Mobile phones for learning in mainstream schooling: resistance and change

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ABSTRACT
This paper, based on empirical research, considers how structure and agency together reproduce the social practices surrounding mobile phone use in secondary schools in the United Kingdom. Many schools have policies banning their use in class, reflecting and supporting the dominant social construction of mobile phones as tools for social use, but not for learning. This study aimed to understand how mobile phones could support learning in secondary schools, and identified activities across many subject areas and year levels. It also showed that hands-on experience had a positive effect on students' attitudes to mobile phones for learning in school. The results indicated that decisions on ownership of devices and technical issues in integrating mobile phones with networks and virtual learning environments are important considerations for schools wishing to use mobile phones for learning. It concluded that teachers have a great deal of agency, and that they display this by innovating or resisting change.

Keywords
Mobile phones, secondary school, social theory, culture, structure, agency

INTRODUCTION
By the time they reach secondary school, 91% of 12 year olds in the UK have a mobile phone (LSE, 2006). Nowadays these devices often provide clock, calendar, games, music player, Bluetooth connection, internet access, and high-quality camera functions in addition to voice calls and short messaging. Recent models allow users to read portable document file (pdf) formats, spreadsheets and word-processed files, but they have rarely been seen as tools for learning. Further, mobile phones in schools have attracted media attention, promoting the view that they are disruptive technologies, in a negative sense. When a Government Minister urged parents not to allow their children to take their 'Christmas toys', such as mobile phones, to school, he was backed by the general secretary of a teaching union (BBC, 2007a). Many schools in many countries ban their use in class, and document this in written policies. Where they are allowed, existing practice tends to focus on social and administrative uses, such as sending text messages for reminders or delivering exam results (Board of Studies NSW, 2005). Thus in spite of their functionality and potential for learning, mobile phones themselves are stigmatised, because 'mobile phone' is a socially-constructed term referring not just to the physical artifact, but constituted by advertising, politicians and teachers. They have even been referred to as potentially offensive weapons (BBC, 2007b). This has led to calls for a new name for the devices (Hartnell-Young, 2005) and makes this study very timely.

A fundamental difference between mobile phones and the handheld computers that have been introduced into schools through other projects is that most students already own mobile phones. This project raised a new set of issues to do with ownership of computing devices, security of school networks, and societal perceptions of device use. To understand what is occurring in relation to mobile phones in schools, we considered the schools as social systems which are themselves part of a larger system, and explored the nature of control and change in relation to teachers and students, policies and culture. Control system models, based on cybernetics, can help us to understand how actors enact social roles with enough stability to preserve institutional arrangements, while still demonstrating creativity (Robinson, 2007). Social theory, particularly Giddens' (1984) structuration theory, suggests a duality that involves human agency and structure, and argues that the structural properties of social systems exist only insofar as forms of social conduct are reproduced across time and space, and that social practices ordered across time and space are the basic domain of study. The social structure includes traditions, institutions, moral codes, and established ways of doing things exist at the macro scale, yet these can be changed by human agency when people ignore, replace, or reproduce them differently. For Giddens, routinisation is a fundamental concept of structuration theory, as is power. He sees formulated rules (such as written policies) as codified interpretations of the rules or techniques applied in reproducing social practice. Of interest to this research is how individual schools produce and reproduce a culture that supports learning, in this case with the support of mobile phones.

Structure is regarded as rules and resources implicated in social reproduction, and institutionalised features of social systems like schools have structural properties in the relationships that are stabilised across time and space. Broadly, in a secondary school system the curriculum, accountability mechanisms such as policies and examinations provide the structure, as do the hierarchical relationships between people, and the routines that have changed little over many years. Individually and collectively teachers, students and the wider community act as agents to differing degrees. At the micro scale, teachers are usually expected to display 'control' in classrooms, and the introduction of communication technologies into schools has challenged this in two ways: teachers realised that many of their students had more computer skills that they did, and by accessing information on the Internet, could also gain more information than their teachers (Green, Facer, Rudd, Dillon, & Humphreys, 2005; Green & Hannon, 2007). Thus a shift in power relations in classrooms is occurring, resulting in many teachers taking on learning behaviours beside their students (Hartnell-Young, in press), as in a community of practice (Wenger, 1998), which allows for both central (expert) and peripheral participation. Similarly, constructivist approaches value learner autonomy and control of their learning (Becker & Riel, 1999; Brooks & Brooks, 1993; Brown, 1987) encouraging learners to take risks and develop the insight necessary to improve their own learning.

A paradox is that while the rhetoric values autonomy for students, as structural accountability regimes increased in recent years, teachers have claimed to experience reduced autonomy and sense of agency. In relation to introducing mobile devices in schools, McFarlane, Roche and Triggs (2007) suggested that it was teachers' confidence, relationship with their classes and attitude to taking risks that have the greatest effect on implementation of such technologies. These can be construed as aspects and consequences of personal agency, as clearly one way to maintain some autonomy is to resist change. In light of this, Roschelle (2003) described potential uses for wireless mobile devices in class, reassuring readers that since 'attention is teacher's most precious commodity' (p.266) certain devices ensure that 'teacher-controlled communications predominate'. He recognised that a school is not a simple place to introduce a wireless mobile device, but suggested that teachers might be able to 'maintain control' by disabling certain mainstream applications, including the Internet. Facer, Faux and McFarlane (2005) claimed there is a need to consider the nature of the control gained by students and relinquished by teachers, as if this is a zero-sum game. In the project they described, they noted that in some cases, student use of the devices was teacher-led rather than student-driven, and suggested that this was caused by the perceived rigidity of the curriculum. They might have exaggerated the strength of this structural influence, as teachers in the same national system show agency by innovating. Therefore while teachers might form a structural category in the hierarchy, they behave differently, as do students.

Schools are made up of various system components and structures, including individuals, classroom units and policies. Accountability and management regimes are often predicated on tight coupling of components, while innovation is often likely to result in loosely-coupled systems (Weick, 1976). Secondary schools in general may be more loosely coupled than primaries, as they tend to be organised into subject departments and are larger in population, leading to more administrative units such as year levels. This can make top-down change harder to implement, but provides a condition for ground-up innovation in smaller areas than the whole school. In this study we attempted to capitalise on this loose coupling.

Other research has considered mobile phone use on the edges of schooling (Attewell, 2005; Hartnell-Young & Vetere, 2005, 2006), where in terms of accountability the stakes are not so high, whereas this project specifically looked at mainstream schools. Perry (2006) and McFarlane, Roche and Triggs (2007) noted concerns about introducing mobile devices (in their cases PDAs) into secondary schools, citing teacher agency issues including lack of imagination, knowledge of device capability, fear of bullying and lack of privacy. Thus study worked with and through teachers to clarify these issues.

METHOD

This paper addresses the research question: 'How do structure and agency reproduce the social practices surrounding mobile phone use in schools?' Sub-questions considered how mobile devices could support learning in secondary schools and how school cultures could influence the future integration of mobile phones into everyday practice. The methods were designed to share the control of the research with teachers, and engage with them in many aspects of planning the original funding proposal, data collection and reporting. We drew on the literature of teachers as researchers, a role that recognises teacher agency and legitimacy in researching practice. Hopkins (2002) argued that it is not sufficient for teachers to do research in their own classrooms without relating their enquiries to the work of their colleagues and the aims and direction of the school. In this way a synthesis between teacher research and school development would occur, resulting also in teacher learning. This raised a dilemma for our research: while the project supported all schools' aims of increasing technology support for learning, it disrupted the policies that ban mobile phones in class. One school established a

project reporting space for all the participating teachers on its virtual learning environment (learning platform). However we found it was mainly used by teachers in that school, whereas in other schools, some of the teachers referred to the project as 'your research' rather than expressing the ownership we had hoped.

Three sets of teachers volunteered to be involved from the outset, from two single schools and one cluster, labelled A, B and C. Therefore they were not representative of all teachers in schools and could have been expected to have a strong sense of agency in relation to effecting change. The students were studying the National Curriculum and preparing for examinations. The teachers chose individuals and class groups to participate, with the result that the cohort comprised the range of students in various Year levels and subjects shown in Table 1.

	School A	School B		Cluster C	
		Stage 1	Stage 2	Stage 1	Stage 2
No of teachers	2	2	2	3	3
No of students	20	4	14	12	147
Subject & level	Science Year 10/11	Various subjects Yrs 9, 11, 13	Design Technology Year 11	Geography Year 9	Geography Year 9
Device & access	Students' own phones & sim cards, 24/7	Nokia N80s with students' own sim cards, 24/7	Nokia N95s with students' own sim cards, 24/7	Nokia N80s with loan sim cards, specific lessons	
Survey 1	21	151		12	147
Survey 2	16		12		73

Table 1: Characteristics of participants and devices used

The teachers–rather than the research team–chose the activities and the extent of participation for each group, in a purposive manner, and liaised with the university team.. Importantly, three different approaches developed, as outlined in the table above. School A students used their own phones 24/7 for approximately nine months. School B students used their own sim cards in 'unlocked' smart phones 24/7 for nine months, meaning that they could use any phone company. This meant that in schools A and B students' regular phone numbers could be used at all times. In C all students used a set of unlocked smart phones (with one device shared between every two students). These were lent by the university, with sim cards included, and used for periods of less than a day, so there was no opportunity to personalise, or take control of, the device.

In each school, the same baseline survey was conducted by the teachers, followed by a similar survey with additional questions towards the end of the project. Due to the time span of the project, the cohorts surveyed were not identical, so the unit of analysis was the school, or in some cases, the whole cohort. (This is consistent with the social theory approach taken in this paper). The survey covered current attitudes, as an indication of both agency and school culture, and current practices with mobile phones. Some of the teacher-researchers conducted interviews of participating students and teachers and in addition, the university team visited each school and interviewed teachers and students separately, in a form of triangulation. The interview schedule included reasons for choosing to work with mobile phones, appropriate tasks, connection with other technologies, instances of collaboration and unexpected outcomes. All interviews were transcribed and the team met initially to code from the ground up, checking reliability and revealing themes for future discussion with participants. Finally the data were considered with reference to Giddens' structuration theory. In terms of empirical research, the theory considers agents (people) as knowledgeable, and researchers should pay attention to many forms of 'discursive phenomena' and to 'practical consciousness'. Like Nonaka and Takeuchi's (1995) explicit and tacit knowledge, this means that researchers must consider comments outside formal interviews, email communications, and documentary or photographic evidence that helps to reveal what people think and do.

FINDINGS

In this section the data relating to elements of the secondary school system are presented, using examples identified by school. Mobile phones were constructed over time in several ways: by the small number of teachers involved as cameras and handheld computers to use for learning, and by the written school policies as possibly useful for communication, but disruptions to teaching and learning. At the outset students generally saw them as social tools (almost 50% of the School A students and 30% of

the School B students could not even think of any useful learning applications) and as one student told us, his peers felt 'It can't possibly be a learning device, it's a mobile phone.'

Structure

In the secondary school system the curriculum and internal and external accountability mechanisms including policies, examinations and league tables provide the structure, as do the hierarchical relationships between people, and the routines that have changed little over many years. Each school had a specific written policy that banned mobile phones in classes. School A was a specialist media and technology college, with good media resources. The school's mobile phone policy stated 'Students must keep phones switched off and out of sight in lessons and in the College building…In exceptional circumstances, such as a family emergency, students should seek staff permission to use their phone.' School B proudly claimed that its 'physical resources are supplemented by an award winning virtual learning environment, with extensive use of wireless technology and the intranet ensuring that learning materials are always available to students on line. This means that the learning journey can begin and continue well beyond the traditional school day.' But it had a clear policy for students in Years 7 to 11: 'we do not allow mobile phones in school.' The school justified this stance by equating mobile phones with other technologies, specifically 'Walkmans, laser pens, cyberpets and other devices which could interfere with the quality of teaching.' School C expressed its policy most strongly:

> Any use of a mobile phone, whether it is for calls, messaging, photographs or games during the school day is strictly prohibited. The school has adopted these rules because the use of mobile phones in school can be highly disruptive.

In order to assess the influence of these policies 331 students were asked what the policy of their school was (given 4 categories), and their replies generally reflected the written policy, with 92% across the three sites stating that mobile phones were not allowed in class. Actually, however, the policies and practice were loosely coupled, particularly in School A, where teachers already allowed reasonable use of mobile phones, and some were prepared to ignore students listening to music on their phones in classrooms if they were also obviously working. Further, one teacher in School A said 'There's a general policy, but within that policy there may be pockets of innovation where people try to use mobile phones as an educational tool within the classroom'. The influence of the formal curriculum was evident in the way many students justified or explained use of mobile phones, often expressed as how they helped revise for exams, or provide evidence of learning for eportfolio assessment.

A conversation with the School B champion, also a school governor, turned to the role of governors. This extract shows the intricate relationships between teachers, governors, and the leadership team in the context of the wider system.

> A guy from Becta turned up and talked to us about the future of IT and the vision that the Government had regarding use of IT within the curriculum. And he specifically did mention portable devices for students to use. Our chair of governors was there at the time and…he was frustrated because he felt that whilst the Government were telling him where we needed to be as a school, they weren't telling us how to get there and at that point I said that, as a school we were halfway there and that we were using the handheld mobile devices as part of the pilot project with the University. He was a bit amazed…There is so much going on and so much that he didn't know. Throughout the course of our discussions, I said 'With the full support of senior leaders', essentially and, you know, a governor doesn't really need to know that. But yes, I did make him aware that it was with the support of the senior leadership team, as indeed I couldn't do it if it weren't for their support.

Here the layers mentioned are Becta, representing 'the Government', the board of governors, the senior leadership team, and the teachers. This extract raise questions of tacit knowledge, agency and deference that can all be considered as aspects of power.

Agency

The research reported here was driven by particular teachers in each school who generally had a view that the devices could assist their work and students' learning, and they variously related the devices to the push for technology in education, and efficiency goals. The reasons teachers gave for using mobile phones included status as a technology college, a belief in student ownership, perceived benefits of using the same device in social and school life, and that fact that students like mobile phones and know

how to use them. In School A the 'champion' was a Science teacher, supported by the Head of Department and the Principal. He explained his rationale for using students' mobile phones in class:

> As a society we need to generate a continuous source of good engineers and scientists and to do that obviously we have to engage with them within secondary school to ensure that numbers are retained at A-level and beyond…I think anything that helps enthuse students with science in the classroom has to be a positive.

He expounded the advantages of spontaneity and efficiency, sending regular reminders to his students by text message (SMS), and using students' mobile phones for calculations, experiments needing stopwatches, and as a photographic record. In School B the project was driven by the ICT coordinator, a former teacher, who in addition to borrowing some smart phones from the University, arranged for sponsorship from a phone company, and said:

> I chose the smart phone above and beyond most of the other units because I didn't want a PDA [Personal Digital Assistant]. I wanted a truly mobile unit with all the other features that it had. I was very keen to promote the idea that students have ownership and then they use them both in their social and their normal school life.

In every school teachers had the support of the hierarchy in the form of the head or leadership team, a point frequently made in School B.

Even at the beginning of the project, students in all schools reported using their phones in classes, mainly in Maths (27%), Science (15%) English (11%) and Geography (11%). However they reported quite low use in ICT classes, which might be explained by the curriculum content, which focuses on software more suited to personal computers. School C had been a designated technology college for seven years and teachers said that their motivation for taking part in the project was influenced by its development plan, yet the students here reported using mobiles phones in fewer subjects than in the other schools.

As students were involved as a result of teacher selection, they displayed differing extents of agency. Two Year 9/10 students in School B were involved in this project, but as they were the only students in the class, they both felt intimidated during lessons, as their use would single them out. They were not confident enough to speak directly with staff on their use, and generally used their phones only when prompted. On the other hand, a Year 13 student interacted with the school's learning platform via her mobile phone, capturing and storing images of her own work and other resources for inspiration. Her teacher could also load material specifically to each student's space, thus assisting personalisation. Design Technology students regularly captured evidence of the development of their models using the camera function, and uploaded this to the learning platform. Throughout the project students and teachers reported a range of uses in class, as summarised in Table 2.

Activity	**School**
Using stopwatch	A, B, C
Photographing experiments, project resources,	A, B, C
Photographing student work for eportfolios	A, B
Photographing texts/whiteboards for future review	B
Bluetoothing project material between group members	A, B, C
Receiving SMS & email reminders from teachers	A, B
Synchronising calendar/timetable and setting reminders	B
Connecting remotely to school learning platform/email	B
Recording a teacher reading a poem for revision	B
Connecting to the Internet	A, B, C
Creating short narrative movies	A
Downloading and listening to podcasts or music	A, B
Using GPS to identify locations	B
Transferring files between school and home	A, B

Table 2. Class use of mobile phones

The types of activities were influenced by the school technology infrastructures (for example, only School B enabled access to a learning platform), and the length of time students used the phones in class, but they did not appear generally to be constrained by the curriculum.
The effect of participation in the project on students in the different schools was evident in the survey responses to the survey questions, shown in Figure 1. The left-hand graph shows attitudes at the start of the project, with three options: mobile phones should be used i) only for emergencies, ii) for specific learning activities or iii) any time in class, while the graph on the right shows attitudes at the end of the project.

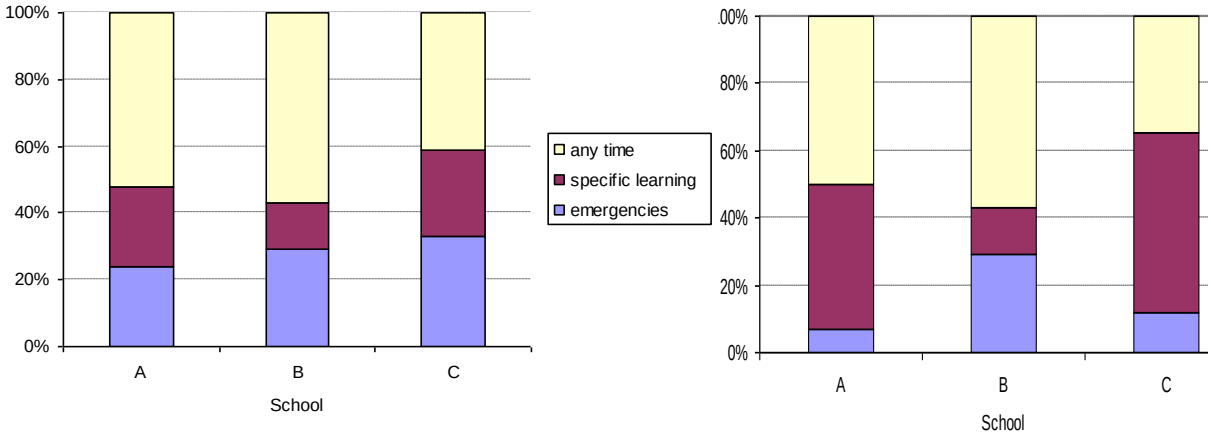

Figure 1. Student attitudes to mobile phone use before and after participation

Figure 1 shows variations in the three schools, but is based on different cohorts over time in School A and B, so must be taken only as indicative. In School A there was a change in students' attitudes to using mobile phones for learning activities instead of only for emergencies. School B showed little change, but already at the outset had a high proportion of students who believed phones should be used at any time. In School C a large increase occurred in the proportion seeing that mobile phones could be used in specific learning activities, while students tended not to suggest 'any time' use.
Teachers who participated in the project saw themselves as learners, and were happy to explore new practices with their students, leading to new awareness. The champion in School B said 'I used to think text messages were a waste of time'. They generally felt that hands-on professional learning was important for them and for others, while student management strategies were also a consideration. A School A teacher captured it clearly:

> A lot of it will depend on the particular school and the ethos within the school. It may not work everywhere and the problem is that as teachers we like to have quite clear boundaries and there is a lot to be said for being always consistent with how you enforce things…You [students] always want to do something that you're not allowed to do and when you're allowed to do it then the novelty disappears.

A group of teachers in School B felt that the most important thing they had learned was that some students who were lacking in confidence were using the units so successfully that they had 'blossomed' both in their social and learning environments and their work ethic had increased almost exponentially. Others on the periphery had mixed reactions, as one student in School B reported:

> My geography teacher said that I'd used it brilliantly and I was always getting things for her as well. When she didn't know a fact I was able to go on the Internet and quickly look it up. I could help her teaching, to quickly look it up...Some of the teachers were quite resistant to being recorded in class, because when I asked my history teacher he said "No. No, I'm not being recorded in class. No."

He went on to analyse issues of control and social practice in terms of teacher resistance, societal attitudes, and classroom management, suggesting that teachers could take control by recording themselves and sending podcasts to students.

A teacher in School A suggested changing the school policy and trying to 're-educate the kids'. However the findings in this paper suggest that changing the policy would be much more difficult than changing student attitudes. Two teachers in conversation in School B suggested teacher development would occur gradually, given awareness of a need, as a drip over time. As technical support and infrastructures also play a part in successful mobile phone use, the attitudes of IT staff need to be taken into account. An interview with a member of technical support staff in School C revealed that although students did the right thing, he could not support future use:

> Because I can't see that there's anything on them that you can't do with something else and be more controlled. Mobile phones are here to stay, obviously, there's not many people who haven't got a mobile phone now, but as a teaching aid I'm not convinced.

On the other hand, parents whose children were involved in this study did not appear to reflect the negativity of the media or some teachers. In School A, students reported that their parents thought it was a good idea, even fun, easier than carrying a camera, and 'it's your phone, if you lose it it's your problem'. A School B student said that at first his parents 'were a bit resistant, but when I explained to them that it was mostly for learning, and the things that I could use it for, they were actually quite happy for me to use it'.

Schools normally provide computer resources for students, often with extensive government funding. Using mobile phones raises the possibility of shifting the cost burden to students and their families, as one teacher raised, adding 'Oh, don't tell the Government that!' The cost of wireless Internet smart phones means that they are not ubiquitous among secondary schools students. However 24/7 use is the desirable option. Therefore cost and ownership go hand in hand as issues to consider.

CONCLUSIONS

In seeking to understand structure and agency in the social practices surrounding mobile phone use in schools, this study found that school policies are not statutory, but local guidelines, indicating and at times reifying the behaviour or procedures decided by the dominant group. This study suggests that this group consists largely of some teachers, with the support of governors. In spite of school heads holding a position in which they operationalise policy, in each case they approved of the use of mobile phones both for this project and on other occasions, both as 'common sense' and positioning their schools as technology leaders. Students tended to be compliant, since they had been socialised into a construction of mobile phones as social, rather than learning tools, and they read the power relations in the school hierarchy. Their attitudes to the use of mobile phones in class easily changed when teachers sanctioned learning uses. The curriculum, except perhaps for that in ICT, does not appear to constrain use. The conclusion is that teachers will be the people who change practice in this regard, and this will result from a shift in attitude. If they see a purpose, they clearly have agency. This study showed that hands-on experience makes a difference to teachers' attitudes, and the negative connotations portrayed in the media were counterbalanced with actual experiences.

While there is a history of large-scale technology implementation in the United Kingdom (such as the introduction of interactive whiteboards), this study makes a case for individual approaches that fit with individual school cultures. If policies are formulated rules (Giddens, 1984) and, as in the examples in this paper, weakly sanctioned, it seems likely that they can be changed locally to reflect emerging social practice, when a tipping point is reached (Gladwell, 2000). Loosely-coupled school systems should enable change to take place without national policy intervention. Reflecting on this study however, it seems that mobile phones act as a substitute for the deeper concerns of teachers, and it is not a 'mobile phone policy' that is required. Teachers are concerned about inappropriate behaviour in school and other contexts, privacy and security of data, including photographs and video clips, distractions in class, and cheating. Therefore these are the real issues of social practice that have a time-space dimension, while mobile phones are a more ephemeral tool. Schools also operate within a larger system that requires them to provide tools to support personalised curricula, raising issues of ownership of computing equipment and access to network connections. In the practice of learning, and given device convergence that means mobile phones contain functionalities of computers, small computers now contain skype phones and personal digital assistants connect to the Internet, the first need for schools is to identify how any devices can help students achieve their goals for learning. Then, appropriate models of ownership will need to be developed, and these may well differ in different contexts.

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