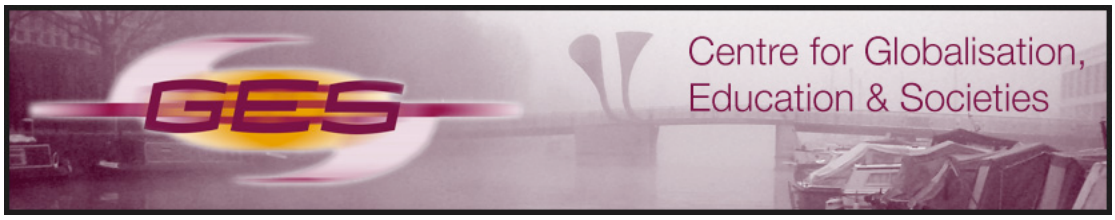

The **Centre for Globalisation, Education and Societies** is based at the University of Bristol and is coordinated by **Professor Susan L. Robertson**.

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'ICT in the Classroom: The Pedagogical Challenge of Respatialisation and Reregulation'

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Introduction

In 1992 a Committee of Scottish University Principals published a report entitled: *Teaching and Learning in an Expanded Higher Education System*. What was remarkable about the report was not its content, which merely presaged the current demand for greater technological support for learning, but its front cover. On it, neatly arranged, are three photographs. At the top is an old sepia coloured photograph from the beginning of the Twentieth Century of three male students working in a chemistry laboratory. Their relaxed, patrician poses combined with the uncluttered, almost leisurely surroundings, indicate a learning space characterised by timeless thought. The second picture is again in black and white and shows two students seated together at a desk taking notes. Alongside and behind lay rows of similar students listening intently to the lecturer all engaged in an act of mass transmission. Although dating from the 1970s, the photograph would not seem out of place today, apart from a slight change in technology and fashion. The third photograph is perhaps the most revealing. It is in colour and at the front sits a female student facing a colour computer screen on which appears to a technical graphic. In the background are three other mixed groups of students all conferring around more terminals. The atmosphere conjured up is one of high technology learning, where the confines of space are no longer a barrier to particular pedagogical practices. What links these photographs together is that they all represent the changing and yet overlapping face of educational, pedagogical and organisational change with the 'technology' being connected intimately to differing social and spatial arrangements.

This glimpse across time not only gives us a sense of a narrative of continuity, but also helps to look specifically at notions of space and their connections to particular forms of pedagogy and learning. In recent years the concept of space has come to figure prominently in debates surrounding the relationship between modernity, post modernity and globalisation (Harvey, 1982, 1989; Lefebvre, 1991, Castells, 1996). This is propelled by the emerging research and theorising on digital technologies, and the associated arguments around the way in which the new technologies overcome and annihilate time/ space boundaries. One consequence of this is to focus attention on space and time as both socially constructed and politically contested; as particular types of arrangements of interests that become fixed in institutions and social relations, later set into motion by the forces of change (see Brenner, 1999).

In this chapter we connect conceptions of space and time with current educational change. Specifically we are concerned with posing the questions of whether and in what ways, and with what consequences, the new digital modes of learning—with their particular spatial and temporal features and capabilities—destabilise and decentre the existing 'orderings' of classroom practices and alter the conditions for pupil and teacher learning? These questions have arisen for us in a research project we are engaged in on new technologies and learning—an ESRC/TLRP funded project *InterActive Education: Teaching and Learning in the Information Age*. In this project, when we have returned to view the video data and review the teacher and pupil interviews, we have been continually struck by the complex ways in which the new digital technologies seem to have larger effects on the learning environment which, in turn, seem to alter what it is that pupils and teachers are doing and learning in classrooms.

We can see this type of dynamic in the many of the cases of the teachers we have been working with in our study. While we will report in greater length on three of them later in

the chapter, for the moment, some of the data collected in those lessons reveals the importance of thinking about the spatial and temporal elements of classroom routines which are, at the same time, bound up with and carry wider and competing and resisting discourses about what is to be learned. In these lessons we see, to different degrees, the teachers particularly conscious of how changes in the space where teaching occurs, as well as challenges arising with the often unforeseen and unanticipated technical demands of computers, can combine to rupture the flow of pedagogic discourse. It is as if these dimensions weigh in on their classrooms so that they are unable to take the order and ordering of classroom life for granted. In one of the cases the disruptions to the ebb and flow of classroom life lead Adrian to the point where he abandons his confidence as a teacher and his claim on the pupils' time. In such stories it is not easy to factor out the specific ICT dimensions from a mesh of overlapping contexts, but with over 50 teachers in focus in this project it is evident that these three case studies carry threads found across the project, whilst also being very much their own 'text' and unique configuration. The point to be made here is that what these teachers are trying to cope with is the challenges posed by new technologies, as pedagogical devices, when they enter pedagogical sites.

Some of this disruption relates to the specific properties and path dependencies of ICT as it is manifest in pedagogical spaces. Some of it relates to the competing discourses or 'force fields' which operate in the context for the classroom practices. Once examined these pressures seem to show that the addition of ICT into a learning environment cannot be understood by explanations that suggest we have a person plus a tool, as in Perkins idea of 'person-plus'. Rather, our work suggests that ICT seems to rupture more fundamental arrangements and as a result changes the relationships and relations these dimensions carry.

Linking Classroom Life to Social Structures and Wider Cultural Practices

In order to understand these kinds of interaction better, we needed a way we could 'see' not only the evident activity or pedagogical moves (Adelman, 1988) in the classroom, but a means by which we might look at the not-so-visible 'force fields' in operation *in and on* those spaces which interact with ICT and produce effects. These force fields are the contextual factors underpinning and constraining the observable features of the lesson: for example, the official curriculum, teachers' pedagogical knowledge/practices, pupil knowledge and expectations, wider society's ideas about how learning occurs, and so on. In one sense, the introduction of ICT into classroom life provides a vehicle for that purpose; in disrupting and destabilising the social order of classroom life, it makes evident practices that had long become commonsense and naturalised. In another sense it pushes us to understand what it is about ICT as a cultural tool that is potentially disruptive and destabilising.

We use pedagogy in its broadest of senses, to mean '…the performance of teaching together with the theories, beliefs and policies and controversies that inform and shape it' (Alexander, 2000: 540). Further:

> '…pedagogy contains both teaching as defined there and its contingent discourses about the character of culture, the purposes of education, the nature of childhood and learning and the structure of knowledge. These discourses bear on and are

> manifested in the various aspects of teaching which I have identified: space, pupil organization, time, routine, rule, ritual, task, activity, interaction, judgement - and of course curriculum' (Alexander, 2000: 541).

In other words, pedagogy is concerned both with the act of teaching and the various devices, routines and patternings in particular environments through which we learn. As we have argued elsewhere (see Robertson and Shortis, 2003), pedagogy can be viewed as a **cultural relay** (Bernstein, 1996) governed by particular regulative structures and practices that take place **in** and **through** the way elements like space, time and discourse, work together to regulate social life. As we have also noted, following Bernstein, the relay and relayed are not neutral; that is '…neither set of rules is ideologically free' (Bernstein, 1996: 41). Rather, particular 'rules' act selectively (to restrict or enhance) the meaning potentials and thus what is available to be realised and pedagogized.

Adapting Bernstein's model: re-contentextualising fields

There are several key ideas from Bernstein that are important to our argument and which we will now elaborate; these relate to pedagogic discourse and pedagogic devices. Bernstein introduces the idea of *pedagogic discourse* to refer to the discourse that regulates specific contexts, such as the formal learning environments we are concerned with, or on-line learning activities via the Internet. This discourse 'arises out of the action of a group of specialised agents operating in a specialised setting in terms of the interests (often competing interests) of the setting' (1996: 116). An example here might be the way in which teachers of Mathematics produce a pedagogic discourse about mathematics teaching and learning—producing what we might otherwise recognize as a subject culture. Their power arises from their claims to expert knowledge around mathematics, as well as processes of teaching and learning.

By contrast, a pedagogic device (for example a computer; the organization of space, a timetable) is the structure that carries the pedagogic discourse; it is a 'symbolic ruler, ruling consciousness in the sense of having powers over it, and ruling in the sense of measuring the legitimacy of the realizations of consciousness' (Bernstein, 1996: 117). Thus, while the pedagogic discourse is the message that is relayed, the pedagogic device is the relay, with its own rules (1996: 117). which underlie the context for the production and reproduction of pedagogic discourse. We see a computer as both a cultural tool and a pedagogic device in that capability potential is not only technical but shaped by ideas and interests which set conditions around the rules for realization.

We have been concerned to develop a theoretical model which enables us to place the intensely competing pressures we have noticed in teacher and student work with ICT. In seeking to do this we have adapted and developed Bernstein's framework of recontextualising fields. For Bernstein,

> Recontextualising rules regulate the work of specialists in the recontextualising field who construct the 'what' and 'how' of pedagogic discourse. Pedagogic discourse is, then, less a discourse and more a principle for appropriating discourses from the

> field of production, and subordinating them to a different principle of organisation and relation. In this process, the original discourse passes through ideological screens as it becomes a new form of pedagogic discourse (Bernstein, 1996: 117).

Bernstein identifies two fields at work; the 'official recontextualising field' (ORF)– created and dominated by the state for the construction and surveillance of state pedagogic discourse, and the 'pedagogic recontextualising field' (PRF) consisting of teachers, trainers of teachers, writers of textbooks, specialised media and their authors (op. Cit: 118). As he observes, these fields may well have a range of ideological pedagogical positions which struggle for control over the field, and indeed these two fields may well be opposed to each other.

In reflecting on our data, we believe that the decentering and destablising of classroom life as a result of using ICT reveals two other fields (see figure 1). The first of these we have labeled the opposing recontextualising field (ORF). Teachers are well aware of the way pupils in classrooms bring with them alternative ideas and practices; to the extent that such knowledge competes with the official knowledge and power of the pedagogic recontextualising field. We might see this competing field of power take the form of disrupting, disturbing, opposing, resisting and appropriating behaviours by pupils (see Willis, 1977; Connell et al, 1982) in an antagonism of strategy (Foucault, 1999). Student's use of ICT in out of school settings and the knowledge and power they gain from these experiences, gives them considerable power and control in opening up the space for contesting and resisting dominance of the alternative recontextualising fields at play in the classroom.

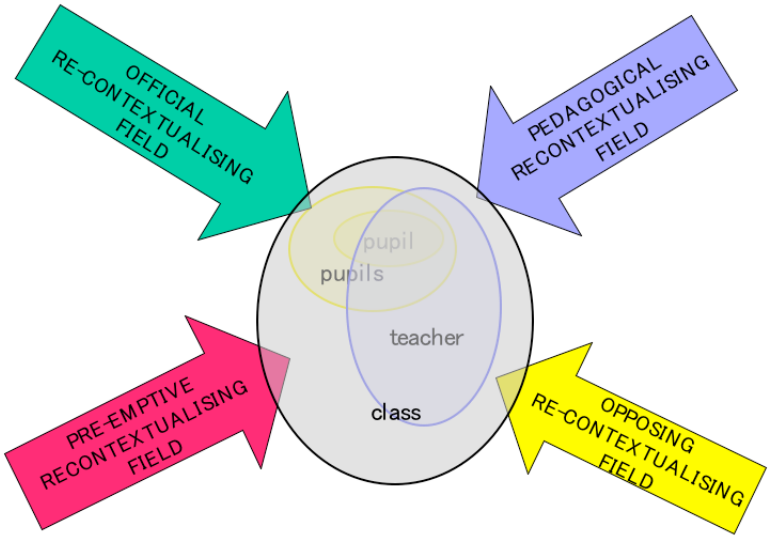

Figure 1. ICT and recontextualising fields.

The second additional recontextualising field we believe operates in formal classrooms—what we have called the pre(emptive) contextualising field (PrERF)—concerns a way of recognsing the interests and voices of the software and hardware developers and the IT

industry- many of whom are well attuned to the world of young people and their multi-modal and multi-sensoried world (see Gee et al, 1996). An earlier example of this field is reflected in the work of Apple (1982) and his analysis of reading schemes and the interests of the corporate world.

While our interest is in ICT and learning, clearly each of the four recontextualising fields we have been working with here have the potential to carry a range of other discourses which, in turn, may compete, or be contradictory. For example, within the official recontextualising field, while there is considerable weight given to the potential of digital technologies to transform learning, there are few, if any, clues as to how—pedagogically- this might come about. Typically teachers bring ICT into the classroom with beliefs that come from the official re-contextualising field: ICT will "transform" the learning although the precise nature of that change process is undefined. This makes it a weak discourse in that it can be colonized and moulded by other competing fields, including the pedagogical recontextualising field dominated by teachers and their professional and curriculum related interests, or the opposing recontextualising field dominated by pupils in classrooms. For example the potential capabilities of the ICT may be subsumed by the traditional manner of presenting the subject curriculum. Alternatively a lesson focused on written text production as part of the National Literacy Strategy may become diffused by non-linguistic performances in other ways of meaning –making as pupils bring in their understanding of visual design and kinesthetic, multi-modal communication acquired on the games console, from television or from other media beyond the school gates. So we have seen teachers become frustrated as pupils give their attention to issues of font choice, colour and size, one even labeling this ubiquitous practice as "obsessive compulsive font disorder."

We suggest that ICT functions to disrupt the repeated norms of classroom life. By using Bernstein's (1996) concept of 'competing re-contextualising fields'; fields, we note whose modalities will reflect changes in context (time, space, discourse). Bernstein's theories on recontextualising fields also enables us to examine the way in which the subject as paradigm and the subject as pedagogy interact to form aspects of these discourses. In terms of the former, the creation of school subjects relies on a re-contextualisation of academic disciplines, thus creating a pedagogic discourse (Bernstein, 1996). This discourse is made up of two types – instructional and regulative – although the latter tends to dominate classroom relations. This pedagogic discourse is in turn influenced by the official re-contextualising field, which represents various state sponsored, policy driven initiatives, while the pedagogical re-contextualising field is made up of professional and curriculum related initiatives. Despite generations of curricular reform, the purpose of teaching, regardless of espoused intention, is to work within the enclosed meanings of the regulative discourse. What emerges therefore, is a situation where the learner's task is to extract and re-present a singular canonical meaning with the teacher acting as the authoritative verifier of its accuracy.

Classroom re-spatialising through ICT resonates with moves away from fixed institutional based spaces of teaching to more open-ended unbounded terrains of learning. By opening up spaces between the outside (the mode of address) and the inside (pupil's cognition) teachers might begin to recognise that the curriculum, pedagogy and learning are un-decidable, un-predicable, and ultimately un-prescribable. In doing this it has the potential capability to transform learning by altering the nature of what counts as learning. Thus, in

helping pupils to engage with a 'new voice' – the technology – teachers might be able to re-introduce into classroom the differences, refusals, and discontinuities that congruence theories try to eradicate.

In summary, the new digital modes of learning carry their own technical-regulative and instructional-pedagogic discourses (following Bernstein, 1996): both react to and challenge the pedagogic models within the classroom, changing the conditions for the production of pedagogic identities for both teachers and pupils. These identities are neither stable nor unified but emerge out of the competing discourses located in the four "force fields " underpinning classroom activity. The configuration of these pressures constrains the nature of the learning that can take place and almost inevitably disrupts the routines established over many years in classrooms without digital technologies. Yet the strong but weakly defined official regulative discourse around ICT espouses a technologically deterministic model of transformed learning which marginalizes the contextual factors actually in play.

Teachers' Stories: ICT transforming Learning?

We can see this in the case study of Adrian's *Subject Design Initiative* [1] which illustrates some of the effects of ICT on a teacher's established pedagogical methods. It is a story which shows the underlying tensions beneath uncomplicated images of a student staring at a computer screen graphics in a mode of autodidactic enquiry. One issue effaced from such imagery of ICT is the precise role of the teacher, particularly in the context of whole class teaching. Our data shows teachers operating in complex and contested contexts of conflicting institutional and pedagogic demands. For example, Adrian's experiment with using ICT in his history classroom came in part from the institutional-level pressures to incorporate ICT in his teaching. Such requirements are common in English schools but are intensified in this example. Adrian is working in an Education Action Zone (EAZ), a school in an area subject to a special government programme of support to raise educational attainment. The EAZ approach typifies current UK government policy in which use of ICT is associated with 'driving up standards'. As an EAZ teacher he will have been given a laptop computer and will have experienced school professional development days in which ICT is foregrounded as an essential administrative and pedagogical tool. This official discourse is in tension with Adrian's experience and point of view which cause him to doubt that using ICT makes a significant difference to the quality of the pupils' work beyond improving their presentation.

Another important factor behind Adrian's SDI was that he asked all his GCSE students to complete their coursework using a computer, without really being able to justify this pedagogically to himself. He admitted he did this because he couldn't "stand reading their handwriting", but also wondered what impact word processing the work might have on the quality of the students' historical writing. So Adrian planned a series of lessons with two parallel year 10 classes relating to their study of America in the 1920s and 1930s. He taught the main events of the Prohibition era before setting up a historical sources exercise in order to develop skills needed for both their coursework and the coming year's public

[1] Subject design Initiative is a short intervention in which a teacher works with university support to plan a short programme of study in which ICT is used to enhance the learning of a particular aspect of subject knowledge. See Sutherland, R. ()

examinations. One group undertook the source analysis exercise in a computer room, the other in Adrian's classroom.

Using ICT in a whole class situation appeared to disrupt Adrian's general disposition and pedagogical routines. Whilst in his History classroom, Adrian appeared relaxed and focused on scaffolding the pupils' learning so they would be able to effectively tackle the source-based questions. Once in the computer room his focus shifted away from the History subject discourse to an ICT technical discourse concerned primarily with procedures required to carry out the activity, such as how to access the relevant files on the computer. This was evident from the start. One boy entering the computer room asked Adrian for the expected aim for the lesson. As a pupil in this class he was used to seeing a clear subject - focused learning objective on the whiteboard. However the board was filled with instructions about the 'B' drive and accessing files from it rather than stating Adrian's main learning outcome.

The ICT technical-pedagogic space had supplanted that of the subject discourse. In the History classroom, Adrian sat behind his desk and launched the lesson by spending eight minutes reading through two sources, discussing their content, and framing possible ways of answering the first question. In doing this he was modelling History discipline processes by demonstrating them and so providing a collective focus of attention for the group. In the computer room only three minutes were spent giving a general summary of the Prohibition era and the nature of the task today before the pupils were sent off to independently access the sources, read them, and decide for themselves how best to approach the first question. In the words of the researcher who recorded the lessons "to an observer watching the tapes of these lessons without knowing any of the context, it might appear that the pupils were being introduced to completely different activities."

Looking at the data, it is not a simple matter to separate out the factors accounting for the differences described: the issues are often contextual rather than materially visible and not all of the issues related to ICT-intrinsic effects. One factor might be Adrian's lack of confidence in using the school's computer network and his lack of trust in its reliability. During some previous research, Adrian had concluded a lesson where the computer hardware had let him down, with a frustrated comment to camera, 'And that's why I never use computers in my lessons, and why I'm never going to do so again'. Such evidence of frustration has been a common report in our video data, questionnaires and interviews.

This lack of ICT experience also leads to the situation in which Adrian entered into a more complex asymmetric relationship of authority with his students. He retained his superior expertise in subject and pedagogic discourse but it is clear that the pupils knew more than he did about the technology. He began his sequence of instructions to open the files, 'If I use the words 'B' drive does that mean anything to you?' Every pupil was familiar with it, and they also knew what Adrian didn't, that it was a 'Read-only' drive. When that problem arose Adrian was unsure what to do, until one of the pupils showed him how to save the file into their own work space on a different drive. The same happened using the software. Some of the pupils knew how to create boxes in Word to copy and paste picture sources and where the 'Word Count' command could be found which Adrian did not. The researcher observed, "Adrian has good subject knowledge and is a capable classroom manager but his pedagogical skills were less in evidence within the computer room."

Other factors relate to the quality of the learning environment and the difference between an established 'subject base' and an ICT 'shared facility' such as a computer room. For Adrian this dispositional aspect is reflected in asides to the class. On one occasion he apologised about the computer room: 'Sorry about this room. It's a complete nightmare'. On another he revealingly talks about 'going home to room 24' (his regular classroom) for the next lesson.

The different environments in each room may have contributed to this sense of a 'home' of routines and an 'away' of 'nightmare'. Adrian's subject base classroom is set out in a very traditional style. The sixteen pupils' desks are arranged in a four by four formation, so that every pair of pupils is isolated in front, behind, and to each side, facing the front where Adrian has his whiteboard, his desk and his teaching space. The walls are painted a warm yellow, and are decorated with a combination of pupil's work and familiar World War I propaganda posters. The room has a high ceiling and plenty of natural light. In contrast the computer room had workstations around the edge of the room, four rows of tables in the middle, and limited space at the front for the teacher behind a row of the pupils' tables. The room was painted a blue, had one small window, and the low ceiling was supported by four metal pillars which made it impossible for Adrian to stand at the front and see all of the pupils. In one case the room is an established designed space for pedagogy: in the other a converted space appropriated for a 'facility'

Perhaps Adrian's unease also came from the fact that he is only in his second year as a qualified teacher but already has responsibilities as the sole history teacher in the school, running the department, and being accountable for the GCSE results. He is under pressure to perform: raising student attainment in improved examination results is an insistent and explicit focus of the EAZ intervention. He is also under pressure to be seen to be using ICT in his teaching. Yet his own experiences about ICT lead him to believe that it has little to offer pupils in their study of history or in their success in public examinations.

A further factor is the tenuous connection between using computers for History teaching and the methods by which students perform well in public examinations in History. It is not clear how the additional capabilities available from writing up notes in Microsoft Word will impact on the ideational learning involved in evaluating sources. As it turns out, Adrian is pleased to see that the ICT work has been more than a matter of presentation. In his debrief he commented, "You can see them organising their work a little better. I think I might book some lessons for coursework next year just to help them organise their information". The students using a Word Processor have developed the structure of the ideas by adding to the word processed draft and the work is better focused and more extensively developed than that of their peers' handwritten responses. Word processing seems to have enabled some 'deep editing' of structure as well as 'surface editing' (Snyder, 2002).

Returning to our data we can see many points of similarity and contrast between the teachers on the project. Gary has a very different profile of expertise to Adrian. He is a Further Education College lecturer with over fifteen years experience of teaching Advanced Level English Language. He is not primarily concerned with results and his commitment as an English Language teacher stems from a clear vision about the social value of his subject discipline and its perceived transformative capability for students' lives. He is also a

confident and resourceful user of ICT: his work detailed below using the Oxford English Dictionary is audacious in scope and was one of three innovative ICT-based initiatives he piloted in a year and shared on a teachers' e-mail list.

The assignment consisted of students checking on a word or meaning they thought was undergoing change by looking it up in the Oxford English Dictionary. The word was then checked against a search of its use in context in an online newspaper database (Infotrac). The students then built an electronic archive of these searches and wrote a mediating commentary to explain what they found. It is an activity which would have been impossible or very difficult before ICTs and the web. The method follows research carried out by Jean Aitchison in the early 1990s reported in 1993 and summarised in a textbook in 2001.

The activity he designed calls upon much more complex potential capabilities of ICT than Adrian's and shows how ICT can expand the learners' potential access to knowledge pools and to electronically assisted search methods which can link previously disparate sources. It also enables learners to develop a more critical and interactive relationship with an authoritative source – the formidable OED. Students can test the dictionary against the evidence of language in use and can see that even this monumental dictionary does not give coverage of things they can prove to exist.

However, like Adrian, the particular impetus for the Subject Design Initiative came from an institutional pressure to integrate ICT with learning. There was a compulsory requirement in Gary's college that all teachers 'delivered' a 'Key Skills' ICT assignment to all their students in all their classes. This institutional demand in turn mirrored a pressure from central government to integrate ICT and subject learning and took the form of a funding incentive. The college was permitted to claim additional units of funding for the same quantity of teaching time. The management obligation gave Gary permission to invest resources of planning time, energy and teaching time for the required innovation.

This dual funding model foregrounds the kind of double discourse of ICT and subject discourse we have seen in Adrian's case. In subject culture terms, Gary's assignment is focused on students learning about and experiencing the processes by which new words come to be seen as being 'in the language.' This process of "lexical diffusion" is an important aspect of the study of contemporary language change and is a frequent examination essay question. ICT gives students opportunities to track new words as they come into the written language and so achieve exemplified understanding of processes which they would otherwise have to take on trust from secondary sources. From the ICT/Key Skills perspective the assignment is an opportunity to promote and test a series of ICT 'competencies' including types of searches, text handling and screen dumps.

In practice, observations of the teaching sessions echoed the same dual preoccupation, or 'double discourse': on the one hand, a concern with pedagogic issues of how to help students learn about language change, on the other, the giving of technically-focused instructions to ensure students were able to use the technology to carry out the task in the prescribed manner necessary for Key Skills accreditation. For example in the lesson which followed the ICT sessions, the balance of these comments was weighted towards the giving of technical advice to ensure students were familiar with 'screen dumps". Without the

required number of screen dumps and related electronic searches the assignment would not qualify for Key Skills accreditation.

The way Gary went about preparing his students for their work in the ICT room shows a number of anticipatory strategies which stem from a caution about using technology and a mistrust of its unreliability in classroom settings. On one occasion when the technology broke down Gary had an alternative paper-based lesson and quickly switched to this. The mistrust also seems to extend to a loss of control of the instructional subject discourse once the students are engaged individually with the ICT processes. With the OED assignment, before even going into the ICT room, Gary had taught them the academic theory behind how words enter the language and how this can be traced. After the ICT sessions he spent a full lesson with each group showing them the learning that should have occurred when in the ICT room. This took the form of modelling a good answer on paper and returning students' draft assignments with comments for re-submission. The students' work with computers was structured and guided throughout by detailed worksheets and examples of practice.

Again, once in the ICT room there is a disruption of the teacher's usual routines for teaching and learning. Characteristically Gary's lessons take the form of teacher-led discussions around texts and there is considerable instructional and regulative input from Gary in order to maintain and develop the discussion about a particular focus. Once in the ICT room Gary gave a brief introductory reminder of the purpose of the session and key details of technical advice. After that the students worked individually or in pairs until the end of the lesson. They used the paper handouts provided by Gary to guide them. The video shows twenty-three simultaneous investigations into different words with a high level of student absorption in the activity, markedly varied progress with the task and also a degree of low level distraction as students hunt for taboo words, use their mobile phones or gossip. It is interesting to compare this class with another when difficulties in getting access to the ICT room led to the same activity with all the class focused on one common enquiry on a laptop computer with a data projector. There the students' choice was more constrained but there were more opportunities for extended discussion around a common experience.

During the ICT session Gary's teaching role changed from planned instruction to needs-based facilitation. He shepherded the twenty–three simultaneous learner investigations by rota on a one-to-one basis by moving around the room coaxing, cajoling, asking and answering questions. Again these questions can be grouped into two domains: technically focused Key Skills questions about how to carry out a procedure and subject domain questions about language change. The video record shows that the students initiated questions about technology whilst the teacher initiated more questions about the pedagogic Language Change issues. So one student stares at an OED definition of a word, 'knobber' which is identical in form to a local dialect word. She is unable to understand the dictionary definition (a type of horse, and not a type of insult or the end of a loaf) until this is explained. Another is flummoxed that citations for 'spliff' and 'joint' go back to the 30s and 40s; he had imagined that these were 60s words. Conversely, the open nature of the learning allows students opportunities to share expertise: one student is able to use his out of college experience to explain that 'chuddies' (as in 'Eat my chuddies', an allusion to Bart Simpson's 'Eat my shorts') must come from Punjabi rather than Urdu as the latter is a dialect preserved for formal use.

After the event Gary's reflections suggest a mixed response to the experiment. On the one hand the assignment had gone very successfully and with a high completion rate by the standards of the college Key Skills assignment initiative. The success had been 'celebrated' by Gary's managers and by the academic board. Gary remained dubious about the time spent on the activity and the way this has interfered with his curriculum delivery of English Language. It has taken three times as long as anticipated and the auditing of evidence of ICT procedures in the assignments has predominated over the subject discourse feedback.

Like Adrian, Dave is a recently trained teacher with a History discipline background and his place on the project originally came from school pressure to be associated with research and development with ICT. As a Primary Teacher he seems to have undergone a more intensively directed training programme including familiarization with the National Literacy Strategy. Dave is an ICT enthusiast and his interest in school uses of ICT began as a way of thinking about it as providing a 'Wow! Factor' (his words). Use of ICT would make teaching and learning more exciting because it would offer multi-modal and kinaesthetic dimensions to a topic students could find boring. By making spelling more exciting students would learn to spell better.

Dave's ICT initiative originated in a concern to improve the spelling accuracy of his pupils and so improve their Standard Attainment Test Scores at Key Stage 2. It was very much a focus in alignment with the official discourse about the use of ICT to "drive up standards." His actual use of ICT turned out to be more problematic as the particular software application used challenged some of his assumptions and the language paradigm of his postgraduate professional training. It was a move from a form focused approach primarily concerned with Standard English to a forms, functions and meanings model (Wells) which encompassed non-standard forms (Carter). Dave worked in a school renowned for the excellence of its phonics-based teaching of reading but noticed that spelling did not improve commensurately in the Key Stage 2 tests. One reason for this may have been that the more complex vocabulary encountered in Key Stage 2 does not follow regular English sound spelling correspondences of Key Stage 1 because more sophisticated spelling relates to semantics, morphology and etymology rather than to phonological and graphological relationships.

The software used by Dave, WordRoot, creates a multi-modal, kinaesthetic verbal environment allowing children to explore the word formation relationships of one hundred words with classical loan word origins. For example, 'scope' is attributed to its Greek origin and the user can play with words ending in 'scope' and see the patterned relationship between word formation and meaning. ICT allows a very quick way of learning about and testing the rule governed semantic principles underlying this type of vocabulary.

In effect the software disrupted the teacher's form-focused, phonics-based paradigm of language and allowed him to see that the spelling of words has historical and cultural dimensions. As such, spelling became a key to language awareness study of a type amenable to investigation and discussion, as well as to clever memorisation techniques. Similarly for the pupils at this phonics-focused school, Wordroot helped them to see logical principles underlying some of the words which are irregular from a simple phonics basis.

One of the interesting features of Dave's work was the way he used classroom management techniques to bridge between individually focused ICT study and group and individual pen and paper work. He anticipated the disruption of space/time by disrupting his peadagogic routines. This started because of limited access to ICT but the reourcefulness of the teacher moved the learning out of the traditional space/time/collective focus configurations of the lessons seen in Gary and Adrian's work.. The SDI started with pairs of students studying Wordroot on stand-alone PCs at the back of the classroom while their peers read or worked on other activities. Collective focus was arranged by the activity being based on a rota. This in-the-background learning was brought together later when the class reverse-engineered the principles of Wordroot by building a full-length wall display of loan word etymology and morphology with a cycle of investigative activities. The graphics and jigsaw approach to words reflected the graphics of the ICT application. This mixture of ICT and pencil and paper work went electronic again in a later development when the pupils asked the teacher if they could simulate the WordRoot application by making a similar series of Powerpoint slides about words.

This later development took place in the ICT suite and shows some of the patterns seen in Gary's work and especially the role of the teacher as technical instructor and pedagogical facilitator. The pupils worked alone or in pairs on individual tasks, in this case building a multi-modal hypertext account of the spelling of a single word including voice clips and graphics. Again, in common with Gary's work, the demands on the potential capabilities of the technology are more extensive than the kinds of demands made by Andy in his History lessons.

As in Gary's work, the students stop functioning just as subject discourse learners and become apprentice "knowledge workers" contributing to a malleable informational artefact. In contrast to Gary's apprentice lexicographers, Dave's pupils function as workers on an edutainment CD ROM. In carrying out this activity they are able to express their home consumer experiences of computer games, software and related media. One 47 minute video observation of a single pupil, Paul, shows him fully engaged by his individual task with only three minor interventions from the teacher and a similar number from other students. Paul is very much pre-occupied with design decisions relating to choices of graphic, font, colour and sound clip. The sequence of choices he makes on screen relates to design and semiotics rather than to words and spellings. In a sense he has moved outside the subject discourse of English spelling and is working as a designer in a team constructing an aspect of a learning tool. As a pupil he is in a different division of labour from the individual student with an exercise book at her desk: the full value of his work will only be available when the teacher stitches up his word pages with those of his Classmates into a CD-Rom about spelling. The CD is also unusual in mixing the teacher's devices for learning spelling with the learners' contributed pages in a co-constructed text. It is interesting to note that the outcome is an artefact as distinct from a piece of writing. It has electronic materiality and semiotic design as well as linguistic text. All this is an outcome with little gross connection with the original intention to use ICT to improve public exam spelling test scores.

Patterns of congruence and discontinuity in the configuration of force fields

So looking at these three case studies we can see patterns of congruence and also marked differences in the balance of force fields applying to pedagogy and ICT. It is the configuration of strengths in these fields, rather than any intrinsic generic or specific property of ICT, that determines the nature of the recontextualisations, and through that the kind of learning which can occur.

There is uniformity across these UK sites in the institutional-level pressure to make use of ICT: the weakly defined but powerfully felt official discourse which presents ICT as an unproblematic "turbo" which will add to the learning. This local pressure bears the imprint of an official discourse at national level and above.

Looking now at the teachers recontextualising field, the presence of ICT appears to disrupt pedagogical routines . In all cases it presents as a doubled layer of complexity as the teacher works with the re-contextualised subject discourse and also with an ICT procedure discourse. ICT in education is not homogeneous and our teachers and their chosen ICT artifacts make very different demands in terms of potential capabilities: Adrian's students are using a word processing application primarily as a typwriter with a memory. Issues of multi-modality and knowledge pools do not apply. In testing the lexicography of the Oxford English Dictionary against the newspaper database, Gary's students are using deeper more complex dimensions of potential capability to construct new knowledge: the students are not so much studying lexicography as doing lexicography. Dan's students do a number of different ICT related activities including working on creating their own multi-modal artefact as designers. In all cases the kind of learning which is being enabled is in tension with the accreditation system which has little direct space for testing activities carried out with digital technologies. This conflict between the exhortation to use ICT and its perceived tenuous relevance to pencil and paper tests is an awkward contradiction for many of our teachers.

This analysis has highlighted the underlying structural dimensions that define the terrain of the classroom. The contested spaces between the official discourse of policy and curriculum, the regulative and instructional discourses of the teachers re-contextualisation in the classroom, the values, ideologies and potential capabilities embedded in the ICT and the interests and aptitudes that pupils bring to bear on their learning activities as a result of their other experiences, including those off the school site. We have found that ICT consistently destabilizes the established routines of classroom life including norms of time and space. This is at its clearest in those contexts where the learning activity leads to the absence of a collective focus of attention in real time: the typical experience in ICT suites.

The addition of ICTs to learning in educational settings is inevitably problematic. The new digital modes of learning destabilise and decentre the existing 'orderings' of classroom practices and alter the conditions for pupil and teacher learning more than can be seen in marketised photographs of students staring longingly into screens in self directed learning, or indeed than is apparent in the surface detail of our own extensive collection of digital video of students using computers in lessons.

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