Year Students' Achievement and Attitudes" Close *et al,* ERC

2.15-3.30: Panel 2: Problem posing and solving in mathematics education

- *Charting the development of problem posing in initial teacher education,* Aisling Leavy, Mary Immaculate College, Limerick
- *Teacher education and problem posing*, Sandra Crespo, Michigan State University
- *Teacher education and problem solving in mathematics*, Kiril Bankov, University of Sofia
- Chair: Michael Delargey, UCC

3.30-4.00: Tea / Coffee

4.00-5.30: Symposium: Cross-national studies of mathematics education reform

- *Perspectives on cross-national studies of education: Insights from the IEA experience*, Jack Schwille, Michigan State University
- *Mathematics education reform in Ireland: directions and dilemmas*, Elizabeth Oldham, Trinity College Dublin
- *Teacher evaluation: Beyond value-added models (VAM)*, Mark Reckase, Michigan State University
- Chair: Aisling Leavy Discussant: Paul Conway

5.30-6.30: Reception @ Aula Max

[7] http://www.projectmaths.ie/

Signature Pedagogies[8] and Professional Learning Seminar

G 02 Western Gateway Building, University College Cork

Wednesday 12th June 2013

AIM:

To support debate on the role of signature pedagogies in support of high-leverage learning across professional fields

Who should come?

Lecturers, teachers and researchers involved in educating for professional practice (e.g. law, nursing, teaching, architecture, medicine, social work, management, counseling…etc.)

FORMAT & SCHEDULE:

1.00-1.45: Registration (free) & Posters[9]
1.45-3.15: Roundtables in collaboration with ISS21 Educating for Professions Cluster (90min): Signature pedagogies across professional fields.
3.15-3.45: Coffee/tea & Posters on signature pedagogies across fields.
3.45-5.30: Symposium: *'Lesson Study: A Model for Professional Learning',* Professor Aki Murata, University of California, Berkeley, USA.

What is LESSON STUDY?

LESSON STUDY is an on-going system of collaborative learning focused on 'in vivo' teaching involving co-planning, peer observation and collaborative re-design of lessons. Lesson Study can be thought of as a 'signature pedagogy' in teaching.

POTENTIAL OF LESSON STUDY:

- A high leverage learning practice in teaching
- An exemplary model of a professional learning community
- Proven approach for enhancing organisational learning in professional education.

Contact: Dr Paul Conway or Dr Vanessa Rutherford, School of Education, UCC:
pconway@education.ucc.ie, v.rutherford@ucc.ie **All welcome. Registration: (free)**

[8] **Signature Pedagogies** are characteristic forms of teaching and learning in a given professional field (Shulman, 2005) e.g. Lesson Study in teaching, simulation in medicine and nursing; case-based teaching in law, business and psychology…etc.

[9] **Submit poster proposal by Tue 4th June.** Abstract 150-200 words and 1,000-1,200 word Short Paper for Conference Proceedings under 6 headings: Introduction, Literature, Design, Findings, Conclusion and References. Poster format: Please bring posters in A0 or A1 format [Times New Roman, 12pt. font, single spaced]. Submit to v.rutherford@ucc.ie

Seminar

Signature Pedagogies[10] and Professional Learning: Fostering Cross-Professional Dialogues

The purpose of this afternoon seminar is to examine powerful learning models and moments in professional education across a range of professions (e.g. law, architecture, planning, teaching, social work, nursing, occupational therapy, medicine, management, counselling, early childhood education…etc.) by bringing together university and school-based professional educators from a range of professions. Powerful learning models encompass a range of practices across professions, now widely perceived to be 'high leverage learning practices', such as role play, problem-based learning, simulation-based learning, rounds, case-based learning and lesson study. The seminar will involve a round table format, involving the representation and discussion of powerful learning models and moments across professions, and a public lecture and panel discussion in which Japanese Lesson Study, now popular in many countries worldwide, will be presented as a powerful professional learning model in that its focus on professional collaborative dialogue via sustained structured and inquiry-oriented conversations can open up ways of re-framing education at undergraduate and post-graduate levels for the next generation of professionals. Among the questions that might be addressed are:

- On what basis is a particular practice/model presumed to be a powerful learning model (i.e. a high leverage practice) in a given professional education context?
- What kinds of contexts support and/or constrain the enactment of such models in professional education?
- What evidence is useful in understanding the learning that occurs/does not occur in these presumed powerful learning models?

In what ways do the powerful learning models support and/or constrain engaging with the language, ethics and cultural issues and values that underpin contemporary professional practice?

[10] *"The psychoanalyst Erik Erikson once observed that if you wish to understand a culture, study its nurseries. There is a similar principle for the understanding of professions: if you wish to under stand why professions develop as they do, study their nurseries, in this case, their forms of professional preparation. When you do, you will generally detect the characteristic forms of teaching and learning that I have come to call signature pedagogies…. And though signature pedagogies operate at all levels of education, I find that professions are more likely than the other academic disciplines to develop distinctively interesting ones. That is because professional schools face a singular challenge: their pedagogies must measure up to the standards not just of the academy, but also of the particular professions".* (Shulman, 2005, p. 52)

Reform and Re-design of Initial Teacher Education: Deepening Engagement with Pedagogy

Western Gateway Building, University College Cork

Thursday 13th June 2013

Funded by the School of Education, UCC and the Irish Research Council-funded Advanced Collaborative Research Award: *Re-imagining Initial Teacher Identity and Learning Study*

AIMS

Share findings from the DES-funded ***Learning to Teach Study*** **(LETS)**[11] and promote discussion about current directions and dilemmas in re-designing initial teacher education

PARTICIPANTS

Teacher Education lecturers, researchers, teachers, principals and other *key stakeholders* involved in Initial Teacher Education (ITE)

FORMAT & SCHEDULE

9.00-9.30: Registration and Posters[12] on initial teacher education
9.30-10.45: Symposium: Insights from the DES-funded *Learning to Teach Study* (LETS)
10.45-11.15: Coffee/tea & Posters on initial teacher education
11.00-1.00: Keynote: Lesson Study in ITE - Professor Aki Murata, University of California, Berkeley, USA. Followed by Discussion.
1.00-1.45: Lunch
1.45-3.45: Symposium on re-designing initial teacher education

KEYNOTE ADDRESS: Lesson Study as a guide for ITE re-design and deepening engagement with pedagogy

- An emerging signature pedagogy in ITE and a high leverage practice in teaching
- An exemplary model of a professional learning community
- A proven approach for transforming schools' engagement with pedagogy

Contact: Dr Paul Conway or Dr Vanessa Rutherford, School of Education, UCC
pconway@education.ucc.ie, v.rutherford@ucc.ie

REGISTER: http://www.uccconferencing.ie/product/reform-and-re-design-of-initial-teacher-education-deepening-engagement-with-pedagogy-130613/

[11] The DES-funded ***Learning to Teach Study*** (LETS) is available at: http://cora.ucc.ie/bitstream/handle/10468/880/PFC_LearningPV2011.pdf?sequence=1

[12] **Submit poster proposal by Tue 4th June.** Abstract 150-200 words and 1,000-1,200 word Short Paper for Conference Proceedings under 6 headings: Introduction, Literature, Design, Findings, Conclusion and References. Poster format: Please bring posters in A0 or A1 format [Times New Roman, 12pt. font, single spaced]. Submit to v.rutherford@ucc.ie

Signature Pedagogies[13] and Professional Learning: Roundtable, Posters & Seminar

Western Gateway Building, University College Cork
12th June 2013

AIMS:

To support debate on the role of signature pedagogies in support of high-leverage learning across professional fields

PARTICIPANTS:

Lecturers, teachers and researchers in various fields of professional practice (e.g. law, nursing, teaching, medicine, social work, counselling…etc.) across different education sectors

FORMAT & SCHEDULE:

1.00-1.45: Registration (free) & Posters
1.45-3.15: Roundtables (90min) involving sharing of practice across professional fields.
3.15-3.45: Coffee/tea & Posters on signature pedagogies across fields.
3.45-5.30: Seminar on Lesson Study by Professor Aki Murata, University of California, Berkeley, USA.

What is LESSON STUDY?

Translated from the Japanese words *jugyou* (instruction, lessons, or lesson) and *kenkyuu* (research or study), **LESSON STUDY** is an on-going system of collaborative learning focused on 'in vivo' instruction that uses investigation, planning, taught research lesson and collaborative design. Lesson Study can be though of as a signature pedagogy in teaching.

POTENTIAL OF LESSON STUDY:

A high leverage learning practice in teaching.
An exemplary model of a professional learning community.
An existence proof of how transformations of local capacity can be enacted in professional education.

Contact: Dr Paul Conway or Dr Vanessa Rutherford, School of Education, UCC:
pconway@education.ucc.ie, v.rutherford@ucc.ie

[13] **Signature Pedagogies** are characteristic forms of teaching and learning in a given professional field (Shulman, 2005) e.g. Lesson Study in teaching, simulation in medicine and nursing; case-based teaching in law, business and psychology.

Glossary

Learning Outcomes: Statements of what the learner should know, do, or understand and be able to demonstrate following a period of study

Mathematizing: Finding and using mathematical tools to organise and solve a real-life problem. Starting with context-linked solutions, the students gradually develop mathematical tools and understanding at a more formal level. See **Realistic Mathematics Education**.

Mentor: A school-based trainer who is responsible for a trainee teacher or NQT's day-to-day guidance and training during a school placement or during a period of induction or probation.

Methods courses: courses related to the teaching of particular subject matter, classroom management, and assessment.

PCK: Pedagogical Content Knowledge – "represents the blending of content and pedagogy into an understanding of how particular topics, problems or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction". (Shulman, 1987, p. 8). It describes how teachers represent and formulate their subject to make it comprehensible to their students, thereby combining content, pedagogy and learner characteristics.

Portfolio: Students are required to compile a personal portfolio of teaching practice, recording, reflecting on and tracing their professional development during the year.

Primary teaching subject: In the context of the PDE, this is the main subject being taught by the student teacher during the practicum. It must also be a subject recognised by the Teaching Council, and the student teacher must have studied it to an advanced level during his/her degree. Students are also generally required to teach a second subject during their practicum.

Project Maths: a programme of reform in mathematics teaching and learning, introduced in all second level schools in September 2010, designed to teach mathematics in a way that promotes enhanced skills and real understanding.

Realistic mathematics education: Approach to mathematics education which stresses the importance of real-world contexts as both a source of learning and site in which mathematical ideas can be applied. Originally developed in the Netherlands(Freudenthal, 1991). See also **Mathematizing**.

Signature Pedagogies are characteristic forms of teaching and learning in a given professional field (Shulman, 2005) e.g. Lesson Study in teaching, simulation in medicine and nursing; case-based teaching in law, business and psychology.

Supervision of teaching practice: Each student teacher is allocated a supervisory tutor at the beginning of the course, who visits and observes their teaching practice on a number of occasions. Students are also visited by a second, "cross-over" tutor, as a quality control measure and to ensure fairness in assessments.

Teaching Council: The professional body for teaching in Ireland, established on a statutory basis in March 2006 to promote teaching as a profession at primary and post-primary levels, to promote the professional development of teachers and to regulate standards in the profession.

Teaching Practice: Students on the PDE are required to have a minimum of 100 hours- normally 6 hours per week- in direct classroom teaching practice in a post-primary school during their course. Students are required to arrange these placements themselves directly with the school. Students must achieve a pass mark (at least 40%) in their teaching practice and an aggregate of 40% in the remaining modules in order to be awarded the PGDE.

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Re-imagining Initial Teacher Identity and Learning Study

The aim of this research, the Re-imagining Initial Teacher Identity and Learning Study (RIITILS) was to build on the first Learning to Teach Study (LETS1). LETS 1, funded by the Department of Education and Skills, was the first study of its kind in Ireland, and involved the development and implementation of a study of initial teacher education in the Post Graduate Diploma in Education (PGDE) for post-primary teaching, in the School of Education, University College Cork. Its aim was to identify the individual and contextual dynamics of how student teachers develop curricular and cross-curricular competences during initial teacher education. Within an overall framework that explored how student teachers develop their skills, competences and identity as teachers, it focused on curricular competences in mathematics, science and language teaching, and on the cross-curricular competences of reading and digital literacy and the development of inclusive teaching practices.
RIITILS involved a second programme level study, LETS2, of the PDE (since renamed the Professional Diploma in Education). LETS 2 utilised and extends three key findings from LETS 1: that post-primary teachers struggled to enact the meaning of 'real world' experiences in maths, that they had limited understanding of how reading literacy impacted their subject and that while they felt ready to teach by the end of the PDE programme, they did not necessarily feel able yet to promote inclusion. Using LETS 1 (2008-09) as a unique data set, LETS 2 (20012-13) extended it (through interviews, survey and artefacts) and examined how mathematics student teachers engaging with reform-oriented Project Maths in particular, engage with the 'real world', reading literacy and inclusion. The main outcomes of RIITILS were:

- A series of publications drawing on LETS 1 and LETS 2 data
- Two conferences
- Collection and analysis of LETS 2 data

IRISH RESEARCH COUNCIL
An Chomhairle um Thaighde in Éirinn