

# Transformative learning through educative assessment: one student's experience of a learning journal

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## Abstract

*It is now widely understood that assessment practices have a key influence on learning. Summative assessment tends to have a damaging effect overall and in particular on learners' self-awareness and deep engagement. Both these in turn produce a deleterious effect on attainment. This research concerns the use of learning journals in a university mathematics module, taken by secondary initial teacher education students, for the assessment of learning (summative), for learning (formative) and as learning, developing further the concept of educative assessment. Using a narrative approach to analysis, this paper focuses on the experiences of one of the course participants for whom engagement with the learning journal radically changed her view of the subject - she came to see it as an open and creative subject - and her view of herself as a learner. The implications for teaching and learning and for assessment practices are considered.*

## Introduction

It is now widely understood that assessment practices have a key influence on learning<sup>1</sup>. Summative assessment tends to have a damaging effect overall and in particular on learners' self-awareness and deep engagement (Harlen & Deakin Crick, 2003). Both these in turn produce a deleterious effect on attainment (Black and Wiliam, 1998a). However, regular and repeated summative assessment is a current requirement at almost all universities, certainly in Anglophone countries. Assessment practices in mathematics in higher education currently involve almost exclusively individual timed examination performance (Rodd, 2002). Many learners find current practices which emphasise 'a "performance" route' (Mann, 2003, p20) to success, with mathematics being ' "a kind of competition you train for" ' (Mann, 2003, p19), alienating and oppressive; and many are reported as failing and/or disliking the subject (Boaler and Greeno, 2000, Macrae *et al*, 2003, Mann, 2003).

Given this, at Sheffield Hallam University, working with students in initial teacher education for secondary mathematics, we try to offer as wide a range of assessment experiences as possible and, in the case of almost all *summative* assessment, we try also to provide opportunities for *formative* assessment and also for what we have termed *educative* assessment as well. These three terms help us focus on three different purposes of assessment. The distinction between assessment *of* learning (*summative* assessment) and assessment *for* learning (*formative* assessment) is now a familiar one (see, for example, Black and Wiliam, 1998b). This paper also explores the notion of assessment *as* learning, what might be termed *educative* assessment, where assessment practices are recognised as themselves being part of the learning process, through the medium of learning journals.

## Assessment purposes

Typically, *summative* assessment of learners has been concerned with certification, its purpose being to pass, fail, grade or rank a student; additional purposes may be to select students for future study or employment or to predict success in future study or employment (Earl, 2003). Summative assessment has also become very widely used as a policy tool

(Broadfoot and Black, 2004), largely linked to quality assurance: in this case, it is still concerned with passing, failing, grading and ranking but this time of institutions (or of teachers) rather than of learners (Barton, 1999). *Formative* assessment on the other hand has been concerned with feedback from teachers to the learners themselves on their performance and their learning; and its purpose has been to provide information to teachers and students for the enhancement of learning (Black and Wiliam, 1998b).

In this paper I explore *educative* assessment, the notion of assessment *as* learning. In this case, the assessment practices are recognised as themselves being part of the learning process itself. Sometimes, 'assessment as learning' is used to describe classroom practices which better support the educational development of students (Earl, 2003), emphasising the importance of classroom assessment as a critical element in helping children learn. Whilst sympathetic to such an approach, and sharing a concern with the nature of tasks which are set for learners, our intention here is rather different: we aim to change summative assessment practices to make them, at least in part, educative too.

In our assessment practices, then, we aim to devise tasks which are challenging learning experiences that develop skills and lead the student into new areas of mathematics, rather than closed tasks which take the student back over prior study. The assessed work is an important site for building their relationships with the discipline of mathematics and for their work on their developing identities as mathematicians. Our intention is that these things happen in ways which open up the subject to wider participation and make successful engagement with mathematics not just the prerogative of the few.

Those aspects of the assessments that we are labelling *educative* have a number of characteristics. Here I draw attention to two of them. First, the students have the space to explore and find out about their mathematics, space in which to try out different approaches to the subject, space to develop their own ideas, allowing a wide range of skills to be acknowledged, for example, posing problems as well as solving them or communicating their mathematics visually or orally. Mathematical imagination is valued. Second, the students have the opportunity to become aware of their own progress and to find out about themselves as learners of mathematics. For example, they may elaborate the process of bringing their mathematical thinking to fruition, explaining and evaluating choices, approaches, methods.

### **The study**

The project on which this paper is based falls within an action research paradigm with elements of an auto-ethnographic approach. The participants were fifteen graduates studying mathematics at undergraduate level as part of a course preparing them to teach mathematics in secondary school. The project was inspired by an article about using learning journals with secondary pupils (Coles & Banfield, 2012) - 'one of the things we were most struck by was the power of these journals in supporting pupils to revisit and take on their work in a manner that seemed to provoke new learning and awarenesses' (p11). Our students were given a scrapbook at the beginning of a pure mathematics module. The format was chosen to encourage informality, personalisation and freedom in the students' responses. The teaching of the module was interspersed with 'scrapbook sessions' where scissors, glue and other materials were provided and students reviewed and extended their learning; these sessions were supplemented by substantial amounts of independent out-of-class work by the students on the scrapbooks. The scrapbooks were submitted throughout the module whenever an individual chose for formative feedback - "post-its" attached to their work - and finally for summative assessment.

Data for the wider study comprises the fifteen journals themselves, written reflections from six of the students, a group interview with the fifteen participants and individual interviews with four of the participants. Overall, the students were very positive indeed about the experience. Elsewhere, I have analysed the students' responses thematically (Povey, 2013 and in preparation). Here, using a narrative approach to analysis and based on an individual interview, the paper focuses on the experiences of one of the participants for whom engagement with the learning journal radically changed her view of the subject - she came to see it as an open and creative subject - and her view of herself as a learner.

### **Emma's story**

*We began by opening Emma's learning journal at the beginning:*

**Hilary:** Can you remember back to [the beginning of the module]?

**Emma:** Yeah I can, yeah, sort of. I think at the start ... I was more sort of concerned with getting it right and giving sort of a clear like "this is how I worked it out and here's my formula" and that was it. And then I think I was asking questions why, but they were more sort of to get the answer than just thinking around the topic and, you know, trying to take it further. And I think I was probably the same quite a way through these two [first tasks].

I started writing myself little explanations quite near the beginning because I found myself sitting and working through stuff and understanding it and then coming back to it a few days later and thinking "Oh, I've completely forgotten that again," and I'd have to go through it all again. So I started writing sort of these little labels so that I could just read that and think "Oh yeah," and it'd click something. That really helped me with [my later studies] actually because I did that all the way through my file. It's brilliant.

*Emma turns the pages and several pages further on:*

**Emma** With complex numbers I kind of hate them. I hated them when I did them at college and I hated them when I did them now, so I think I was trying to like miss it out and then I think you put a comment in saying "I think you should put some stuff in," so I was like "Right." So I had a look.

**Hilary:** Was it useful to do that at all?

**Emma:** It was really useful because then I actually understood and I was like "Okay, I think I can..." I got my head round it a lot more and I was glad actually that you pushed me to do that because I did feel like it was a bit - it was one of those things where you feel like you've almost got there and you've almost got it and then you'll just drop back again and think "I just don't really understand it." They're amazing. This is the main reason why I wanted my scrapbook back because I wanted a copy of that page because I keep forgetting it, but it was so handy to just have it there.

*We turned over a few more pages. We find Emma's proof that square root two is irrational:*

**Emma** I think this was where I really started to think about stuff. So the proof kind of things that we were doing, obviously we were doing some ... in the algebra [module] and I just hated them. I was just kind of like "Oh, what's the point? Like we know that root two's irrational. It just is, there's no point in proving it." Actually I found that it's quite satisfying to prove that it is irrational and it also taught me that the reason why you want to look at why it is is because you don't

always want to just be accepting what other people say, so you need to be able to figure out for yourself and that proof was nice. And I kind of did it in the two different colours because like the red is my explanation and the black is just the proof followed through. So again I did that so that instead of me just putting it in order I'd written down my thoughts at each bit. So I've gone like "So if root two equals  $M$  over  $N$  where  $M$  and  $N$  have no common factors," I've gone "Well why don't they have any common factors?" Oh, I've written it there – because if it's root two - "If root two is rational it can be written as a fraction." So that was that.

*A few pages further on we come to set theory:*

**Emma** I thought this was really interesting because I always thought that this was a really easy topic ... and I just thought, you know, once you know the rules you can just do it, but actually when we started doing the complements and some of the ones that equalled other ones it got really confusing and I think this is where I started to use diagrams a bit more to help me figure out what was going on as I've written in massive letters there [*pointing to her journal*].

*Looking at the journal prompts her to reflect on the changes that took place in her understanding of mathematics and herself as someone doing mathematics:*

**Emma** I think this is where I started to analyse what I'd thought before and how I was starting to think now because I've said here "I never really thought before that a square was a rhombus and a rhombus was a special type." So I think this is where I was starting to realise that perhaps - well I've definitely realised this now. When I was taught at school it very much was instrumental and even though because I did sit and think about things I did have a good understanding of it as well, I perhaps didn't have the level of understanding that I should have had. Yes, because I always thought I had a really good maths education, but I've realised actually it probably could have been better ...

This one I really struggled with because I remember having to take this out a few times. You can see I took it out a few times and redone it because we discussed it once and it was like "Oh yeah, that's how it is," and then we did it again and it - So this is another example of one of my lengthy explanations to myself of how I've got that answer because I figured there's no point in just sticking it in and giving yourself the answer because when you look back you're going to be completely lost...

It's really hard to remember what I was thinking because now I feel like I'm such a changed person with my views and everything after last year, so it's hard to go back and ...

**Hilary:** If I can remember I think you said something about "But why do we have to prove things?" and I said "Oh well, Vicky, you're going to have a hard time because that's what mathematicians do," or something like that, you know, and I could see you looking at me.

**Emma:** Yeah, I was like "No, it's not. Mainly you just sit there and do questions and get the right answers," but now I find myself every time - like I was working on something the other day where, you know, if you divide by a fraction you just flip it and times by it and I was like "Well I know that, but actually why can you just do that?" and I just sat there for like half an hour just thinking about it and I still haven't quite got it.

*Emma continued to leaf through her journal talking with great interest and confidence throughout, which space does not permit me to include here.*

## **Discussion**

What is lost in this retrospective account is the struggle Emma experienced with this module in general and with her learning journal in particular. She struggled with the mathematics, she struggled with my definitions of mathematics and she struggled with the nature and purpose of the learning journal. This resonates with the description given by a teacher supervisor of students in Denmark for whom the learning of mathematics in higher education was entirely structured around their assessed project work. In the early stages of their learning,

*the students feel 'overloaded' and experience a mild form of hopelessness. ... This is fully intended because it, to some extent, stimulates the researcher's state of mind. (Vithal et al, 1995, p204)*

I claim that using the learning journal for summative assessment also provided both rich opportunities for formative assessment and was in itself also educative. The 'researcher's state of mind' was developed by this educative assessment practice, where the students had to engage in doing mathematics, in creating the mathematics for themselves, rather than simply meeting the results of the mathematical activity of others. From the work of Paulo Freire (1972) onwards, there has been a recognition that issues of epistemology - how knowledge is constructed and by whom, what counts as knowledge and what it is to know - are central to developing critical educational philosophy and practice (Giroux, 2001). The learning journal demanded that the students find their own mathematical voice and use it to communicate their own mathematical ideas.

Learning journals provide an opportunity for students to write to learn and for tutors to read to understand their students' learning; they also create the opportunity for dialogue between tutors and students (Borasi and Rose, 1989). The scrapbook format enabled both students and tutor to focus on communication rather than presentation. As Zinsler (1988), quoted in Burns (2004), notes: 'Writing is a way to work yourself into a subject and make it your own' (p16). Emma discovered the power of writing mathematics and found that the scrapbook format supported her mathematical thinking in a number of ways. The formative feedback it provided motivated her to respond to mathematical challenge with resilience; it helped her to engage with the idea of mathematical proof which she had previously resisted; and developed remarkable confidence in herself as a learner and doer of mathematics.

However, I believe the learning journals did more than this. The process of finding one's voice in writing works dialectically with that of becoming convinced one has something to say. Experiencing the conviction that one has something to say (and the right to say it) is fundamental to transformative, critical education. A hope is that the transformation Emma experienced in herself - for her, linked strongly with the experience of the learning journal - as she became an authoritative and authoring knower of mathematics will remain with her and enable her to develop a continuing critical practice which seeks to empower the young learners with who she will be working in her professional life in the secondary mathematics classroom.

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<sup>i</sup> This paper draws on and in some case re-presents earlier work related to assessment: Povey, Hilary and Angier, Corinne (2007) Creating opportunities for authoritative knowing: some undergraduate experiences of mathematics assessment, *Philosophy of Mathematics Education Journal*, No 21, September, available at <http://people.ex.ac.uk/PErnest/pome21/index.htm>