School transfer and the learning of mathematics: Learning landscapes and Bourdieuan frameworks

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This paper explores the metaphorical language of *learning landscapes*, which I have developed in order to map children's experiences of mathematics education, in particular before and after the transfer from primary to secondary school (11/12 years). I will also draw some parallels from the work of the French sociologist Pierre Bourdieu, employing his concepts of habitus and field to explore further the complexities of learning situations

Introduction

As a fledgling educational researcher this account may lack the sophistication often articulated by seasoned researchers. However, this will hopefully be offset through an account of the initial enthusiasm of a new endeavour, creative thinking and the discovery of an education theoretician with whom one has an affinity of thought. This story falls into three chronological sections as hinted at in the title. Firstly I shall consider briefly the issues surrounding school transfer. What are thought to be the underlying causes of the hiatus in learning that takes place after transfer and what has been done in recent years in an attempt to address it? I will explain why a re-examination of this key stage transfer is required which leads into the second section: the development of a metaphor that I have found useful in understanding learning situations. The third section charts my discovery of the work of Pierre Bourdieu, with its central concepts of habitus and field. I will show how this links to, and extends the notion of learning landscapes and helps to clarify a theoretical framework for my classroom-based research. I conclude with an account of my first encounter with a year six class with which I will be conducting my research and the recognition of the necessity of a reflexive approach.

School Transfer

During the last few decades several studies have resulted in broad agreement that school transfer presents children with a huge challenge, one that for many proves to be a major obstacle in their learning careers. Despite these studies, with their associated recommendations, the problems remain. Galton, Gray and Ruddock (1999) have recently re-examined the issues surrounding transfer (and transition) and have proposed key areas that need further investigation. The UK government is fully committed to tackling these problems:

> For many years transition from primary to secondary school has been inadequate. Far too many 11 year olds have lost momentum in the last few weeks of primary school and over the summer holiday before they start secondary school. All too often when they do start secondary school, teachers start with 'a clean slate' and set expectations lower than they should be. The result has been that by the end of the first year in secondary school many pupils have made little progress and lost motivation and as many as 30 per cent actually achieve lower standards than in

P. Valero & O. Skovsmose (2002) (Eds.). Proceedings of the 3rd International MES Conference. Copenhagen: Centre for Research in Learning Mathematics, pp. 1-10.

> the last year of primary school...We have therefore begun to address what, for the last generation or more, has been neglected or swept aside as an intractable problem. (DfEE, 2001, p. 40)

Much of the blame is apportioned to the 'clean slate' approach of secondary teachers, but this reflects an inadequate grasp of the complexities of transfer. The UK government's plan is concerned largely with structures and processes but a deeper investigation of the *culture shock* of school transfer must be a priority. Anne Murdoch explains: "when children transfer to their next stage of schooling they face not only different teachers and surroundings but also changes in the nature of schooling itself, such as differences in the length of the school day, timetabling, teaching styles and curriculum". (Murdoch, 1986, p. 47) It is no wonder that for many this is a traumatic experience.

Three broad areas of action have been identified, which it is believed, if addressed, will significantly improve the learning progression between the two institutions. Jill Nichols and John Gardner summarise these at the outset of their recent examination of key-stage transfer:

> Fluency should be underpinned by continuity and progression designed into the curriculum, by the efficient and purposeful transfer of information at the interface and by comprehensive liaison between the various parties involved: teachers, pupils and parents. (Nicholls and Gardner, 1999, p. 1)

With regard to curriculum continuity there are those who thought, pre-national curriculum, that such an aim was realisable "with goodwill and sustained commitment by all concerned" (Ginnever, 1986, p. 194). However, it is questionable whether the UK National Curriculum moved us near enough to this goal. The National Numeracy Strategy on the other hand includes an unprecedented level of pedagogic prescription and may therefore stand a better chance of achieving effective continuity. Here again we see another glimpse of the real problem: primary and secondary schools are in many ways very different worlds with different philosophies, cultures and pedagogic practices. They are educational communities with different social rules and structures. A thorough exploration is needed to understand the effect that uprooting/replanting process has upon the developing child. My thinking moves wider than mere structural change to consider all of the influences on the learner (of mathematics), whether they be part of the education system or other dimensions of children's experience, for example, friends and family.

Learning landscapes

In order to revisit this area of concern I sought to explore the issues surrounding school transfer in a new way, which will hopefully shed further light on the problem. As part of the initial scene setting I began to use the metaphor of learning landscapes* and subsequently this image became increasingly well focused.

Before unpacking this imagery I considered the different cultures and sub-cultures that to a greater or lesser degree play a part in shaping pupils' experience of mathematics. I use the term culture rather loosely as the discussion is intended to reflect the exploration of ideas rather than the outlining of a theory. The following processes can be applied to any subject area one could choose, but the profile of influence will be unique for any one of those subjects. It is the peculiar make-up of the profile for mathematics that precipitates some of the major challenges faced by mathematics educators. The following list of participating influences, whether active or passive, is not intended to be exhaustive, or in any order of priority, importance or magnitude.

Political agendas
Public perceptions
School philosophies
Classroom cultures/teacher perspectives
Pupils attitudes
Parental support
Friends'/peers' attitudes

Let us consider some of these in more detail:

Political agendas are in a constant state of flux but have a very clear role in defining the types of mathematical experiences that children have in the classroom. These agendas are not simply those of the current government, as referenced above, where 12/13 year-old pupils' lessons are apparently increasingly to be determined by the chosen priorities of the National Numeracy Strategy, Key Stage 2 assessment, possibly Bridging Units and the Key Stage 3 strategy. These initiatives are simply a reflection of what Michael Apple (2000) has called the "conservative restoration" that has driven many governments to respond to international comparisons with a raft of *reforms* including national curricula and standardised national testing.

Classroom/teacher cultures are those environments established by the teacher in which children are supposed to learn. At best they might include stimulating resources, enthusiastic teaching, effective differentiation and meaningful assessment. They would empower children to foster effective learning habits, support their peers and feel increasingly comfortable with their strengths and weaknesses. The child feels valued and knows that his/her contribution to the class is valued. These cultures allow pupils to explore new ideas without fear of failure and encourage them to grow in self-confidence. Of course the typical primary school pupil spends the majority of their time with

* This section was largely written before reading the work of Pierre Bourdieu and it is interesting (for me at least) to note the similarities and differences between my metaphor and his framework of field and habitus.

one teacher in one classroom. Consequently that teacher’s perspective on the teaching and learning of mathematics is a critical influence in shaping children’s attitudes to the subject. Classrooms may share very similar *cultures* in terms of the general learning environment but a teacher who is mathematically nervous could have a very different effect from an enthusiast. Either one might, through the employment of appropriate teaching strategies, enable students to be successful in assessments but the inherited perceptions of mathematics may affect students’ future development either way. The situation in year seven is critically different, where the child must manage frequent *culture shifts* from one lesson to the next.

Parental support, or lack of it, is another influence that must be considered in order to compile as full a profile as possible. Any teacher of secondary mathematics will be all too aware of the influence of negative, or simply different, perceptions of mathematics amongst parents. Donald Macnab’s (2000) plea for us to rediscover a sense of vision for mathematics education in the UK fails to account for the responsibility of parents in such a process. Here I consider parents separately from *public perceptions* because of the nature of the interactions: parental influence is potentially much more direct and therefore probably has greater potential to influence, positively or negatively.

Peer attitudes are also considerably important. Galton, Gray and Ruddock’s study recommends further research in four areas, this being one of them.

> A third study would look in some depth at the impact (both positive and negative) of friendships on commitment to learning; it would identify strategies that teachers could use to discourage the growth of groups with an ‘it’s not cool to learn’ attitude (Galton, Gray and Ruddock, 1999, p. 29).

They acknowledge that shifting social relationships have a significant role to play in determining the rate of pupil progress post-transfer. One example of this is demonstrated in a recent study that has highlighted the effect that gender has upon responses to school transfer (Jackson and Warin, 2000).

I have deliberately not included other dimensions, such as the influence that a high quality physical environment can bring to learning and teaching. This is undoubtedly a factor that must be considered in any comparison between educational establishments but, as will be alluded to later, this aspect of the landscape is difficult to change for a given institution.

How do these seven stratified layers of influence combine to form a learning landscape? Which factors have the greatest/least effect and how does this vary between schools, classes and individuals? Moreover, it is the similarities and differences that this influence-profile has in primary and secondary schools that is the key to understanding the turbulent effects of school transfer. We will need to make some simplifying assumptions concerning pupils in any one class regarding the distinctiveness of their individual experiences. It is clear that the last three items in the list above will mean very different things for different children. However, for any one pupil, it is reasonable to assume that their personal influence-profile may look different in years 6 and 7 even in these three areas.

Learning landscapes

In moving from these profiles of influence to the development of a learning landscape we will need to reflect upon the constituent elements that define a landscape: *geology, climate, human influence* and *time*. By looking at each of these in turn we shall now consider how the notion of a learning landscape could be developed. The difficulty with mapping the sevenfold list of influences above into the four characteristics of a landscape is not straightforward, as there is not a one-to-one correspondence. However, the process should create an image that will make it possible to understand the distinctiveness of the two learning environments.

Firstly we will assume, for the sake of simplicity, that most landscapes have a fixed underlying geological structure. This foundation provides constraints for the landscape itself; for example, the chalk downs of southern England cannot underpin the same landscape as the rugged glacial mountains of western Scotland. Within education there exists sub-structural *geology*: the age of compulsory schooling is from 5 –16 say with fixed Key Stages, each school has its own layout of classrooms, and so on. For any one student this *geology* is fixed but in some ways it contains major discontinuities, for example at transfer.

The second aspect of the analogy concerns climate, both macro and micro. Again it is easy to see that climate constrains the landscape within a certain range. Compare, for example, the lush tropical rainforests of Brazil with the dry Sahara or freezing Arctic Circle. Of course these are extremes but even within the UK the keen botanist will know that some plants can only survive in some areas with subtly different microclimates. Climate remains relatively constant. Human impact on an environment can be rapid and significant, but climate change cannot be forced to move at the same pace. We are currently experiencing global climate change as a result of the greenhouse effect and global warming but however alarming this might be it is still a relatively slow rate of change. In this case climate is altered gradually as a side effect of broader human impact on the environment.

It is in this dimension of the analogy that much of the parallelism becomes clear. The learning climate that exists within a particular friendship group, family, in the whole class and, crucially, in the broader society may have a very definite impact on the quality of mathematical learning. This *climate* functions at certain levels: public perceptions form a *macroclimate* within which each school has a developed *mesoclimate*. Taking this further to the individual classroom we have a number of *microclimates*. It may be relatively easy to alter such *microclimates* but the further back up the scale one goes the more difficult it becomes to affect *climate* change. This may be one of the issues that needs exploring further in the international comparisons of mathematical competencies. National learning-climates affect the richness of the learning landscape within that country or region. Consequently, it is of critical importance to understand the potentially limiting factors: the public's perception of mathematics and society's attitude towards compulsory schooling. Then we will be in a far better position to appreciate the challenges of teaching and learning mathematics.

I have already made clear that *human impact* on the landscape can be rapid and significant: consider, farming, deforestation, urbanisation, erosion, pollution, etc. Sometimes such actions are proposed to benefit society whereas at other times the ill thought out actions of indivs, groups or governments have a detrimental, and sometimes irreversible effect on the landscape.

It is in this area that most change occurs in education and consequently the educational landscape has been radically altered in recent decades. In terms of mathematics I have listed the significant changes that are currently shaping the mathematical learning landscape 0-12 year olds: primarily the UK's National Numeracy Strategy. The question that remains to be answered is this: to what extent will this major human intervention positively alter the mathematics-learning climate in this country? If these human actions fail to affect negatively perceived attitudes towards the learning of mathematics in the general public, then a climatic barrier will exist that restricts the transformation of the learning landscape. Such a challenge is beyond the scope of this paper but is in need of exploration. Why does such a climate of attitudes exist concerning mathematics? Where and when do they arise and can they be challenged? What positive actions would need to be taken, and what negative actions need to be stopped, in order to achieve this?

The final definer of landscape is *time*. It is not that time itself changes the landscape but that the passage of time provides a framework in which change can take place. The effects of climate and human impact occur in very different timeframes, both in the natural environment and in the shaping of learning landscapes. However, we have also noted that change that occurs in either one of these ways cannot happen independently of the other. Climate creates natural boundaries within which only a range of human activities will have long-lasting effects. One cannot grow a forest of frost sensitive trees in Canada. They may look great until the winter but are inescapably doomed to perish. Neither can one expect any strategy to result in vastly increased mathematical competence if a significant proportion of those individuals and institutions that could influence the learners are proudly innumerate, possibly including some educators themselves! It may succeed for a while but will only be transformational in the long run if the prevailing climate allows.

I have employed this metaphor in an effort to explore the various influences that can impact the learning of mathematics. If one can assume any child to be situated in a unique learning landscape then one must ask whether that environment is helpful or disadvantageous to the learner planted in it. Many organisms can function in a range of environments but there may be some to which it is particularly well suited and some that prove to hinder growth and development. [It is not difficult to see why, when using this analogy, a transfer from primary to secondary school is such an unsettling transplant.] Moreover it is worth noting that any organism in such an environment exists in a symbiotic relationship with the rest of the ecosystem. It is not only sustained and partly defined by its surroundings but effects the ecosystem of which it is a part. We might draw a parallel with a school *ecosystem* that exists for the education of children but is also shaped by the children that it educates. It is this dynamic between the educational (and other) structures and their processes and the children that experience and shape those processes, that leads us to a consideration of the work of Pierre Bourdieu. I will consider how his concepts of field and habitus can help us to explain the processes supporting and hindering mathematical learning and how school transfer impinges on those processes.

A new discovery – Pierre Bourdieu

It was with some excitement that I started to read of the work of the French sociologist Pierre Bourdieu, largely because of the ways in which I could see my learning landscape metaphor relating to his concepts of field and habitus. I will explain briefly how his theoretical framework mirrors some of the ideas contained in the previous section and, therefore, how it proves useful in explaining children's progress in learning mathematics.

The aspect of Bourdieuan thought that is most helpful for my purpose is the dynamic relationship between objective structures and the subjects who are shaped by processes of those structures. Bourdieu seeks to break down any subjective/objective dichotomy by recognising the dialectical relationship that occurs between them. For him structure is very much a dynamic, cause and effect concept because the structures are in themselves continually reproduced by those agents that the structure has itself influenced. Hence structure speaks more of the relationships involved than the determined object. What I am interested in here is how two of his central concepts, habitus and field, reflect and extend the learning landscape metaphor outlined above.

Habitus

Habitus is a complex idea that, as Nash has pointed out, "Bourdieu is reluctant to define, and anyone who attempts to discover consistency in his usage will be disappointed" (Nash, 1999, p. 176). Consequently, the following quotes provide a means of quickly generating an impression of this concept:

> habitus refers to a set of dispositions, created and reformulated through the conjuncture of objective structures and personal history (Harker, Mahar and Wilkes, 1990, p. 10).

> The habitus itself is viewed as history embodied in human beings. Its existence is apparent in and through social practices as manifested in ways of talking, moving getting on with people and making sense of the environment (May, 1996, p. 126).

> (*habitus is*) a system of schemes of perception and discrimination embodied as dispositions reflecting the entire history of a group and acquired through the formative experiences of childhood (Nash, 1999, p. 177).

Lastly, Bloomer and Hodkinson describe habitus as “an embodiment of the complex amalgam that some would call structural factors, such as social class, gender and ethnicity, together with a person's genetic inheritance, all of which continually influence and are influenced by others through interaction” (Bloomer and Hodkinson, 2000, p. 589). This is a particularly helpful point when considering the way that children engage with mathematics lessons. So, to examine the social context of children learning mathematics one needs to appreciate the complexity of the individual and group habitus and how this habitus is structured and structures the field in which it is situated.

Field

As I have already shown Bourdieu’s sociology is dynamic, therefore the notion of habitus is not static but only exists in relation to a field or fields of power that are able to structure and be structured by the habitus of individuals and groups. For Bourdieu, if there is no field there can be no habitus and *vice versa*. It is with this concept of field that we can begin to realise the potential of this theory in analysing the learning of mathematics in the classroom. Grenfell and James outline the notion of field:

> Field is…a structured system of social relations at a micro and macro level. In other words, individuals, institutions and groupings, both large and small, all exist in structural relation to each other in some way. These relations determine and reproduce social activity in its multifarious forms. Moreover, because they are structural, positions…can be mapped or located, and the generating principles behind their relations ascertained (Grenfell and James, 1998, p. 16).

So how might this mapping process work in this context? Grenfell and James aim to provide a way of utilising a Bourdieuan framework for educational research. Below I have reworked their diagram to demonstrate the interplay between my proposed fields: school, family and youth culture

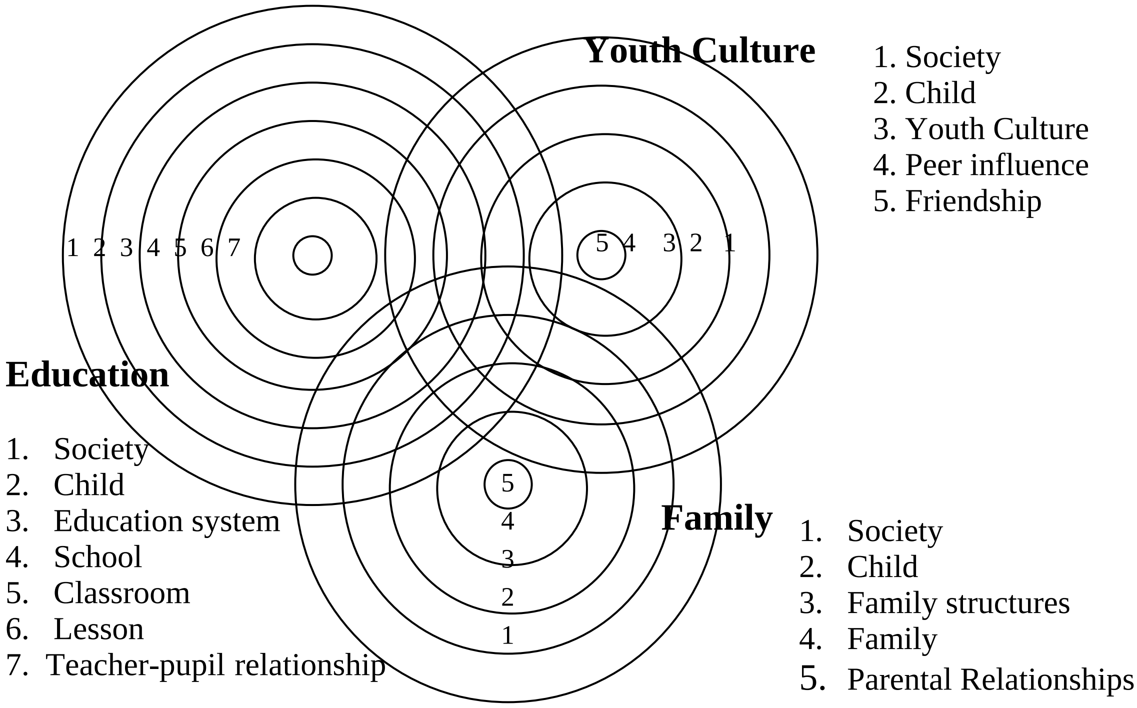

Figure 1. Proposed structure of a childhood field

This two-dimensional representation fails to do full justice to the complexities of the social context of learning mathematics but it does begin to show how these fields interrelate. In this diagram they are not mathematics specific but one can see how a field diagram peculiar to that area of learning would be different from another. Could a particular child's route across these fields be plotted and are any pathways particularly easy or difficult to traverse?

Grenfell and James (p.169) go on to outline Bourdieu's three-stage research methodology but what is interesting to note is the repeated usage of geographical language: 'map', 'position', 'field' and 'site'. This language is reminiscent of the learning landscape metaphor and helpful in bringing a symbolic, visualisable slant on what could otherwise be complex theory. Herein lies the power of utilizing such metaphorical language: it provides an alternative strategy for comprehending the learning situations in which I am interested.

Concluding reflections

Having arrived at some sort of methodological framework I made my first visit to one of the classes with which I intend to work. This is a year six class in one of the feeder primaries of the school in which, until very recently, I taught mathematics. The teacher is one that I know quite well from my work in liasing with the primary feeder schools on matters of curriculum continuity, record transfer and teaching and learning strategies. Consequently I was somewhat taken aback to walk (unannounced) into a lesson on digital roots. I was immediately struck by the realisation that only a few months previously I had taught a very similar lesson to some year 8 students. Upon reflection I realised that this may be to my advantage in undertaking a longitudinal study for in some ways I will be able to see the end from the beginning as well as seeing the beginning from the end in a couple of years time.

After more thought I came to the further realisation that I was very much part of the landscape that I was now involved in exploring, in fact I had even been partly responsible for shaping the mathematical learning landscape that these children would traverse in the next two years. I had taught some of their older siblings, developed activities that they would take part in next year and, in Bourdieuan fashion, been in some small way responsible for the development of the habitus of some of their future mathematics teachers. This situation is both one of advantage, providing insights not available to others in the same situation, but also necessitates reflexivity so as to avoid the misrepresentation of forthcoming research interpretations.

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