

## **'Belonging' as a subject specialist: challenging the barriers**

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### **Abstract**

This paper reports on teachers' perspectives on how they develop subject specialist identities. The research discussed here is part of a larger action research project which probed teachers' confidence in their subject specialism. Data was collected from small scale midpoint evaluations and focus groups. The context is that of mathematics teachers undertaking an in-service sustained professional development course. However the findings are relevant across teacher education because they have implications for supporting professional development in schools.

The research findings indicate that although teachers' individual confidence in their identity as subject specialists develops this may not be mirrored by the development of confidence in belonging to the community. Barriers to belonging included: teachers' own conceptions of what it means to be a subject specialist; school based factors such as practical support and school attitudes towards continuing professional development.

**Key Words:** Teacher education; identity; participation; subject specialism; mathematic; confidence.

## **Introduction**

This research project focused upon teachers participating in a Higher Education programme: the Mathematics Development Programme for Teachers (MDPT). The MDPT programme is part of a current national initiative from the Training and Development Agency (TDA). The professional development initiative, the Mathematics Development Programme for Teachers is a subject knowledge course aimed at teachers who may be teaching mathematics in secondary schools but who may not have originally qualified as teachers of mathematics. The TDA define the course audience as those without a mathematics degree or mathematics initial teacher training (ITT) specialism (TDA, 2009). The MDPT can be set in a national context of the Smith Enquiry (2004) that recommended that there was a need to look beyond mathematics graduates in order to fulfil the supply of mathematics teachers, noting for example that it would require around 40% of mathematics graduates to opt for Initial Teacher Education (ITE) per year to fill training places, a challenging outcome to achieve Smith (2004, p.46). Subsequently several strategies have been employed to address the identified significant difficulties with the recruitment of mathematics teachers. These strategies include pre-initial teacher education courses for graduates with degrees other than mathematics and in-service initiatives such as MDPT.

Whilst the project was an action research project designed to impact upon the development of the MDPT course, the findings have the potential to inform the wider teacher education community. The various communities of which the teachers are members impact upon their perceptions of themselves as subject specialists and professionals. Being part of a subject teaching community was found to have positive effects upon professional learning but may conversely bound self perceptions of teachers as mathematics teachers and thus limit their potential to be confident subject specialists.

## **Literature Review**

### 'Belonging' as participation in a community of practice

Subject specialist groups of teachers may be considered to be '*communities*

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*of practice*' Wenger (1998) consisting of groups or individuals who hold a shared identity through work towards a common goal or activity. Lave and Wenger (1991) used the term '*legitimate peripheral participation*' to describe the way in which individuals may come to learn through participation in communities of practice with levels of complexity of engagement increasing over time. Although their work is not specifically situated in the school environment they argue that it is the practices of the community that form the basis of what is to be learned rather than specific teaching by members of the community. This conception of learning is relevant to this paper as the context of the teachers is that they are currently operating as teachers of a subject outside their initial subject specialism with their practices forming the basis of their learning.

Wenger (1998) later further develops a model of learning with a view that in contrast to the process of legitimate peripheral participation in order for change to be effective (for learning to take place) *both* reification, a process of translating the shared experiences into the concrete, *and* participation (in the practices of the community) must take place. In the context of a particular mathematics department for example reification could consist of shared departmental policies or a shared discussion about teaching and learning. There may be a shared vision for example of an approach to problem solving in mathematics lessons, this could be stated in developed policies or in resources developed by the department. Participation may involve the way in which these policies or shared ideas are interpreted within that community. It is this shared participation that has been referred to as 'belonging' in this paper.

It is widely acknowledged that teacher knowledge in relation to their practice can be tacit Schön (1983) and so this practice may be challenging to access for newcomers. Becher and Trowler (2001) suggests that induction into a subject area may involve immersion in accepted practices that affect the way the world is subsequently viewed as a result. This seems to support a view that professional knowledge and attitudes are shaped by the environment in

which this knowledge is experienced, a situated perspective where knowledge is developed within a community rather than within individuals (Boaler et al, 2000). There are challenges with the notion of peripheral learning as a model for teacher learning as established teachers are known to develop and refine practice on an ongoing basis. For example, Fuller et al (2005) provide examples of teachers discussing initiatives and working together on a regular basis and consider that this informal learning was a feature of non-peripheral members of the community such as long standing departmental members Fuller et al (2005) rather than of the peripheral apprentice (or more recently qualified) teachers. Indeed, the professional standards for practising teachers reflect an expectation that teachers commit to continual professional development, both formal and informal (TDA, 2007).

### Subject Specialism

The current national curriculum (QCA, 2007) provides subjects with a place in the statutory curriculum. It positions subjects as supporting overarching aims that together represent the full learning experience rather than as the subjects themselves providing the framework for the curriculum. This positioning of subjects within this statutory framework suggests that there is a continuing need for subject specialist teachers in schools. Additionally, given the continued focus by the government upon league table accountability of core subjects (which includes mathematics) and the nature of mathematics GCSE as a '*critical filter*' to the access to further learning and other opportunities in society (e.g. Ernest, 2001, p.282) it appears that mathematics specialists are needed within schools, framed as a subject discipline. This includes the Primary phase, indeed the Williams Review (DCSF, 2008) recommended that a mathematics specialist is required in every Primary school and there is currently a national professional development initiative to support this aim.

### The Development of Confidence

The Mathematics Development programme is a year long professional development course. Graven (2004) argues that the teacher development courses should be of sufficient length for confidence to emerge in order to

admit both what they need to know and what they need to learn (Graven, 2004). Graven goes on to develop Wenger's model of learning conceptualising confidence both a process and a product of moving towards belonging to a community, arguing that confidence is developed by learning through experiencing. This conceptualisation of confidence differs from cognitive theories, for example Wasson (2009) develops Eldred et al's definition as '*a belief in one's own abilities to do something in a specific situation*' (2004, Eldred et al cited in Wasson, 2009, p.14) for use in an educational setting as being about both knowing and applying ideas. MDPT teachers need to know both about key ideas in mathematics and to apply these within their own classroom.

## **Methodology**

The aim of the study was to probe teachers' confidence in their subject specialism in order to further develop the course to meet their needs and so is based on an action research approach, that of learning through action (e.g. Koshy, 2010). By understanding the nature of participants' development as mathematics teachers it was hoped that further hypotheses could be generated from action research (Jex, 2002) to support course development.

Initial snapshot data was collected from the sixteen participants in order to probe the way in which they were currently both operating and viewing themselves as mathematics teachers in the form of responses to open ended questions about how they view themselves as subject specialists. A similarly open ended written course evaluation was also completed by participants a few weeks into the course.

Focus group data was collected at the midpoint of the course. A prompt grid was provided to focus discussion on three areas of participants' development; as mathematics specialists, as contributors to mathematics departments and as classroom practitioners. The participants recorded their views on a summary grid provided as well as participating in the discussion. Discussions were recorded and transcribed. Participation in the focus groups was offered

to all the teachers undertaking the MDPT course and was at a time when the participants were available. Institutional ethical guidelines were followed at all times.

## Findings

Transcripts of focus group discussions were analysed initially using a broad framework of three strands. The first two strands related to how participation on the MDPT course was felt by participants to be impacting upon identity and practise. The third strand addressed the notion of confidence with this issue being first raised by the teachers within the initial snapshot data. This paper will examine the teachers' perspectives on developing subject specialist identities.

In both focus groups the notion of what constitutes a mathematics specialist was debated. For some this involved comparison with others in the department and for the development of their ability to respond to questions in the classrooms. Mentoring and the presence of supportive colleagues was a big issue, these were viewed as positive and where they did not occur this was a barrier to development of a positive identity as a mathematics specialist. Respondents were aware of professional development trajectories, one referred to her development as being comparable to learning over the NQT year and another referring to the development of reflective practice. Barriers were also identified as some noted that they had ideas to give but they were not being received by their department.

Confidence was repeatedly mentioned explicitly by both groups. In particular many of the comments related to the development of confidence in themselves as individual learners of mathematics but with caution expressed by Hayley<sup>1</sup> as she expresses conscious incompetence (Howell, 1982) with '*it is different doing it yourself to teaching it*', demonstrating her view of what is required to be a subject specialist teacher.

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<sup>1</sup> All names have been changed in line with institutional ethical guidelines.  
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## Discussion

Both focus groups debated what constitutes a mathematics specialist. Definitions of what it means to be a specialist were offered, with regular use of reification to negotiate meanings. Firstly there was regular reference to specific level and types of operation in the English 11-16 mathematics classroom, for example:

*'I think that I feel more comfortable at this stage at Key Stage 3 rather than at Key Stage 4 [and] I think that at Foundation level I feel very confident as a specialist and having recently attempted an A-level paper there are parts looking at grades Bs and As and A\*s there is definitely a gap where I would have to go back into my shel'.*

Secondly the notion of the definition of a subject specialist by reference to previous advanced study was offered.

*'I cannot imagine ever feeling confident that I am a mathematical specialist unless I go off and do a pure mathematics degree. I can't think that my depth and breadth is anywhere near sufficient to claim that'.*

Finally some evaluated their development as subject specialists by comparing themselves to others in their school mathematics department and others by considering their responses to questions in the classrooms.

Participation in the MDPT course appeared in itself to present barriers to participation in departments for several group members. Firstly, the legitimacy of learning through MDPT was perceived by Andrea as being under question:

*'I feel now that some people in my department resent the fact that I am coming on this course...Senior people. They ask me what I am doing on the course and it is like they don't believe that I am doing things...as though they think I am off on my holidays or something. They don't believe that I am*



*actually doing any work.... they don't consider it work, like studying'.*

These negative effects of being seen as peripheral are a barrier to participation in her subject department for Andrea, something noted by Fuller et al (2005) with '*wider learning within a community of practice [...] works best when it is accepted as a legitimate activity, for novices and full members, in the community of practice concerned*' (Fuller et al, 2005, pp66). Nielsen (2008) also considers that being recognised by others in a community is important to the development of identity formation Nielsen (2008). Andrea goes on to link her comments to her identity within the department, appearing to suggest that instead of moving towards belonging to her department as a participating member her participation in MDPT has instead raised issues of increased peripherality:

*'I feel as though because I am doing this course everybody is aware that I am not as good as everybody else and so they don't value the things I say as much'.*

Other barriers to participation in school arising from taking part in MDPT were linked to resources in participants' schools by Carrie:

*'...all we are in this year is a cover burden. They can't think beyond that. Certainly I think that in the long term I will have more to offer my department'.*

This issue of time as a resource had arisen in the course evaluations with ring-fenced time away from school being valued by participants. The MDPT course had up to forty days of supply cover attached for participants to support their participation in the course but the anecdotal evidence from discussions with local Headteachers suggests that the impact of "*Rarely Cover*" (DCSF, 2009) a national scheme with the effect of reducing the cover responsibilities of teachers in school may have had an adverse impact upon the willingness of senior managers to release teachers for professional development in some schools, something reflected nationally (Field Studies

Council, 2010). Those who control resources are recognised as being controllers of the power to encourage or provide barriers to participation (Fuller et al, 2005) and this is exemplified in Carrie's above quotation.

Course evaluations demonstrated increased confidence with subject knowledge. Andrew expresses individual confidence as a process of moving towards full participation as he explains

*'Certainly as I specialist I feel like I am moving towards that. I don't think I will be there by the end of the course but I think it has put me in the right direction. I know what I need to do and I know how to do it and I know how to get there'.*

This individual sense of purpose along with empowerment to achieve his aims suggests that he is confident in his own abilities to develop as a mathematics specialist.

Andrea also raises the issue of individual confidence:

*'It just made me realise how I feel quite confident through doing this course and through doing my own self study to stand in front of the class and feel more confident. I think that in the past when I first started kids could see through me and question my ability whereas now I am more confident. But when it comes to talking to other people because they have degrees I feel how I used to again and I feel as though I am not going to progress or go any further... I asked somebody in my department [about mathematics] and he has confused me completely but he had done degree level maths and he just started going off on another trail and I got totally lost...and then I thought...I know nothing'.*

This illustrates a contrast between confidence from cognitive and situated perspectives. Andrea demonstrates Wasson's (2009) notion of confidence in her own ability to know mathematics (through her own subject knowledge development) and to apply it (in her own teaching). This is in contrast to her

description of how she feels when talking to others in her department where admitting what she does not know (by seeking help with a mathematical problem) presents difficulties. Andrea's lived experience rather than fostering a sense of belonging has formed a barrier to full participation and the experience has served to reinforce her peripherality within her department. Position in the department was an issue for James:

*'I contribute in that I teach in the department, but I don't get involved in any discussions in any maths meetings and departmental issues...I don't even get the minutes'.*

It is possible to view departmental discussions and subsequent records as examples of the reification of practice within a mathematics department. That James is excluded from this (whether by choice or design, he is not clear) provides a barrier to full participation as a member of that department. He goes on to later attribute his non-participation directly to his '*boundary membership*' (Wenger, 1998, p.103) of two subject departments:

*'If you still have half a foot in PE and half a foot in maths then there will always be difficulties won't there'.*

James' view of being a half member of each subject department and the resulting difficulties suggest that there may be missed opportunities for him to enter into '*brokering*' (Wenger, 1998, p.103), that is, bringing positive aspects of his experiences as a PE teacher to the mathematics department and vice versa. Whilst the process of brokering presents opportunities for learning as a renegotiation of meaning (what can James learn as a result of his experiences between the two departments?) according to Wenger a negative effect can be that James finds himself '*uprooted*'. Wenger goes on specifically to point out that there is potentially personal cost in the form of feelings of individual inadequacy unless this uprootedness is acknowledged in some way as being an expected hazard of brokering. This has implications for the design of the MDPT course as it suggests that aspects of the course focussed around

psycho-emotional aspects of learning are important. Currently, there is a focus upon the sharing of experience as developing mathematics teachers and reflection upon practice. Course evaluations show that face to face days that involve time to socialise and share experiences when out of the MDPT classroom are valued by the participants, with James' comment suggests that these aspects of the course require further consideration and research.

### **Conclusions**

This paper is limited as it is based on an action research approach, is localised to the context of the research and so not generalisable. Focus groups findings can only be tentative as they illuminate the experiences of the groups being investigated rather than being representative, typical or being views that can be extrapolated. Furthermore, they usually generate a consensus as they are the localised product of social processes in a particular time and place (Barber and Schostak, 2005, p.43). Hopkins (1985) suggests that open problems may lead to hypothesis generation (rather than confirmation). The value of this paper is therefore that by understanding the nature of participants' development as mathematics teachers further hypotheses about the nature of this development emerge that may be worthy of future exploration in the teacher education sector.

Within this bounds of this study the various communities of which the participants are members have had an impact upon their perceptions of themselves as mathematics teachers.

Key ideas arising from the study relevant to this paper were:

- The MDPT participants had developed confidence in their own ability to teach and learn mathematics. They were able to assess their progress and the extent and limitations of their mathematics. In many cases the teachers expressed confidence in their ability to be able to continue their journey and develop further i.e. they knew what their next steps were and how to go about them. Key literature links this awareness of individual learning trajectories to the development of elements of identities (Wenger, 1998, p.149).

- This individual confidence did not always transfer to confidence as a product or process resulting from belonging to a community of mathematics teachers.
- The teachers' context impacted upon their development. This may involve resources factors such as time and cover arrangements to support course engagement or school ethos around professional development.
- The role of a mentor or similarly supportive colleague was valued in supporting mathematics teacher development and particularly in developing individual confidence as a mathematics teacher so that it manifests as social confidence within the department or community of practice.

These key ideas can be fed into future course development. Firstly, the role of a mentor or supportive colleague needed more scaffolding and impetus from the course to support the development of this relationship. In order to scaffold the current participants' relationships with colleagues and to enable them to take their learning from the MDPT into their departments and the design of future online tasks was reviewed. These tasks will be evaluated in order to further develop suitable activities to enable the participants to engage with the MDPT in school much more explicitly than previously. For example, participants could be required to critically discuss classroom resources for teaching mathematics with a school colleague as part of a critical evaluation. These modifications can be a focus for another cycle of action research in a future study.

The issue of what it means to be a 'subject specialist' in mathematics arose as conceptions of subject specialists as only being those who are mathematics graduates for example formed barriers to the participants' full participation in their mathematical departments or communities. Recruitment to the MDPT involves discussions with Headteachers and this is an opportunity to further establish the legitimacy of this learning with key stakeholders. This paper also highlights wider issues for the teacher

education sector: How does a school's view of continuing professional development (CPD) support or form a barrier to participation? Are national initiatives such as '*Rarely Cover*' (DCSF, 2009) a potential barrier to participation in CPD?

The notion of 'brokering' has suggested a means of conceptualising the experiences of teachers, to draw on James' analogy '*with a foot in two department*'. The MDPT may present opportunities to support teachers in this area, for example by providing peer support and opportunities for reflection. Again these have been re-examined and developed for future years as a result of this study. The psycho-emotional effects of participants' experiences are not acknowledged explicitly in either Wenger's model of learning and so this again is an area with the potential for future exploration by those in teacher education in relation to teachers' development as subject specialists.

In conclusion the MDPT teachers had developed their own subject knowledge confidence. They were motivated to contribute to their subject department although were not always able to do so as not only did many of them not see themselves as subject specialists but they felt that neither did their schools. Where there were barriers to becoming subject specialists this involved in-school attitudes and factors such as practical support and the influence of the teachers' own conceptions of what it means to be a subject specialist. For the teachers in this study these barriers had an impact upon their development as subject specialists and it would be of value to the teacher education sector to further reflect upon ways to challenge these in the design of future provision.

## References

- Barbour, R. S. & Schostak, J., (2005) 'Interviewing and Focus Groups', in Somekh, B. & Lewin, C. Research methods in the social sciences. GB: Sage Publications Ltd., pp.41-48.
- Becher, T. & Trowler, P.R. (2001) Academic tribes and territories: intellectual enquiry and the culture of disciplines. 2nd edn. Buckingham: Open University Press.
- Boaler, J., William, D. & Zevenbergen, R. (2000) The Construction of Identity
- Fox, K. (2010) "Belonging' as a subject specialist: challenging the barriers' *Teian Journal* 1(2) December [Online]. Available at: <http://bit.ly/tyfJ5M> (Accessed 28 October 2011).

in Secondary Mathematics Education. Montechoro, Portugal 26-31 March. International Mathematics Education and Society Conference.

Department for Children, Schools and Families (DCSF) (2008) Independent Review of Mathematics Teaching in Early Years Settings and Primary Schools: Final Report. [Online]. Available at: <http://publications.education.gov.uk/eOrderingDownload/WMR%20Final%20Report.pdf> (Accessed 27 September 2010)

Department for Children, Schools and Families (2009) Implementation of 'Rarely Cover' From September 2009: Summary of changes to be made to the Teachers' Pay and Conditions Document and Guidance on School Teachers' Pay and Conditions (Subject to formal consultation round) [Online]. Available at: [http://www.teachernet.gov.uk/doc/13538/Rarely%20cover\\_STPCD.PDF](http://www.teachernet.gov.uk/doc/13538/Rarely%20cover_STPCD.PDF) (Accessed: 31 March 2010).

Ernest, P. (2001) 'Critical Mathematics Education', in Gates, P. Issues in mathematics teaching, London: Routledge Falmer., pp.277-293.

Field Studies Council (2010) Supplementary memorandum: transforming education outside the classroom-Children, Schools and Families Committee [Online]. Available at: <http://www.parliament.the-stationery-office.co.uk/pa/cm200910/cmselect/cmchilsch/418/10030308.htm> (Accessed: 17/04/10).

Fuller, A., Hodkinson, H., Hodkinson, P. & Unwin, L., (2005) 'Learning as Peripheral Participation in Communities of Practice: A Reassessment of Key Concepts in Workplace Learning', British Educational Research Journal, 31 (1), pp.49-68.

Graven, M. (2004) 'Investigating mathematics teacher learning within an in-service community of practice: The centrality of confidence', Educational Studies in Mathematics, 57 (2), pp.177-211.

Hopkins, D. (1985) A Teacher's Guide to Action Research, Milton Keynes: Open University Press.

Howell, W.S. (1982) The empathic communicator, University of Minnesota: Wadsworth Publishing Company.

Jex, S. (2002) Organizational Psychology: A scientist-practitioner approach, New York: John Wiley and Sons Inc.

Fox, K. (2010) "Belonging' as a subject specialist: challenging the barriers' *Teach Journal* 1(2) December [Online]. Available at: <http://bit.ly/tyfJ5M> (Accessed 28 October 2011).

- Koshy, V. (2010) *Action Research for Improving Educational Practice*, 2nd edn, London: SAGE Publications.
- Lave, J. & Wenger, E. (1991) *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.
- Nielsen, K. (2008) 'Scaffold instruction at the workplace from a situated perspective', *Studies in Continuing Education*, 30 (3), pp.247-261.
- Qualifications and Curriculum Development Agency, (2007) *The Secondary Curriculum* [Online] Available at: <http://curriculum.qcda.gov.uk/key-stages-3-and-4/index.aspx> (Accessed: 31 March 2010).
- Schön, D. (1983) *The Reflective Practitioner*, San Francisco: Jossey-Bass.
- Smith, A. (2004) *Making Mathematics Count: The Report of Professor Adrian Smith's Inquiry into Post-14 Mathematics Education*. London: The Stationary Office Ltd.
- Training and Development Agency for Schools (2007) *Professional Standards for Teachers: Core Standards* [Online]. Available at: <http://www.tda.gov.uk/teachers/professionalstandards/standards/attributes/ppd/core.aspx> (Accessed: 22 April 2010).
- Training and Development Agency for Schools (2009) *Mathematics Development Programme for Teachers* [Online]. Available at: [http://www.tda.gov.uk/teachers/continuingprofessionaldevelopment/maths\\_cp\\_d.aspx](http://www.tda.gov.uk/teachers/continuingprofessionaldevelopment/maths_cp_d.aspx) (Accessed: 21 April 2010).
- Wasson, S. (2009) 'Capturing and Nurturing Student Confidence', *ESCalate Newsletter*, (15) [Online]. Available at: <http://escalate.ac.uk/6415> (Accessed 27 September 2010)
- Wenger, E. (1998) *Communities of Practice: Learning, Meaning and Identity*. Cambridge: Cambridge University Press.