

Bringing enthusiasm into the mathematics classroom

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...effective teaching and constructive learning are often regarded solely as cognitive processes. There is often little regard given to the feeling and emotional aspects of teaching and learning.
(Demetriou & Wilson, 2008, p. 938)

All articles in this issue focus on transformation and situated learning. The first three address some of the challenges prospective and newly qualified primary and middle school mathematics teachers' face. The fourth, by Pat Drake, provides an interesting contrast adopting a unique, starting point from which to consider our own practice.

Susan Swars, Stephanie Smith, Marvin Smith and Lynn Hart describe how inter-related aspects of prospective primary teachers' thinking and attitudes changed over a 2-year period. Their article—*A longitudinal study of the effects of a developmental teacher preparation program on elementary pre-service teachers' mathematics beliefs*—emphasises the importance of developing conceptual understanding both as part of the teacher education process and thence within the primary school environment. They discuss various obstacles to these processes but explain how a two-course mathematics methods sequence with an integrated field based component helped shift students' thinking and assisted them become more confident and cognitively oriented in their approach.

In his article—*Contextualising the notion of belief enactment*—Jeppe Skott points out that, '...beliefs are elusive and not easily accessed...'. He argues that teachers work within personally constructed contexts which both influence, and are influenced by, practice. He illustrates the notion of belief practice using the case of Larry—a novice middle school mathematics teacher—who experiences tensions between his own beliefs and the school culture he encounters when embarking on his first appointment. Adopting a multi-method approach, Jeppe explores how Larry's teaching begins to be influenced by his environment and yet, how he, in turn, is able to accommodate his own philosophy into his practice. Thought-provoking implications for future belief research are discussed.

Similar issues of cultural adjustment and modification arise in Despina Potari and Barbara Georgiadou-Kabouridis's article—*A primary teacher's mathematics teaching: The*

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development of beliefs and practice in different “supportive” contexts. It describes a longitudinal study which follows a primary teacher through the final stages of her initial teacher education programme through the cultural conflicts experienced by many in their first year of teaching and then, unusually, into her second and third year as a classroom practitioner as she gains in confidence and understanding. It focuses on both micro and macro levels and highlights the multiple communities and expectations that teachers negotiate. The importance of providing appropriate professional support and intellectual challenge to practitioners, particularly early on, in their careers is a clear and timely reminder when Christina, the teacher under discussion, describes some of the tensions she experienced and makes remarks such as, ‘If I hadn’t attended the course I would have continued to teach in a mechanical way’ and ‘The problem is that they (her peers) do not interpret children’s thinking’.

In the final article—*Teaching assistants developing mathematics for teaching*—Pat Drake examines an unusual solution to the severe shortage of secondary mathematics teachers in England. She explains how 10 people, who had been assisting in classrooms—but who were neither qualified teachers nor expert mathematicians—undertook a programme whereby they could combine their school-based work with a specially tailored mathematics degree. The issues involved provide some important insights into mathematics education when one is both learning and teaching the subject. It also raises questions surrounding the content of school and university mathematics courses and an apparently uncertain relationship between the two.

Although not extensively discussed, most—if not indeed all—of the individuals in these articles will have experienced emotional responses to the situations in which they found themselves: fear, anxiety, relief, anger, exhilaration to name but a few. Recently, while interviewing I asked a prospective teacher how she might describe an effective teacher and her immediate reply was ‘Someone who knows their subject well enough to have fun with it’. Usually, such interviews are a collection of standard questions and predictable responses such as, ‘I want to be a teacher because I like children’ and ‘To be a good teacher you need to be patient’. About the same time as this interview, I just happened to observe one of our students, Morag, teaching a class of nine-year-olds. Morag was only 5 months into her teacher education course and yet she taught one of the best mathematics lessons I have seen in a long time: mathematics was undoubtedly taught, learnt and understood but, significantly, both Morag and the children appeared to be having fun! What makes the event even more remarkable were Morag’s confession afterwards that she had been extremely nervous about being observed coupled the fact that the class were known to be notoriously difficult to manage.

These two incidents proved to be surprisingly thought provoking for me for it had been a considerable time since I had thought about mathematics, education and fun all in the same sentence. Here I wish to address the balance. Personally, I enjoy mathematics and I enjoy both teaching and being taught but how often had I highlighted for my students the importance of enjoyment in the educational process? It is certainly the case that some prospective teachers seem to think that the sole purpose of education, particularly in the early years of schooling, is for the children to enjoy themselves. Effective mathematics education, however, is considerably more than just having fun as is so clearly articulated in this edition and elsewhere (e.g. Hill, Ball, & Schilling, 2008; Rowland, Huckstep, & Thwaites, 2005). I make no claims that the discussion which follows is based on large-scale empirical study. It is more intended as a catalyst for future research rather than a definitive statement on the preparation of mathematics educators.

Returning to the interview situation: when candidates come to be interviewed as prospective primary teachers one of the attributes I look for is enthusiasm. It is not easy to define—it is a certain sparkle in the eyes and a way of holding oneself—and yet I suspect most of us would recognise and agree when we saw it. ‘Enthusiasm’ is not on any check list and, on its own it is not enough (I am sure we have all encountered enthusiastic bores), but I would argue that it is a crucial component to becoming a successful classroom practitioner. What I want to discuss here is how we might cherish and nurture such enthusiasm more effectively in the light of the rigours of becoming and remaining a mathematics teacher. To do so, let us consider Morag and the lesson that impressed me so much.

Morag was accepted onto her primary teacher education course with the lowest mathematics grade allowed. She had performed well in other subjects—gaining respectable exam results at school followed by a good degree in psychology—but had ceased studying mathematics at school as soon as she possibly could. She embarked on her teaching education course saying—along with 59% of her colleagues—that she lacked confidence in mathematics. She did not, however, go so far as 13% of her classmates who claimed that they hated it or 22% who avoided it.

Five months (i.e., almost half way) into her education course, I observed Morag teaching the following session. She was working with a class of 18 nine-year-olds in one of the more challenging areas of the city and described some of the children’s behaviour as ‘a bit riotous’. She began her mathematics session by capturing the children’s attention by channelling their interest and energies into thinking up ice cream flavours for the lesson. Each group were then invited to work out how many different two-flavour combinations they could create from a selection of five, six or seven types of ice cream depending on their attainment level. No other directions were given.

Without exception, the children assiduously began their work and remained on task for the next 25 minutes. During this time, a teaching assistant worked with four of the less able children using well-directed questions to encourage them to think in a systematic manner while Morag observed the class intervening when she considered it necessary and responding to requests for assistance. At no time did she specify how the task should be done. On the contrary, she explained that the children could record the work in any way they wished. On occasion, she asked individuals to consider how they might ensure that there were no duplications in their results. Towards the end of the session, Morag assembled the class and together they embarked on a lively discussion of various ways to combine ice cream scoops such as slimy slug, bat’s blood, frog fruit and double chocolate. Within less than 5 minutes, the conversation moved on to abstract representation of these enticing flavours and thence to generalisation.

What makes such an account so remarkable is that Morag was in the early stages of her teacher education programme and yet, unlike so many of her colleagues, she did not conscientiously adhere to a detailed lesson plan. Indeed, her session plans were rather sketchy but with clear start and end points and very little substance in between. The lesson was none the worse for that: on the contrary I think it was an important factor in its success.

Taking a closer look, Morag did not begin by engaging the class in mathematics as some of us might endeavour to do. Rather she captured their imagination through more child-centred and familiar means. It was not the mathematics which intrigued the class but the thought of sampling revolting flavours of ice cream in a range of combinations. Gradually, however, the children’s interest began to shift and towards the end of the session they appeared engrossed in a discussion of abstract mathematical combinations.

If I am honest, had I been Morag's tutor and seen her plan before the session, I would almost certainly have asked her to be more specific about what both she and the children would be doing during the entire course of the lesson. I would have been wrong. Had she prepared in greater detail the likelihood is that Morag would have felt more constrained to operate in a particular way and—as is typical with prospective and newly qualified teachers—to follow a pre-determined sequence. In the process, she might possibly have become flustered, as is often the case, if she could not remember her script. As it was, instead, Morag was able to observe the children and respond to their needs as appropriate. Even at the end of the session, she guided them with a few well-targeted questions: 'I don't know which of you is correct, how might you find out?' and 'Can anyone think of a different way so you could do a quick check?' At no time did she appear to impose her own agenda. She did, of course, have an agenda but, capitalising on her knowledge of nine-year-olds, mathematics and the educational process, she was able to work in an imaginative, responsive, and yet focused, manner.

It would be naïve to suggest that all our prospective teachers could operate in such a manner but the incident reminded me of the power of interest and enthusiasm in the educational process: not as a one-sided process but rather as something involving all, or at least the majority of, classroom participants including the teacher. That being so it is important to recognise some of the obstacles which might hamper these powerful—but potentially fragile—emotions. That could take volumes but here I briefly focus on two, which are not typically discussed in the mathematics education literature.

The first obstacle is an insufficient understanding of children. As mathematics educators, we endeavour to ensure that student teachers develop a good grounding in the subject and are aware of the mathematical expectations they might have of children at different stages. We may not, however, be so assiduous in considering child psychology and the experience of being a young person confined to a classroom for hours every day. We may tell our students to 'start with the child' but do we explore that in any depth or do we simply mean find out what a child can do and build on it? Do we spend sufficient time and attention educating prospective teachers in the arts of close observation and genuine dialogue with their pupils so that they can discover what really intrigues young people and motivate them to learn?

The second obstacle is an insufficient understanding of the process of becoming—and, indeed, remaining—a professional educator. There are many facets to this but, by way of illustration, I focus on just one. However, much you warn them, the majority of prospective teachers simply do not realise what a challenging and all-consuming occupation teaching can become. I remember during my own training that I was absolutely exhausted on my final teaching practice only to be advised by my tutor to visit my doctor as I must be unwell. Now I am suspicious if my students are not tired when I visit them! More seriously, we need to be cognisant of the fact that, '...there is a trend of increasing absenteeism and early retirement due to mental health problems, particularly stress and depression' (McDaid, Curran, & Knapp, 2005, p. 365).

I am not suggesting that all mathematics educators retrain in psychology but rather that we might explore further what aspects of becoming a teacher are particularly stressful, such as closely following a scripted lesson, and whether they are an essential component in the preparation of effective mathematics teachers.

To conclude, the start of one's teaching career has been portrayed as 'a period of survival and discovery' (Huberman, 1993, p. 5). Anything that can reduce the impact of the former to promote the excitement of the latter for teachers and pupils alike must surely merit further consideration.

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