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Transition: looking sideways as well as forwards

Geoff Wake

University of Manchester, Manchester, United Kingdom

Background

For students progression from one institution to another presents challenges in relation to their learning as well as their changing social relationships. This is particularly striking as students make the transition from school/college studies to university where they often become significantly more independent and modes of learning are redefined. The Transmaths project investigated this transition in relation to mathematics for mathematically-demanding subjects in Higher Education building on earlier work that had considered the mathematical experience of students in pre-university education in sixth-form / Further Education colleges.

Research Questions

Overall the project aimed to understand how educational practices in Higher Education (HE) interact with social, cultural and historical background factors to impact on students' learning outcomes, identities, and choices in relation to learning mathematics for science, technology, engineering and mathematics (STEM) and how these practices are constrained or afforded by different educational systems and practices.

This paper arises from our exploration of how mathematics educational practices are mediated by the different educational systems into which students progress and focuses in particular on one cross - case emergent theme that our data analysis highlights as being significant: that of learning resources. Here we consider the learning experiences and technologies that universities provide and explore how students interact with these and appear to be increasingly redefining this interaction by drawing on a range of further resources over which they have greater control.

Methods

This paper draws on, and synthesises data from two sources:

(1) detailed case studies developed in five universities where data was collected in the ethnographic tradition with video and audio recordings of a range of teaching / learning activities, photographs, researcher notes together with follow-up interviews with lecturers and students (individually and in focus groups). Each case was developed so that in addition to collecting a wide range of contextual data there was a focus on particular practices that the university put in place to cope with the 'mathematics problem' as they saw it.

(2) a series of longitudinal interviews with some 50 students at three data points: (i) immediately following the students' sitting of A Levels the results of which determined whether their application to a specific university course was successful or not, (ii) during the first year of their university course, (iii) at the outset of their second year of university study.

Frame

The data is analysed drawing on Cultural Historical Activity Theory (CHAT) in an attempt to understand how individual students actions and the activity of the university learning community are socially constructed and developed in relation to individual goals and community motives and how these are mediated by a range of factors. CHAT in particular draws attention to artifacts (here relating to learning technologies), rules (both implicit and explicit that are historically evolved) and the division of labour between members of the community as key mediating factors.

We find the work of Engestrom and colleagues (Engestrom, 2001) in which they explored organisational development by means of a 'boundary crossing' laboratory helpful in questioning the notion of what it means to make 'progress'. In this work Engestrom questioned the assumed vertical directionality of concept development being at the intersection of everyday and scientific understanding investigating how sideways re-conceptualisations can be helpful in transforming the activities of systems. Such expansive transformations of the activity of a system it is suggested might occur when contradictions, that is, historically accumulating structural tensions within the system are present.

Our longitudinal interview data draws our attention to the actions of the individual (student) in our consideration of the activity system focused on the learning of mathematics and with this focus we find the development by Beach (1999) of the construct of consequential transitions helpful. This considers change in the relations between individuals and social activities with these being acknowledged as having a clear notion of progress. Much as Engestrom considers organisational development as having the potential to be horizontal as well as vertical, Beach considers individuals as having the potential to make lateral (vertical) or collateral (horizontal) transitions as they reposition themselves in relation to community activity, but perhaps most useful in our case is the construct of encompassing transition that can occur as repositioning takes place within a single activity.

In our analysis therefore we bring together these two theoretical frames as we explore how relatively recent changes in learning are being afforded by rapid developments in information and communications technologies (ICTs) and how these have potentially empowered students in redefining the learning landscape.

Research findings

Our analysis confirms that transition issues in relation to learning mathematics do not lie exclusively at the point of progression from school / college study of mathematics but rather they can emerge at different times as students engage in different ways at different times during the initial stages of their university experience (Gueudet, 2008). We find the range of resources available to students, the expansion of this and the potential empowerment of recent innovations in ICTs together with changes in rules that have introduced significant fees for students particularly significant in starting to redefine students' relationships within the learning community. At an organisational we see these developments as providing contradictions with the potential to lead to conflict for individuals and consequently expansive learning. Such a development has implications for individuals as they reflect upon their learning actions and roles in relation to the community potentially resulting in an encompassing transition. This suggests a future phase of action research might helpfully engage teachers and learners in making modes of learning an object of joint inquiry with the purpose seeking progress sideways as well as forwards.

Beach K. D. (1999). Consequential transitions: A sociocultural expedition beyond transfer in education. *Review of Research in Education*, 24, 124-149.

Engestrom, Y. (2001). Expansive Learning at Work: toward an activity theoretical reconceptualisation, *Journal of education and work*, 14 (1): 133 - 156.

Gueudet, G. 2008 Investigating the secondary - tertiary transition. *Educational Studies in Mathematics* 67: 237 - 254.