

0362

Diagnostic testing in mathematics as a policy and in practice in the transition to HE

Julian Williams, Paul Hernandez-Martinez, Diane Harris
University of Manchester, Manchester, United Kingdom

Background

This paper reports the findings of a cross case analysis of the transitional practices associated with what our (i.e. the ESRC 'Transmaths' project team's) gate-keepers and practitioner colleagues tend to call "Diagnostic testing". We looked closely at one university's implementation of this practice in two Schools where it was believed to be 'working' to improve first year university students grades and retention, and we compared with other places where it was thought less successful.

Research Questions

Our project asks RQ1: How do different mathematics educational practices found in 6fFE/university transition interact with social, cultural and historical factors to influence students' (a) learning outcomes, (b) identities, and (c) decisions in relation to learning and using mathematics?

RQ2: How are these practices mediated by different educational systems (their pedagogies, policies, technologies, assessment frameworks, institutional conditions and initiatives)?

In this paper we specifically focus on the learners, teachers and managers' experiences of the 'diagnostics' practices designed to ease students transition.

Methods

We draw substantively on the mathematics education literature on Diagnostic Mathematics Teaching and (somewhat more widely on) 'Assessment for Learning', and indeed on published case studies by LTSN's and HEAs who promote 'Diagnostic testing'.

The methodology is based on a cross case study comparative analysis of the phenomenon in different contexts (after Yin). We begin with a close up site study (ethnographic in style) of two closely related School practices in one university, where similar testing is conducted, but divergent responses to the diagnostics are implemented. We then compare with other cases where the testing practice is deemed less successful (and in one case is actually dropped).

Frame

We draw on Cultural-Historical Activity Theory (CHAT) for the analysis of the conflicts between mathematical practices, identities and systems in the school/College and the university. Students in transition 'cross the boundary' between distinct, contrasting systems and experience, and even induce contradictions. Thus the tools, signs, concepts and their meanings (e.g. 'testing', 'teaching', 'learning', 'proof', 'being a mathematician', working 'independently') crafted in school/College practice may take on different meanings and indeed be unfit for purpose in the university setting.

In particular from this point of view, we need to examine the 'testing' involved in the 'diagnostic' practice: is it aligned with what was learnt and assessed in school? Additionally, one looks to the 'follow through' from diagnosis involved: what does this consist of and is it actually responsive to learners' needs?

The subjective experience of the student is to some extent a reflection of the dissonance such contradictions cause, and a successful 'transitional practice' will be one that alleviates this dissonance

(ditto the lecturers/teachers). Distinct understandings of students and lecturers can be viewed in this light, and appropriate dialogues (eg through AfL, dialogical teaching, 'responsive' practices etc) are seen as potentially supportive.

Research findings

We have been able to identify more and less successful implementations of this practice as constituting quite different transitional practices from the learners point of view. The practices that we deemed 'more successful' were those where there was a dialogical response to the diagnostics that allowed adaptation of teaching to learner need, i.e. that realised a degree of formative assessment and associated pedagogical response (NB we don't yet have 'hard' quantitative evidence but are seeking this now to supplement the qualitative findings). These often involved 'weaker' students getting the support of a knowledgeable 'teacher' in a safe, dialogical context (smaller groups, learning support, mathematics centre, etc). This raises questions about the 'academic' and 'teacherly' identity: in many cases we are seeing School teachers being employed in such support roles, and this 'works well' for some. On the other hand these staff often have low academic status, and their voices may not be widely heard or appreciated by the academic management.

In less successful cases the provision was of insufficient quality, or was not adaptive to the diagnostics, or (in two cases) did not exist at all ("there was no follow through").

We draw the more general conclusion that for a policy to 'work', it has to satisfy the three main stakeholders in different ways usually involving a number of compromises:

- The management /leadership have to believe that it is cost-effective as well as capable of being presented as educationally sound;
- Teachers have to believe that it is educationally effective in terms of helping them to teach better or more efficiently; and
- Students have to believe that it helps them to achieve and make progress more effectively or efficiently.

Finally we can conceptualise the more successful practices as ones that go some way to adjusting university practices to creating a 'boundary space' in the university in which some of the more dialogical 'schooling' practices are afforded. This can be highly appreciated by those learners who are struggling in transition on many fronts (e.g. the independent learning expected, coping with a regime of 'lectures' and distanced staff, AND the jump in level of mathematics).