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A Socio-Cultural Exploration of the Mechanisms Underpinning Performance Dips Following Transition from Primary to Secondary School

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Abstract

A range of transition research suggests that students undergo a dip in performance subsequent to an educational transition. In this paper, through consideration of ethnographic data and recent situated theoretical conceptualisations of learning and teaching, we explore the mechanism of this phenomenon. We argue here for the use of situated learning models where all knowledge is understood as being contextualised in the activities and practices of both the learning situation and the wider societal frameworks which construct that situation. We explore children in transition and the concomitant learning and teaching practices in a UK school. We demonstrate that knowledge and performance is mediated by the practices that the new students must acquire in order to participate in their new community. The data follow a group of year 7 children who are new to the school and their teacher over a three week period engaged in work on averages. In their efforts to adopt the practices dictated by the teacher, the data demonstrate that conceptual and procedural understanding shifts from one of confidence to one of hesitancy and questioning. Understanding of children in transition, school performance and the attendant teaching practices are discussed in light of the data.

Keywords: transition; socio-cultural theory; classroom practices; legitimate peripheral participation

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1.0 Introduction

A range of international literature suggests that a significant number of students suffer adjustment problems and performance dips post-transition from their elementary school to their secondary school (e.g. Ireland/Estonia: Darmody 2008; France: Bourcet 1998; UK: Choi, 2012; Canada: McDougall & Hymell, 1998; Italy: Zanobini & Usai, 2002; Finland: Lahelma & Gordon, 1997; Norway: Kvalsund, 2000; New Zealand: Ward, 2000; Israel: Shachar, Suss & Sharan, 2002; USA: Cohen & Smerdon, 2009).

Explanations for these phenomena range from intra-individual explanations of student self-esteem, to structural discontinuities between transition institutions. However, there is little data which actually documents the activities and experiences of the children in the classroom, which would allow for an understanding of the nature of their participation and how this might contribute to their learning and achievement in the new school. In this paper we explore data which illustrate the actual learning experiences of children in their new school. We do not claim that these experiences are generalizable across all schools and classrooms, but argue that the principles that emerge from analysis of the data suggest that performance is inextricably embedded in the practices of the classroom and that these practices serve to construct the ongoing participation and so learning of new school students.

1.1 Learning theory

Contemporary learning theory challenges traditional intra-individual models of learning which, broadly speaking, understand the process as the receipt and internalisation of new information. The quality of such learning in individuals is explained variously by reference to genetic predisposition and/or the environmental reinforcers present at the learning event and at the performance of the learning (Sfard, 2008). Approaches to pedagogy reflect such assumptions; educational institutions are organised to reflect transmission models of teaching and learning, where the teacher delivers information, the students accept and internalise that information and subsequently perform it in various assessments which judge the quality of the learning. Of course, this represents a somewhat simplistic overview of a wealth of literature which explores a variety of human learning and does not seek to deny that more recently there has been a turn towards context (see Núñez, Edwards & Matos, 1999; Williams, 2009; Shreyar, Zolkower & Pérez, 2010; Smardon, 2004; Samuelsson, 2010).

However, the substantive point is that in much of the literature, little attention is given to either the proximal and distal contexts of the learning or to the nature of the required performance of the learning. This suggests that the contexts of both the learning and of the performance of the learning are viewed as neutral in understanding learning processes.

In contrast, distributed models of learning argue that individual engagement and interaction with the context, not only of a specific learning event, but also the wider environment, represents a more accurate analysis of the process and outcomes of learning. For example, Nunes et al. (1993) suggest that in the teaching of mathematics, attention must be paid to '...social and logical rules that apply outside school.' (p148). Their research which studied both street and school mathematics, suggests that in the teaching and learning of mathematics it is helpful if the problem can be socially imagined, that it is contextualised in people's lives.

This would suggest that in learning an individual does not just attend to the actual learning event, but also to its situation and meaning in their wider lives. Cobb et al. (1997) took time to explore the culture of a first grade classroom and in that context explored children's learning. Their observations led them to comment 'Within the encompassing classroom micro-culture, ... classroom mathematical practices ... can be seen to constitute the local social situation of the children's development.' (p216). In their examination of classroom behaviour, Hatch & Gardner (1993) take an almost ecological approach (Bronfenbrenner, 1999) in suggesting that learning can be understood as the interaction of the personal (individual experience), local (immediate constraints and resources) and cultural (wider societal meanings).

1.2 Aims of the research

Given the above arguments the aims for this research are:

- To explore the classroom practices which construct the transition experiences for students;
- To explore the interaction of student – activity – context during transition;
- To understand student learning and performance during transition.

2.0 The Ethnography

In England and Wales in the UK the majority of children leave primary school at aged 10-11 (year six) in July and move to secondary school (year seven) in September. The data presented here emerged from wider ethnographic research which followed a group of children through their final term in year six to their first term in year seven. The data represent observations gathered in mathematics (referred to generally as 'maths' in the UK) lessons over a three week period and seek to provide a picture of the classroom, and of the teacher and student interactions therein. The maths lesson data in particular was identified because whilst other lessons demonstrated similar issues, the curriculum content in maths is easy to identify unambiguously and so the overlap between primary and secondary school is clear.

In the focal school, maths classes were streamed based on ability. Ability was judged on the basis of the children's performance in the Key Stage 2 Standard Ability Tests (SATs) taken in primary school in year 6. The class observed was the second to highest group of maths achievers. All members of the class had achieved a level 5 in their SATs, which represents the top achievement band in Key Stage 2.

2.1 The data

In common with all lessons in the new secondary school, the first week in maths concentrated on inculcating the practices of the maths classroom into the children's behaviours. The list of rules for operating in maths included (amongst others):

- How the exercise book should be treated (there are different approaches for the front and back of the book in which children write);
- Appropriate writing implements;
- The use of calculators;
- How school uniform should be worn in the classroom (different teachers had different policies on this).

In the first week children examined how to represent data using pie charts, and then in week two the topic was 'averages'. In order to have achieved a level 5 in Key Stage 2 mathematics, these children had already demonstrated that they could understand and show competence around averages, using them to process and interpret numerical information.

The data suggest that the practices which surround knowledge became an inextricable part of the children's assessment of their own understanding and influenced their performance. The data presented here consist of extracts from fieldnotes which include classroom observations made by the researcher, as well as verbatim quotes of verbal communications between the teacher and the students.

During their first maths lesson on averages, the children revealed good knowledge and understanding of some of the basic principles including key terms and concepts, and some of the basic procedures for calculations, as this extract from the fieldnotes indicates:

> *MrsM talks about averages, "Averages, anyone know anything about averages? Can anyone tell me about averages?"*
> *Dave "If you've got 4 numbers you add them all together and multiply."*
> *"No"*
> *"Divide"*
> *"What average is that?"*
> *"Mean"*
> *"Good, what other averages are there?"*
> *"Median"*
> *"Good you know something about averages, don't worry if you don't know, we're doing it now."*
>
> *MrsM asks for definitions for different types of averages. They do all know, know terms means, median, mode, range and they can define them, MrsM "Well done, I'm impressed with what you know. Well where are your books? They should be out."*

Indeed, a subsequent lesson felt unnecessary to the researcher given the students' grasp of the subject matter, and the teacher's emphasis was instead on correcting other classroom practices:

> *Tells them to open books and put data and heading Averages.*
> *"Copy this down and remember what I said yesterday about spelling." She writes on whiteboard.*

As she writes MrsM says, "It's obvious some of you have done this before, so this is revision but for some it's totally new and that's fine, everything I'm writing down is things everybody in this class, or some people, have told me." I have to wonder why she is doing this lesson at this level when clearly all of them know.

MrsM: "Will where's your pen?"
He finds it, he is writing in pencil, this is what you do in primary school.
"From now on make sure you write in pen."

MrsM goes round and looks whilst they copy from the board.
"Right, a number of people with no titles underlined, even though I said yesterday. Martin, why are you turning round?"

As the lessons progress, the focus on classroom practices which are novel for these children as compared to their primary school experiences, becomes even more apparent in the fieldnotes:

"Do that and put your pens down and then I can see who we're waiting for."
Boy asks if they should go on and do the question in the book.
"No, you need to listen once you've finished writing, put your pen down."

Someone asks if they can have a drink, in secondary school teachers against letting them drink, afraid they will spill it and cause a fuss. MrsM to me [researcher] "I know they say it helps them concentrate, but so does listening."

Eventually it appears as though the children's previous confidence in their knowledge and understanding of averages is diminishing somewhat, as evidenced through more hesitancy and a reluctance to suggest correct answers to questions:

MrsM is explaining how to do the questions in the book: "You have to show the working out, because if you do a test you'd get a mark for showing you have to add the data values together. If you didn't show the working and you got the wrong answer you wouldn't get a mark." She goes through the question on the board:

Mean = 25/5 = 5

> *Median of 2 5 5 6 7 (asks class to do it and writes answer on the board) 5, points out that it's not enough to circle it, you have to write it down.*
>
> *Median = 5, before she writes this she says every single hand should be up, they all do know it, so why are only some hands up?*
>
> *"Range, need to give the calculation not just the answer 7 – 2."*

We go along, "Put your pens down, face the front, Eamon sit properly. Bless you (somebody sneezes). Dan are you paying attention? I don't think you are, you're flicking through your planner."

The teacher continues to assert that the children should know the answers to the questions being posed, and expects that this knowledge would manifest itself in every child putting up their hand to answer. When this does not happen, the teacher seems to interpret this as a lack of understanding on the children's part. In contrast, the fieldnotes indicate the researcher's feeling that in fact the children were already very familiar with the mathematics being taught:

> *"Example two: find the median of 15, 4, 2, 6, 9, 11*
> *What do we have to do? Every single hand should be up."*
>
> *"Can anyone tell me why I've chosen that as an example?" Puts them in order.*
>
> *2 4 6 9 11 15 "There's no middle number, what do we do?"*
> *All seem to know, add middle numbers together and halve it.*
> *Asks, "How do we halve something? What's another way of saying it?"*
> *Someone answers "Divide by 2".*
>
> *She goes on doing examples on the board.*
> *"Right copy all that into your books as I've written it"*
> *I doubt that anybody has learned anything today.*

After leaving the room for a moment, the teacher returns and indicates some questions from their work books which the students should write down answers to.

This prompts some students to seek clarification about precisely which questions are to be answered, and about how and where the answers should be written, rather than about the actual processes of calculating averages:

Someone knocks on door. MrsM leaves for a moment, immediately students start talking.

She comes back. "Underneath that, when you've finished write these questions down, I don't expect you to finish all these in 15 minutes this lesson."

Writes:

Ex 16 1
2a, 4, 5, 7
Ex 16 3
1 and 3
Ex 16 4
1,2 and 4

Lots of questions about where they should write it.
MrsM: "Remember you should have your page split in 2". Shows them how to find place in book, chapter 16 corner of page.

Questions:
"Miss, do we do A and B?"
"What have I written?"
"A"
"So, do you think you do B?"
"No"
"You need to think before you ask a question."

In this way, the students' learning and the teacher's teaching seem centred around conventions of writing and appropriate ways of expressing knowledge. This last student's attempt to clarify these new conventions leads to an admonishment. This focus on academic practices continues to feature in the field notes:

Points out that 2a asks for mode, 4 for median etc. "Remember to write the numbers of the question in, remember what I said yesterday."

"Phil, draw your dividing line in pencil so if you need to do something across the page you can rub it out."

"Write the exercise number and the question, especially as you're not doing all the questions."
"Miss, do we write all the numbers down?"
"Yes, show your workings, you can use a calculator, if you've got one. "Brilliant."
"Yes."
They all reach for their calculators.

As seen here, once the teacher says that they can use a calculator, all of the students reach for their calculators. This instruction is almost immediately qualified, though:

MrsM: "Don't use a calculator if they're easy though."
"Conner, all the time you've wasted finding that calculator you could have written those numbers down and added them up."
Mostly working alone, but low level of whispering.
"When you get an answer make sure you write some units down whether it's apples, pears, pounds, centimetres, whatever."
MrsM continues to monitor the work, walking around the classroom.
"Don't forget to write the total down, don't just write the answer."
"Right Will, what is it? What are the units?"
"Will what have you done with your blazer?"
Will had fallen down the hill three times and is very proud of it, his blazer is covered in mud.

This lesson ends with another reminder of a classroom practice which the students have failed to carry out adequately:

MrsM: "Open your planners, you should put those on your desk at the beginning of the lesson."
"Year 7, you need to follow an instruction when you're given it."
Writes on board what they should write in their planner.

At the beginning of the first maths lesson the following week (week 3 of the study), the data reveal what seems to be a distinct sense of confusion on the part of the students about what they should be doing and how to do it.

The researcher's own fieldnotes record the teacher's sense of the students' confusion, but also the researcher's own sense that something strange is happening as compared to the previous week:

> *"We did an exercise on mean, median and mode and there were some quite difficult numbers and you had to say which was the best to use." Tells them to carry on with that exercise.*
> *Alan: "Miss, I've accidentally skipped two pages."*
> *"Miss, can we use a calculator?"*
> *"Yes, because there's some quite difficult numbers."*
>
> *Lots of looking in bags, messing before they get down to work.*
> *"Right year 7 there's too much chat here, you've got some quite difficult work and everyone should be working on it."*
>
> *There are lots of questions about what to do. Finally "Year 7 there appears to be a bit of confusion. To find the mean you add them all up and divide by number of data values, I said don't write down all the numbers, just add them up on your calculator."*

The researcher notes that this latest instruction not to write down all the numbers is at odds with the instruction to 'always show your working' which the students had been given towards the end of the previous week's lesson:

> *This is difficult as normally you have to show all your working.*
>
> *"For the mode you need to do a tally table and then use that for the median. That's why we're doing it in that order. Then say which is best to use. Okay, all get on with it, there shouldn't be so much talk."*

The field notes go on to reveal the researcher's emerging confusion about what seems to be a lack of understanding as compared to the previous week's understanding:

> *Talk continues, discussing the work and trying to do it together. Odd because some of them seem to find this hard but last week they all knew how to do the mode, mean and median.*
>
> *Chloe: "Is mode the most number?"*
> *MrsM: "Have a look in your text book or your book. You could have done that yourself without asking me."*

Odd question because Chloe knows what the mode is.

MrsM: "For question 2 a tally chart doesn't help, you need to use your own initiative with some of the questions and see what works best."
My observations lead me to think that using your initiative is not encouraged at school, it is a risky thing to do.

"Alex, sit up in your chair, you look like you're about to fall off."

"Everybody put their pens down, there're some common mistakes. The more difficult it is the more you need to concentrate, you knew what they were last week but you have to think about what the question is asking. This is about how often numbers come up when they throw dice."

Everybody seems to know less this week than last.

3.0 Interpreting the data: Learning in transition

The data show that the pupils in the classroom moved from a position of competence (demonstrated by their success in the SATs and their initial ability to explain and work with averages) to a position of hesitancy, where they demonstrated that they were unsure of what to do in response to the exercises set. They questioned their understanding of instructions, the procedure for performance and eventually their understanding of what defined averages. One interpretation might be that they had 'unlearned' the principles of averages. This would suggest that the internal representation of the information had in some way been wiped or reorganised such that the knowledge became inaccessible. It could be that the information had been forgotten, although this seems unlikely given the sustained engagement with averages during their primary school years and the previous week in secondary school.

Moreover research suggests that students who achieve advanced levels of performance in school are likely to retain this knowledge over many years (Conway, Cohen & Stanhope, 1992). A more complex interpretation would be that in fact there is not a direct or linear process between internal knowledge representation and the externalisation or performance of that knowledge. Instead there are factors which intervene and which serve to complicate learning and concomitant performance. Given this proposition, theory must account for the complexity of learning and move beyond straightforward transmission, internalisation and performance models.

The data were collected in the maths class, but must also be viewed in the context of the new school environment. That environment requires very different behaviours from the children's previous school environment, and there are a broader range of new subjects and classes which the children are negotiating in their transition. The wider ethnography of which the data presented here formed a part, revealed that different teachers required different behaviours in terms of behaviour in class, the use of stationery and the recording and presentation of homework, amongst a myriad other new rules. Moreover, the work of transition involves engagement with different pedagogic approaches and the negotiation of a range of new social relationships (Tobbell, 2003).

The maths lesson, then, is carried out not in isolation, but rather as part of a networked environment. Bronfenbrenner's (1999) ecological model provides a framework for operationalising this network. The children are in transition from one educational environment to another and so by definition they are experiencing multiple shifts in their relationships with people and objects. In ecological theory terms this can be represented by a shifting mesosystem. The mesosystem represents the connections between elements of the microsystem (that is the proximal relationships of the child). During transition, the mesosystem is in the process of reorganising in the face of new challenges. The principle of ecological theory argues that the development of the child is underpinned by the multiple interactions within their ecological systems which come together in non-predictable ways to construct experience. In the maths classroom the children are managing a relationship with a new teacher and with new peers. They are engaging with new objects and familiar objects, but using them in novel ways. But more than this, this process of relationship management and object engagement is reiterated throughout their school day.

Bronfenbrenner's underpinning principles for the theory argue that development happens as a result of sustained engagement which results in shifts in behaviour. Here, and more widely, the notion of development is represented as movement forward; actions become more complex as they are rehearsed and mastered. However, we would argue that depending on the experience, development is not just movement forward, but could also be change in the face of experience.

In the new school, pupils have learned that their former 'ways of doing' are not necessarily useful; from the seemingly trivial use of a writing implement (pens not pencils in secondary school maths books) to more complex behavioural repertoires in the classroom (judging when collaboration is acceptable, be it with a person or an object such as a calculator). As a result the children are experiencing new demands without the accompanying understanding of how to react properly to these demands. The recurring and multiple interactions experienced in the school day may result in inaction – manifested in this study by students' eventual hesitancy, insecurity and reluctance to participate.

In order to understand this more deeply, Lave & Wenger's (1991) notions of situated learning are useful. This perspective on learning argues that on entering a new community (here the new secondary school) students can be thought of as legitimate peripheral participants. They are faced with an established community which is constructed by a variety of practices of which they are unaware. The process of learning is underpinned by movement from legitimate peripheral participation to full participation, as they learn the new practices through repeated engagement with them. The major point here is that knowledge and performance are situated within the participatory acts. The maths lesson represents the proximal social context, and as such, demands certain practices in order to participate successfully. These practices are also situated in the larger social world of the new school, and all participation is embedded in the complexity of that new environment.

Situated theories of cognition argue that all practices and attendant participation in those practices are inextricably embedded in the contextual world and that "This world is socially constituted; objective forms and systems of activity, on the one hand, and agents' subjective and intersubjective understandings of them, on the other, mutually constitute both the world and its experienced forms." (Lave & Wenger, 1991, p51). In terms of the data above, this means that performance in the maths class represents the interaction of knowledge about averages with the children's increasing understanding of the different practices in the new school. Note from the data that the teacher rarely refers to the correctness or incorrectness of an answer written in the exercise books, but rather concentrates on the practices which envelop these (e.g. the use of pen rather than pencil; underlining the title; using a pencil to divide the page in half).

In their transition the new students have learned that the ways of behaving in primary school are no longer useful in secondary school, and many of them have fallen foul of the new school rules. As the weeks in the new school progress they have become increasingly uncertain about how they should act and so, to avoid getting in to trouble, they have started to check everything by questioning the teacher. It is not enough to react to that which is written down in the form of instructions, they need the reassurance of the teacher's voice to confirm their understanding because the teacher has ultimate power to praise and sanction.

MrsM's comment "The more difficult it is the more you need to concentrate, you knew what they were last week..." reveals an individualised interpretation of the students' performance: that with more effort they could apply their internalised knowledge and answer the questions. In fact, the students are indeed concentrating, they are striving to perform the maths exercises in the context of the all the new practices required. Given that all participation emerges from the interaction between the internalised and the externalised world which, when in transition, calls for the constant renegotiation of meaning, this performance is further complicated by wider negotiations of behaviour in the new school. Gresalfi, Martin, Hand and Greeno (2009) have argued previously that mathematics competence might more properly be viewed thus: "...constructed in classroom interaction ... episodes of activity are distributed between the task, teacher and students." (p67). We would argue further (with due reference given to ecological models of behaviour which account for proximal and more distal influences) that classroom interaction is further constructed by the wider experiences of legitimate peripheral participants in the entirety of their new socio-cultural world.

4.0 Implications for the classroom

We would fully acknowledge that an understanding of mathematical performance requires exploration of more minute behaviour (for example see Howe, Nunes and Bryant's (2011) work on rational number and proportional reasoning; Gray, Loud and Sokolowski's (2009) analysis of students' use and interpretation of variables in calculus, and Skoumpourdi's (2010) work on use of the number line in approaching mathematical tasks). However, we would argue that all performance must be understood in terms of the proximal and distal contexts in which it takes place. It is insufficient to focus on the activity without placing it in its wider context.

We would further argue that this becomes particularly relevant during periods of educational transition and the concomitant shifts in micro and mesosystems which impact on individual identity and mediate performance.

Of course this presents additional challenges to the teacher who is faced with the demands of delivering the curriculum in a limited time frame to a disparate set of students. It is easy to see that a teacher may become irritated by constant questions in the face of what appeared to be clear instructions, and confusion in the face of apparent inability where there was once ability. Moreover, teacher behaviour must be understood in terms of macrosystems which privilege the transmission model and intra-individual understandings of learning which construct their behaviour (Smail, 2005).

However, as outlined in section 1.0 a range of research has argued that in transition between schools performance is impaired and we would suggest that the socio-cultural interpretations of learning outlined above provide a useful framework for understanding why this might be the case. Given this, it becomes incumbent upon the teacher to account for the wider worlds of the students in transition and to understand that performance is a result of person – activity - context interactions. Despite this, there is very little research which actually examines the interaction of context and individual learning and performance in order to assist teachers in pedagogic approaches to transition.

From the data above it would seem that attention needs to be given to the constant negotiations of new meanings in which students are engaged and allowances made for these and perhaps focused assistance provided in the acquisition of and participation in new practices. The ethnographic data from which this paper emerged suggest that most students do learn the new practices, but that the focus of learning during transition periods is located in practice because it is this which is emphasised in the new school. Knowledge may be constructed by the students as taking a secondary role because any previous learning must now be renegotiated to conform to new demands. Whilst it is understandable that each institution would form and promulgate their own set of practices, it may be that an examination of the number and nature of these might serve to facilitate participation and so learning during transition.

5.0 Conclusion

In this paper we have used observational data from a wider ethnography of transition from primary to secondary school in a UK school to demonstrate that performance is embedded in wider practices and that these practices influence students' participation in learning. We have argued that learning cannot be fully understood by intra-individual models which propose largely unproblematic processes of acquisition, assimilation and performance. Rather, we argue that all knowledge is situated in proximal and distal contexts, the practices of which interact to construct student participation. The importance of this understanding is particularly salient at times of transition, and the very nature of transition involves the negotiation of multiple changes. We have suggested that socio-cultural understandings of learning would require and facilitate shifts in teaching practice to enable participation and so allow for optimum student performance.

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