Report on the project entitled

A Cross border comparison of student teachers' identities relating to mathematics

supported by SCoTENS

The project, known by the acronym, MIST, aimed to explore the mathematical identities of primary school student teachers. The mathematical identity of an individual is the relationship she/he has with mathematics, including knowledge and experiences, perceptions of oneself and others. Participants were drawn from both Stranmillis University College (SUC) and St Patrick's College Drumcondra (SPCD). The researchers on this project were Dr Patricia Eaton (Department of Mathematics, SUC) and Dr Maurice OReilly (Department of Mathematics, SPCD).

Work was in three phases: preparation, data gathering, and data processing and analysis. The researchers met in Dublin on 10/11/08, 5/2/09, 23/2/09 25-26/3/09, 24/08/09 and in Belfast on 6-7/8/08, 9/2/09, 16/2/09, 20/4/09, 19/6/09, 12/1/10 and 6/7/10.

Preparation (May 2008 – January 2009)

This phase involved gathering background information on the respective systems of initial teacher education and the broad context of mathematics education in Northern Ireland and the Republic, familiarization with the research literature and preparation of a questionnaire to be used for gathering data. The last of these included completion of requirements of the Research Ethics Committee, SPCD, and presentation of the draft questionnaire to peers in the Mathematics Education Reading Group meeting in NUI Maynooth (12/12/09). The comments from the Reading Group were very helpful for fine-tuning the questionnaire.

Data gathering (February 2009)

Data was gathered from participants in the third year of their B.Ed. programme, having chosen to specialize in mathematics, using the questionnaire (with, mainly, open-ended questions, 5th February in Dublin, 9th February in Belfast) followed by focus groups (16th February in Belfast, 23rd February in Dublin), involving the same participants.

Analysis and Research Outcomes (March – August 2010)

The data (both questionnaires and focus groups audio recordings) were transcribed by Ubiqus Ireland Ltd (Waterford) and checked by the researchers. Patricia Eaton presented an initial overview of the research findings to the Mathematics Department, NUI Galway (3/4/09) in a paper entitled *Mathematical Identity or Who are you and why are you here?* The following four papers have been presented at conferences in 2009:

1. *What other people think and why it matters? An investigation of key influences on mathematical identity* Presented at 34th ATEE (Association for Teacher Education in Europe) Conference in Palma de Mallorca (29th August – 2nd September).
2. *Exploring mathematical identity as a tool for self-reflection amongst pre-service primary school teachers: "I think you have to be able to explain something in about 100 different ways"* Presented at the 10th Mathematics

Education into the 21st Century Project conference in Dresden (11-17th September).

3. *Who am I, and how did I get here? Exploring the Mathematical Identity of Student Teachers* Presented at the 3rd National Conference on Research in Mathematics Education (MEI3, 24-25th September).
4. *What is maths and why do we study it? The views of student teachers.* Presented at 35th ATEE (Association for Teacher Education in Europe) Conference in Budapest (26th – 30th August 2010).

The third of these provided a general overview of the MIST project to peers in mathematics education. The other three examined in some detail specific issues emerging from MIST. We expect other journal papers to arise from the research.
A poster on the project was also displayed at the annual SCoTENS conference in Malahide in October 2009.

Dissemination Event (May 2010)
A symposium on mathematical identity, based on the work of this project, was held on 7 May 2010 in St. Patrick's College, Drumcondra. The target audience was teachers/lecturers, researchers and policy makers from the mathematics education, mathematics and education communities in Ireland (North and South) with an interest in the key questions relating to mathematical identity to be addressed at the workshop. The following key questions were addressed:

- What's in MIST for us as individuals?
    - Why is Mathematical Identity (MI) important in my work?

- What's in MIST for us collectively as a community of practice?
    - What insights on MI can we gain from one another?
    - What research collaborations in MI might be fruitful?

- What's in MIST for our students?
    - How can awareness of MI support students in their mathematical development?
    - How can MI be harnessed to attract more students into mathematics?

The event was organised as a series of keynote addresses followed by a number of workshops where the key questions could be explored in greater depth, facilitated by Prof. Claire Lyons, Mary Immaculate College, Limerick. The keynote speakers were:

- Dr Maurice OReilly, MIST researcher, CASTeL, St Patrick's College
- Dr Patricia Eaton, MIST researcher, Stranmillis University College
- Dr Dolores Corcoran, Education Department, St Patrick's College
- Dr Miriam Liston, Project Officer for Mathematics, NCE-MSTL
- Dr Aisling McCluskey, Mathematics Department, NUI Galway
- Dr Nick Todd, Education and Training Inspectorate, Northern Ireland

Twenty-four participants enjoyed an interesting and stimulating event with very positive feedback received from all who attended. There is potential to harness the interest and enthusiasm generated by the symposium to explore future collaboration in research projects in this area.
It is hoped to hold a similar event in Belfast in Spring 2011 should further funding allow.

Conclusions

All four papers cited above, along with details of the dissemination event, are available in full at: http://staff.spd.dcu.ie/oreillym/mist.htm. For the purposes of this report to SCoTENS, it is appropriate to reproduce the conclusions in the third of these papers. These are in effect a statement of the research outcomes of MIST to date.

The students surveyed have all chosen to study mathematics at a higher level as part of a bachelor of education programme and it is perhaps unsurprising to find that they hold a positive view of their experiences of mathematics. The journey undertaken to reach this point however has been a complex and personal one and yet common themes seem to emerge which can inform practice as we seek to understand what it is that has encouraged these students to stay with mathematics. Findings on the impact of attitudes of peers and family will have resonance with those seeking to attract more adherents to mathematics, as the role played by the attitudes of society to what is traditionally thought of as a difficult and challenging subject is uncovered.

Students' insights into the nature of the subject and how it is delivered can be used to inform teaching with a view to increasing the number of students choosing to participate in further study. For example, Esmonde (2009) has argued for "providing students access to the means to construct … positive mathematical identities". She advocates a learning environment in which students cooperate in a community of practice and where those who are positioned marginally in this community are supported to move to a more central position. Thus the role of the teacher includes fostering change for the better in students' mathematical identity (Wenger, 1998). To effect such change, requires knowledge about students' mathematical identity in the first instance. From the experience of this survey, we maintain that narrative (Clandinin & Connelly, 2000; Kaasila, 2007) is an efficient method of finding this knowledge and, indeed, of drawing attention to wider issues in teaching mathematics. In the context of continuing professional development, we recommend workshops with teachers adapting the approach of this study.

Moreover at a meta-cognitive level we contend that this act of exploration is an extremely valuable exercise particularly for student teachers. To remember how they were taught, to discuss their memories and in doing so to tease out and distil important issues in the complexity of how they learned mathematics, will bring greater awareness to the professional practice which lies ahead of them. Further longitudinal study would be required to discern whether or not the students who participated incorporate the insights gained into their practice and, if so, how. In the context of a greater emphasis on teachers as reflective practitioners (GTCNI, 2007) this process can be seen as effective preparation for a career in which self-reflection is central to good practice. This exercise is also of value to lecturers in teacher education contexts, in getting to know the formative context of students and leading them to a deeper understanding of their relationship with mathematics and how this impacts on its learning and teaching (cf. Smith, 2006).

References

1. Clandinin, D.J & Connelly, M. (2000). *Narrative Enquiry: Experience and Story in Qualitative Research*. San Francisco: Wiley.

2. Esmonde, I. (2009). Ideas and Identities: Supporting Equity in Cooperative Mathematics Learning. *Review of Educational Research*, 79(2), 1008-1043.
3. General Teaching Council for Northern Ireland (GTCNI) (2007). *Teaching: The Reflective Profession*. Retrieved 29 June 2008. http://www.gtcni.org.uk/uploads/docs/GTCNI_Comp_Bmrk%20%20Aug%2007.pdf
4. Kaasila, R. (2007). Using Narrative Inquiry for Investigating the Becoming of a Mathematics Teacher. *ZDM-International Journal of mathematics Education*, 39 (3), 205-213.
5. Smith, T. (2006). Self-Study Through Narrative Inquiry: Fostering Identity in Mathematics Teacher Education. In P. Grootenboer, R. Zevenbergen & M. Chinnappan (Eds.), *Identities, cultures, and learning spaces*, MERGA, Adelaide, 471-478.
6. Wenger, E. (1998). *Communities of Practice: Learning, meaning and identity*. Cambridge: Cambridge University Press.

Contact Details

Patricia Eaton, Stranmillis University College, Stranmillis Road, Belfast, BT9 5DY, Northern Ireland.
email: p.eaton@stran.ac.uk,
web: http://www.stran.ac.uk/informationabout/theuniversitycollege/staffprofiles/

Maurice OReilly, CASTeL, St Patrick's College, Drumcondra, Dublin 9, Ireland.
email: maurice.oreilly@spd.dcu.ie,
web: http://staff.spd.dcu.ie/oreillym/