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Net Generation students: Agency and choice and the new technologies

Abstract
Based on research investigating English first year university students, this article examines the case made for a new generation of young learners, often described as the Net Generation or Digital Natives, in terms of agency and choice. Generational arguments set out a case that links young people’s attitudes and orientations to their lifelong exposure to networked and digital technologies. This article draws on interview data from mixed methods research to suggest that the picture is more complex than the equation of exposure to new technologies and a generational change of attitudes and capacities. Starting from the position that interaction with technology is mediated by activity and an intentional stance we examine the choices students make with regard to the technologies they engage with. We explore the perceived constraints students face and the way they either comply or resist such constraints. We conclude that agency actively shapes student engagement with technology but that an adequate conception of agency must expand beyond the person and the self to include notions of collective agency identifying the meso level as an activity system that mediates between the students and their technological setting.

Key Words: Net Generation, Digital Natives, Millennials, Generation Y, Agency, Student Experience
Introduction

Students arrive at university already schooled in a variety of practices related to learning and technology. They are steeped in practices that have yet to take on a final or fixed form, which they have developed in both their social lives and in formal learning or work contexts. One aspect of this is the way students’ engage with digital and networked technologies. The availability of computing has become near universal in advanced industrial countries because relatively powerful computers can be found in many homes, work and educational settings, and in public spaces such as libraries and Internet cafes. In the UK Eynon has reported that 82% of learners live in Internet connected homes (Eynon 2009).

The world that young people grow up in prior to their arrival at university is filled with new technology and it has become a regular discussion point as to whether this new environment is having profound, identifiable and universal impacts. Two of the common phrases used to describe the new generation of young people in this debate are the Net Generation (Tapscott 1998, 2008) and Digital Natives (Prensky 2000a, 2000b).

Within this literature there has been little exploration of the arguments that could account for the dramatic change these authors associate with an entire generation of young people. In Tapscott’s most recent book he draws on no theoretical account but simply an anecdote (2009 p 1-3) in which he ‘noticed’ that his children and their friends were all ‘talented’ in relation to new technology. The reason for this layer of talented young people was that: “they were the first to grow up surrounded by digital technology” (2009 p2). He goes on to say that
“Each generation is exposed to a unique set of events that defines their place in history and shapes their outlook.” (2009 p16). The argument Tapscott makes claims that a ‘generation’ exists across the world, in all kinds of economic and social conditions not just in advanced economies. The cause of this generational change and the characteristics of the Net Generation is that:

... the most significant change affecting youth is the rise of the computer, the Internet, and other digital technologies. This is why I call the people who have grown up during this time the Net Generation, the first generation to be bathed in bits. (Tapscott 2009 p17)

Prensky has advanced similar arguments to support his use of the term Digital Natives (2001a, 2001b, 2009). In his 2001 article Prensky argued that growing up with digital technologies has a profound effect on all young people:

It is now clear that as a result of this ubiquitous environment and the sheer volume of their interaction with it, today’s students think and process information fundamentally differently from their predecessors. (Prensky 2001a p1 sic)

The term has also had a recent development in the book Born Digital (Palfrey & Gasser 2008). Like Prensky they claim “These kids are different” (p2) because they have never experienced a pre-digital world. Prensky argued that the new generational change is not incremental: “A really big discontinuity has taken place. One might even call it a ‘singularity’ – an event which changes things so fundamentally that there is absolutely no going back.” (Prensky 2001 p 1). This
literature accepts the strong determinist argument that the existence of an environment infused with digital and networked technologies leads to a generational step change amongst young people. For a discussion of the determinist line of arguments found in this context see Selwyn (2003). This article questions this line of causation by examining aspects of agency, activity and choice.

There is also a growing literature that is critical of the Net Generation and Digital Native arguments. Some of this literature is based on empirical, largely survey, research (e.g. Bullen et al. 2009, Jones et al. 2010, Kennedy et al. 2008, Pedró 2009, Selwyn 2008). Other critics have a taken a more theoretical stance (Bayne and Ross 2007, Bennett et al. 2008). The empirical literature demonstrates that students in advanced industrial countries are far from homogenous in their response to new technologies (see Kennedy et al. 2008 and Jones et al. 2010). Bayne and Ross (2007) suggest that the Digital Native argument leads to a one way determinism forcing institutions and teachers to change. They also note a paradox in the debate because each person is fixed in a generational position but older people are expected to change and become more like the new generation. This argument leads to a deficit model of professional development in which it is suggested that older academic staff can become ‘immigrants’ but will never be able to bridge the gap arising from their generational position (Bayne and Ross 2007). Bennett et al. (2008) argue that the debate about young people in education can be likened to an academic ‘moral panic’ in which arguments and
assertions, articulated in dramatic language, are not based on either adequate empirical or theoretical foundations. Bennett et al. suggest that this line of argument is associated with a polarized and determinist debate in which change is inevitable and those who resist change are portrayed as out of touch and not having legitimate concerns (Bennett et al. 2008 pp782-783). Whilst critics of the generational arguments have provided strong arguments against the Net Generation and Digital Native frameworks they have not set out an alternative explanation for the changes that the empirical research has found amongst young people in general and university students in particular.

**Agency and the Net Generation debate**

The arguments used to support the contention that there has been a significant generational change rely on a form of structural, specifically technological, determinism. The claim is that the contemporary world includes a range of digital and networked technologies and because young people have been exposed to these technologies they are radically different from preceding generations. Technology features in this account as an independent and external structural factor acting on social forms but not conditioned by them. An alternative account could begin from an understanding of young people as active agents in the process of engagement with technology. The notion of agency has been widely discussed as a contrasting framework to structure in the social sciences. Structure describes the factors enabling and constraining what human agents do. Agency, in contrast, is concerned with the shaping of processes by the intentions and projects of humans. Czerniewicz, Williams & Brown (2009) have investigated

Archer’s view of agency is only one part of a complex debate in the social sciences and a fuller discussion of agency can be found in Emirbayer and Mische (1998). In Archers view agency can be viewed as a ‘distinct strata of reality’ (Archer 2003 p2), in which agency is emergent and cannot be reduced to structure nor vice versa. In this account agency is often portrayed as individual and in Archer’s writing there is an association of the agent with the person and the self. Social identity for Archer is a ‘sub-set’ of personal identity and the acquisition of social identity is a process of progressive individuation (Archer 2002 p19). The individual holds the power to be active and reflexive:

In a nutshell, the individual, as presented here in his or her concrete singularity, has powers of ongoing reflexive monitoring of both self and society. (Archer 2002 p19)

There are clear strengths in this approach. In particular the rejection of social as well as technological determinism and the focus on the active mediation between structure and agency as central to understanding the way social reality affects students’ take up and use of digital and networked technologies.

Ashwin has suggests that agency and structure can be seen as epistemic rather than ontological distinctions providing different characterisations of the world and different ways of seeing and describing the same social processes (2009, Ch2).
Ashwin also argues that a description of processes in terms of agency does not necessarily lead to a reduction to the individual (Ashwin 2009 Ch2). He notes that decisions can be the emergent outcome of discussion and that agency can be the outcome of collective processes.

Archer claims to have an emergent position with regard to reality and an ‘emergentist ontology’ (Archer 1995) which suggests that objects possess powers that are outcomes of two or more elements and that these powers cannot then be explained or reduced to their components. If this is the case then it seems odd to argue for the reduction of agency to the individual person because their capacities are equally emergent and impossible to reduce either to the individual or to their social and material position in the world. Students entering university become part of an institution with prescribed roles for teachers and students and informal roles that emerge from student-student and student-tutor interactions within the framework of the institution.

Archer also argues that agency is fundamentally a human characteristic and this has been challenged by the tradition of work by Actor Network Theorists, amongst others, who point to the capacity of things to act and have effects in the world, using the term actants rather than actors to indicate this blurring of the boundaries between humans and things in terms of agency (see for example Callon and Latour 1992). In the case of networked and digital technologies this blurring of the boundary between humans and machines in complex and
emergent networks becomes more pronounced. For these reasons we would want to hold open the possibility that agency could be found in technological artefacts in the way suggested by Actor Network Theory (Callon and Latour 1998). Students entering university engage with technologies that provide a technological landscape, a complex of different tools and services encountered through a variety of interfaces and devices.

**Activity as an alternative framing of agency**

Activity theory offers an alternative framing of structure and agency by shifting the focus to action by a subject in relation to an object. The subject is understood as the sensing feeling interior, conditioned by contingency and creativity. It is distinguished from the external object, composed of other people, animals and things, which are dealt with by the subject in terms of purpose and intention. Object in Activity Theory carries an extended meaning because it also refers to the sense of object as an objective and it is this sense of purpose that relates the notion of activity to agency and distinguishes it from other theories such as Actor Network Theory.

...actor-network theory and distributed cognition... posit a sociotechnical network whose generalized nodes are actors that can be either human or artifact. Such actors represent states that move through a system - whether the actor be a pencil or a person. Intentionality is not a property of these generalized nodes. Activity theory distinguishes between people
and things, allowing for a discussion of human intentionality. (Kaptelinin and Nardi 2006 p10)

Activity in the Vygotskian theoretical tradition is not simply a series of actions, the state of being active or merely a string of linked behaviours. Activity is always conditioned by the circumstances in which it takes place, which would include both the circumstances related to the person themselves, including their internal states, and the external circumstances within which the person acts i.e. activity is part of an activity system.

An activity system is a complex and relatively enduring ‘community of practice’ that often takes the shape of an institution. Activity systems are enacted in the form of individual goal-directed actions. But an activity system is not reducible to the sum total of those actions. An action is discrete, it has a beginning and an end. Activity systems have cyclic rhythms and long historical half-lives (Engeström 2005 p219)

The idea of an activity system situates human actions within larger social and material contexts and provides a basis for examining social forms that are neither micro nor macro but rather meso in character, situated at an institutional level between the macro and the micro. (For a fuller discussion of the idea of meso levels see Sibeon (2004) and Jones et al (2006)). Activity is used in a precise way in Activity Theory and this article draws on two contemporary sources for the meaning of activity and agency in relation to this tradition (Engeström et al 1999 and Kaptelinin and Nardi 2006). In both sources activity is a central term and
they both draw on a common tradition originating in Vygotsky (1930/1978). We identify as activity the more or less intentional actions that take place as part of an activity system, over time.

The technological determinism that marks the Net Generation and Digital Native literature stands in marked contrast to the sociological interest in activity and the interplay of structure and agency. Notions of agency and activity suggests that students act as appropriators of technology and that any changes in the context of young people, consequent upon the widespread introduction of digital and networked technologies, is unlikely to lead directly to changes in the attitudes and practices of an entire generation. Research investigating new students entering university needs to understand the evidence describing the position of young people in relation to new technologies and begin to provide an account of how new technologies are actively appropriated by students in both their studies and in their social lives.

**The research**

This article is based upon data collected as part of a two year study which took place from the spring of 2008 until the early summer of 2009 in five universities in England. The universities were selected to represent the main ‘types’ of university found in the English system. Access was gained to 14 course areas that provided a range of pure and applied subject and disciplinary areas (16 courses overall because 2 courses used for Survey 1 were replaced for Surveys
The courses were an opportunity sample of those courses that would allow access to the research team, chosen to make sure they included a range of disciplines and a variety of pure and applied subjects (see Table 1 for a more detailed description of universities and courses under study). During the spring of 2008 a questionnaire exploring the experiences of first year students as they encountered e-learning at university was developed by the research team and administered in all five participating institutions. Results of this survey have been reported in Jones et al. (2010). A further pair of linked surveys was issued in the autumn of 2008 and the spring of 2009 and these have yet to be fully reported (for early reporting see Jones and Hosein 2010, Ramanau et al. 2010, and Jones and Healing 2010). This article focuses on interview data collected between the spring of 2008 and early 2009. The student interviewees were all volunteers from the survey sample.

Students were recruited from respondents to the first and second surveys. At the end of both surveys respondents were asked “Are you interested in being contacted to learn more about participating in the next stage of the research?” and if they answered positively they were asked to provide contact details for both email and mobile phone. Later these volunteers were contacted with a request for a telephone interview. The student interviews were conducted in two phases. A set of pilot interviews in spring 2008 (n=10) and a full set of student interviews in the autumn of 2008 and early 2009 (n=58). The interviews were
conducted over the telephone, conversational in style and followed a semi-structured form with four key areas covered in all interviews.

Each interview began with a short preamble explaining what was meant by the key term e-learning “By e-learning I mean learning using a wide range of ICT, such as course management software, mobile tools, online media etc”. Each topic area was initiated with a question, sometimes split into two parts, and the schedule included a series of prompts that could be used to develop the conversation if this proved necessary. The topics and initiating questions were:

1. The student’s first experiences of e-learning at university
   Could you begin by telling me about your experiences of e-learning in the first few weeks of your studies at [name of University].

2. Use of technology and learning
   a) Tell me more about how you go about your work studying at University, b) what role does technology play in your studies?

3. Transition to university
   Now I would like you to have a look back at your previous experiences of using ICTs in your education, e.g. school, college, another university etc.

4. Technology and student life in general
   a) Tell me about yourself as a technology user, b) could you tell me more about your experience of using technology for recreation?

At the conclusion of the interview each respondent was asked if they had any further comments or observations.
To complement the student interviews, the research team spoke to at least one member of staff responsible for each of the courses to ascertain basic course details about course numbers, course design and the role of the member of staff on the course. In addition, the research team requested formal interviews with these members of staff but in the event, 12 members of staff were interviewed in 2008 covering 10 of the courses in 4 universities. The interviews were semi-structured and face to face and they took place at the member of staff’s place of work. In one interview two members of staff were present, all other interviews were conducted with a single staff member. The interviews were intended to gain information about the course, what use the course made of technologies, the kinds of pedagogy deployed, what assumptions were made about the students likely to enrol on the course and the views staff held about the technological aptitude and skills of their students.

The interviews were fully transcribed and entered into NVivo a qualitative research software tool for data analysis. The transcriptions were read and initially coded based on themes derived from the content of the interviews and then revised iteratively as the analysis progressed. The first coding followed the content of answers to questions and brought together elements of answers to different questions addressing the same theme. A further round of coding began to abstract themes that emerged across the initial codes. For example a coding on the theme of ‘distraction’ emerged that drew together a variety of accounts from the interviews. Transcriptions were read individually for initial coding but once the text had been coded the data associated with each theme was then
treated as a pool of meaning with the individual interviewee represented by a code identifying age, gender, course and university.

**The research context**

The interviews were part of a research project which included three surveys of first year students, the first survey took place in the spring of 2008 and it was followed by two linked surveys in the academic year 2009-2009. From the first phase survey research conducted in the spring of 2008 (Jones et al. 2010) we concluded that:

> The new generation of students show significant age related differences but the generation is not homogenous nor is it articulating a single clear set of demands. It seems to us that universities and academics are, as always, faced with choices about how to change and these choices need to be better informed about the kinds of students that are entering their institutions. (Jones et al. 2010 p731)

The very fact that we found that the new generation of students was not homogenous questions the simple model of causality found in Net Generation and Digital Native literature.

The interview data can provide a fuller understanding of how students account for their choices in relation to new technologies. Most importantly for this article the student voice can assist in developing an adequate theory of causation and agency to help explain the findings from our survey work. The survey findings were not clear about what kinds of choices students were making in terms of
which technologies to engage with during their studies and whether these choices were influenced primarily by the university (meso level) context or the general technological (macro level) environment. One of the factors that was apparent from the survey data was that the mode of university study had a significant impact suggesting that there were contextual factors at either a macro or meso level in the university environment that led to a differentiation between place-based and distance students in terms of their engagement with new technologies.

There were also differences between universities in how important Internet access was thought to be ($\chi^2 = 59.64$, d.f. = 8, $p < .001$) and in particular differences between university’s modes, i.e. between distance and place based universities ($\chi^2 = 56.68$, d.f. = 2, $p < .001$). Students in place based universities saw the Internet as being more important than students in the distance university. (Jones et al. 2010 p726)

A number of separate factors could influence this variation between modes. Distance students are generally studying part-time and the majority are over 25 years of age in addition to the mode of study having a different character to study in place-based universities. Interview data can help to illuminate the kinds of thinking that inform student thinking about the importance of the Internet.

Net Generation and Digital Native arguments suggest that it is a consequence of young people’s generational position that they have greater confidence and facility when faced with digital technologies. From our survey work it was
apparent that levels of self-reported confidence (defined in relation to skill level) in using various computer technologies and applications varied considerably. Whilst over 80% of students reported ‘slight confidence and basic skills’ or better in using presentation software (87.5%) and online library resources (86.5%) over a third reported they were ‘not confident/minimal skills’ (not known or not confident) using Virtual Learning Environments [VLE](37.7%) and in writing and commenting on blogs and wikis (40.6%). Though confidence might be related to the students’ prior experience of using such tools, and 40% of the students entering their first year in 2009 reported having used a VLE in their previous education, then the relationship is more contextual than simple generational exposure to digital technologies. A local contextual influence suggests that attention needs to be paid to the students’ voice in accounting for why they have confidence in some technologies and not others. Although students 25 years of age and under were more confident of their skills in all of the ICT tasks (Jones et al. 2010), the lack of confidence expressed in the VLE is striking and suggests an area for further research, especially as this contrasts with other kinds of university provision such as online library resources.

The most significant variation found in our survey data amongst students was age. The variation by age wasn’t a simple division between those in the Net Generation age group and older students because we also found significant variations between Net Generation age students. In terms of some of the newer participatory activities we found that there was a minority in our sample that
reported that uploading and downloading audio and video was important to them. These students were more likely to be younger, and in place based universities, with the age of the student continuing to be a factor within the Net Generation age group. The interview data can provide insights into the kinds of decisions made by students in relation to their use of a variety of new technologies and services. Overall what we want to achieve in this article is firstly to provide a fuller understanding of what students report as the context for their actions, and their motivations and choices with regard to their use of new technologies and secondly to add to the development of an adequate theory of causation and agency to explain the age related differences that we found.

**Findings from the interviews**

Our survey had found that universities had the necessary conditions for the Net Generation in that there was a high level of computer ownership and access to computers and broadband networks (Jones et al. 2010). The interviews record students’ first impressions as they encountered the university’s provision of e-learning services and networked resources. Students reported initial surprise or confusion at the array of technologies that were available but few thought that this led to long-term difficulties.

“It was a little overwhelming at first. There was (sic) a lot of things it could do but within a couple of weeks it was pretty easy to learn.” (Net Generation age Female, English University A)
There was little indication that the use of the VLE presented any serious problems for students with most reactions being extremely positive. A representative response was:

“It’s good I like using the university VLE, because it’s like a central thing for everything, a central source.” (Net Generation age Male Computer Science, University D)

The VLE and library services were the most obvious new services commented on by students. For example:

“I didn’t realise that there’d be an electronic library as well as the library, which is brilliant. It means you can access it from halls as well so you don’t have to actually go into the library a lot of the time to find the information you need so probably a lot better than I expected.” (Net Generation age Female, English University A)

These new services were rarely compared to the student’s prior experience, and even more rarely compared in a negative way, though the following quotation provides such an example:

“At my college we had a similar system we had an intranet system and it was better then the one that they have got at the University” (Net Generation age Female, English University A)

Three of the above quotations are from three different female students studying the same subject at one university and they illustrate the range of views associated with a single implementation of e-learning technologies. The question that arises from our review of notions of agency and activity is the degree to which attitudes and capabilities with technologies such as the VLE are affected
by the overall technological context of a generation and the degree to which they are shaped by the university context.

The VLE, collective agency and meso level features

It may seem unexceptional but our survey suggested that student use of technologies was closely related to course requirements (Jones et al. 2010 p729). The design of courses and programmes setting out these requirements also reflected the changing infrastructure:

[name of course] its predecessor was written as a face-to-face course, there was no provision for online teaching. About half way through we created a sort of online version where the course was exactly the same but it was taught by online groups, online tutorials, rather than face-to-face tutorials. And that was not all together successful… So [name of course] from the beginning was written with the idea of, you know, students would need to go online, would need to have a computer, would need to use the internet and that it would be taught by what we call blended tuition. (Staff Arts and Humanities University C)

In this case the university had adopted a new VLE which enabled broader use of online support. The university had also promoted use of the new system with training for staff and encouragement to make new courses in a different way. This process was common across all five universities. For example:
I guess the highest profile initiative at [name of university] is the … University Virtual Learning Environment which, I think it was partly due to the teaching, the TQA, … the University saw that as an opportunity to develop a few technologies and one of the things that they’ve done is [Local name] VLE. (Staff Computer Science University D)

This comment illustrates the way in which the VLE was seen as a part of a wider university level initiative which was itself part of a wider government policy, in this case the Teaching Quality Assessment (TQA) procedure. Our survey showed that students engaged with the technologies that they believed they were required to use on their courses, even though they used these technologies more than they were required to (Jones et al. 2010 p729). This suggests that student choices are not direct responses to technologies that are universally available rather they are responses to local infrastructures and requirements for technology use that are set out in course designs.

Examining student interviews in relation to Virtual Learning Environments we found that student opinions were almost universally positive even though the levels of confidence expressed in the survey had been relatively low (see above).

It’s good I like using the university VLE, because it’s like a central thing for everything, a central source. (Net Generation Male Computer Science University D)
I think it's brilliant, I think the way, being able to access everything that you need for one module all in one place makes things so much more simple, rather than having six different folders with notes in trying to pull it all together, and being able to access things that you might have missed in a lecture. (Net Generation Female Bio-Sciences University A)

Even some students who had expressed initial reservations had been won over:

I thought it was a bit confusing at first but after I got used it I really think it's really good. (Net Generation Female, Modern Languages University D)

The complaints that were made about the VLE were commonly about the use made of the system rather than negative comments about the technology and when aspects of the technology were criticised it was often a particular feature of the system rather than the VLE as a whole. For example:

...the group forum is not very good. (Net Generation Male Computer Science University D)

This strong sense of the positive value of the VLE suggests that a lack of confidence didn't arise from a negative experience and that the VLE did not suffer in comparison to universal services such as Google or Wikipedia. The Net Generation and Digital Natives arguments make no separation between the general services provided via the Web and local technological features such as the VLE.
The student interviews provide further illustrations of the impact of university procedures and policies on how students engage with technology. Students distinguished between their actions as students and the actions they would take on their own behalf as private persons. For example students commented on the way in which their judgment of sources they commonly used was influenced by their position as a student, specifically the advice they were given about expectations for students’ use of sources of information.

I just wouldn’t trust any of it, like we’ve been told not, pretty much not to use anything you find on Google, to use the, like actual proper academic resources on there in the library. (Net Generation Female English University A)

Whilst this comment was unusual in identifying Google it was common for students to identify Wikipedia as a source identified by staff as being unreliable. Also it was common for students to comment about their use of ‘the ones they’ve sort of recommended’ when describing their use of external sources (Older Female Social Work University E). The guidance of tutors and teachers was provided through endorsements or negative comments about the reliability of sources. It was also backed up by assessment procedures and disseminated in formal course documentation.
I actually just did a search on the key words that we were given for our assignment. There were some recommended and also some places to avoid, like Wikipedia itself, because of the sources not being reliable. We were actually allowed to find anything from anywhere as long as it was reliable. (Net Generation Female English University A)

The student's use of the term 'allowed' suggests that the default assumption of this student is that sources are usually more restricted for assignments. The judgements about the reliability or resources were not made as private decisions even though students developed personal methods of verification.

*Interviewer:* Are there any specific websites that you tend to go to if you look for more information on something?

Not really, because I always look around, because if you find something on Wikipedia, for example, it's sometimes not exactly reliable. So I always try and look around and find the same information on another site. Just to verify it, I suppose (Net Generation age Female, Modern Languages University D)

The use of the varied sources of information available via the Web, including Wikipedia, was partly a direct response to the functionality of the service and the availability of the resource but it was mediated by the institutional requirements of university study. The assessment of the reliability of a resource was shaped by institutional requirements and the activity of the student was framed as part of the entire activity system of their university programme and it was not a direct expression of the self or personal values.
Native skills and confidence

The interviews confirmed that access to technology was not a significant issue and that the technology supplied by the university was not thought to be overly complex or difficult to use. This contrasted sharply with the context for students in South Africa described by Czerniewicz et al. (2009) in which students’ access to computers and networks was very variable and it supports the idea that the material prerequisites of the Net Generation are in place in English Universities. Good access was accompanied by a general confidence about skills with technology. For example:

*Interviewer: Have you had to learn any new skills in terms of your use of IT or telecommunications…?*

No it’s all, it’s all been fairly familiar stuff, I wouldn’t say new skills maybe expanding upon knowledge just you know different, how to use the, the university’s own you know intranet system, but that I wouldn’t say it’s a new skill just an expanding on knowledge I already have. (Net Generation Male English University A)

The general level of confidence expressed by students during interview raised interesting questions about how student confidence was perceived by staff and the reasoning behind the low levels of reported confidence in using the VLE that had been found in the survey data from the previous year’s cohort of students.
Staff thought variations in skill level were related to the requirements of the discipline or subject. For example, staff on courses that required the use of spreadsheets suggested that whilst students had a surface familiarity with a variety of Web-based services and common computer programmes they were lacking when it came to more specialized pieces of software and spreadsheets in particular.

Erm they have some idea of about how to use word processing packages but they don’t have very much idea about Excel and using spreadsheets at all. (Staff Accounting and Finance University D)

In many cases there were comments about students having a relatively superficial understanding of new technology, even though they have had a wide exposure to it. This stands in contrast to the assumption made in Net Generation and Digital Native arguments and points to the relationship between skills and their context of use. Staff perceptions were that students did not naturally develop the skills required of them through a general exposure to new technologies.

As might be expected skill levels are not only those developed by students prior to university because in all cases the universities provided skills training in the area of learning technology. These sessions were provided by a variety of bodies
within the university, sometimes the department but typically the library and central computing services.

Student perceptions of this training were not always positive, even when it was course specific and focused on a particular software tool as this interviewee explains:

*Interviewer: Tell me a bit about your experience using SPSS.*

They just give you a list of instructions and you’re not always aware of exactly what you’re doing, it says like recode this data, and I’m like “What data? What’s going on?” I just follow the instructions and then at the end I just sneak on Facebook for 10 minutes. (Net Generation Male, Sociology University B)

Overall student skills in key areas such as the use of spreadsheets and an understanding of ‘how things work’ were not ‘native’ to the new student entering university, they were developed by training and the requirements placed on them by the university and their department. These are active processes demonstrating agency at a collective and meso level within an activity system centred on the university.

Familiarity with digital and networked technology is said to lead directly to an increased capacity to use new technologies when and wherever they are encountered by young people.
“All of them are ‘Digital Natives’… born after 1980… They all have access to networked digital technologies. And they all have the skills to use those technologies.” (Palfrey and Gasser 2008 p1)

Staff report that students do not have a natural capacity to use required software such as spreadsheets and that students’ understanding of technology can be shallow. We reported earlier that students have a positive experience of university VLEs but low levels of confidence. If familiarity with new technologies was enough in itself to develop skills then higher levels of confidence would be expected to match the positive experience students report.

**Social networks as a universal service**

If the VLE can be thought of as a specific provision made by universities social networking sites represent the kinds of universal services available to all via the Web. These services facilitate interaction between students and machine agency because the social networking site brings together a stream of information from friends and acquaintances with suggestions prompted by computer based algorithms. Even these universal services seemed to be affected by local contextual factors and in particular we found evidence in our survey of significant differences between place based and distance students (Jones et al 2010 p 727). These differences affect the amount of reported use of communication technologies and the types of activity engaged in with technology. For example place based students reported using communication technologies to organize face to face meetings whilst distance students more commonly reported using forums to develop a sense of community and relationships with other students.
These differences reflect the different social contexts of place based and distance students:

…all the students seem to be on Facebook so we tend to do quite a bit of discussion on Facebook which I wasn’t on before – that was something new that I had to get into. (Older Female Social Work University E)

This older student’s engagement with social networking was due to the social context and not simply an effect of exposure to the technology. This contrasts with Oblinger and Oblinger who suggests that exposure to technology might override age group: “Although these trends are described in generational terms, age may be less important than exposure to technology.” (2005 2.9).

A common theme that permeated most of the interviews was the distracting nature of social networking sites. These sites were routinely available whilst students were working on a computer and sometimes accessed using mobile phones, even at times when they appeared to be focused on a work related task.

“…if I’m doing some work and I’ve got Facebook open then I get a message or I’ll see pictures that my friend’s posted from a party and I get distracted and I’ll loose where I was in my work and then it’s a bit like I’ve lost my place and it’s hard to get back in and you know, all from that one
Many students happily accepted this distracting aspect of the technology and almost all, across the full age range, recognised this as a feature and potential cost of using social networking sites, a feature shared by communications technologies more generally (e.g. Facebook, SMS messaging, email, MSN and the Internet). Student interviewees adopted several strategies to deal with this effect of working with communication technologies. The strategies used by students to help them focus on their work were either used individually or in combination and we categorized them as:

- Removing the sources of distraction by switching them off
  “to be honest you just turn it all off and then you just don’t stick with it otherwise as soon as you turn it on, you’re losing time and you’re wasting your own time really.” (Net Generation Male, Modern Languages University D)

- Physically removing themselves from the distractions
  “…and the computer is, is you know, today’s distraction, yesterday it was the TV now it’s the internet (laughs) so it, it has quite a serious downside…I tend to use the Library to get away from technology.” (Older Female Veterinary Science University A)

- Interspersing study with breaks
“...it’s just a matter of the person and whether they can not get distracted by it [technology], but I do think it’s just good to have those things there so that you can have a break and chill out and stuff, while you are trying to work.” (Net Generation Female English University A)

- Working under pressure

“Personally I tend to work best under pressure so I’ll sort of leave it until the last minute... I’ll tend to close everything down or at least have it minimised at the bottom of the screen and ignore it, set myself to appear offline on MSN messenger and leave everything, mainly to stop distractions from people talking to you, and try to ignore everything else.” (Net Generation Female Bio-Sciences University A)

Distraction can be seen as a feature or negative affordance of the communication technologies available to students. They are not passive in response to this feature and their coping strategies illustrate the ways in which university tasks requiring concentration interplay with the social desire to stay connected. Students dynamically manage their activity with communication technologies in order to meet the requirements of being a student.

**Discussion and conclusion**

The Net Generation and Digital Native arguments rest on a simplistic form of causality suggesting that technological change in the world leads to changes in attitudes, and even brain function, as well as behaviour. This kind of argument is not new and generational metaphors have been used repeatedly to capture a
sense of shifts in culture, from baby boomers to Millennials (Howe and Strauss 1991). In popular use such over generalisations are largely benign but when they become an accepted and even received wisdom they hold dangers. Policy makers make use of generational metaphors to describe future intakes of students and to frame plans for the development of educational infrastructures. Teachers begin to design their courses for a presumed audience of Net Generation students.

Czerniewicz et al (2009) argue that: “The particular value of Archer’s work is her interest in the relation between agency and structure from the perspective of the agent, or the person.” (Czerniewicz et al 2009 p 83). The research we have conducted illustrates the way in which the structural conditions that students face at university are to some degree outcomes of collective agency and we suggest expanding the notion of the agent to include persons acting not on their own behalf, but enacting roles in collective organisations such as courses, departments, schools and universities. We showed how staff members design and re-design courses in relation to available technologies and how the availability of the technologies themselves is an outcome of decisions and actions taken elsewhere in the university. Sibeon (2004) has suggested that accounts of agency and structure would be improved by the inclusion of levels beyond the binary of macro and micro. Following Ashwin (2009) and Sibeon (2004) we argue that aspects of both structure and agency are at play at all levels of scale and suggest that the inclusion of meso levels would help our
understanding of students’ engagement with new technologies at university. We argue that we need a notion of agency in which agency is conceived of as being active at all levels and in which agency is an emergent property at each level. For example the agency of a teacher designing a course cannot be reduced to the personal agency of the individual, nor can the design of a VLE be attributed to broad macro forces that are simply acted out a local level.

Individual students are also acting in settings that have increasing amounts of active technologies that replicate aspects of human agency. Increasingly the digital networks through which education is mediated are able to become interactive, for example being capable of providing educationally relevant recommendations (see for example http://www.open.ac.uk/blogs/sociallearn). We also report that distraction is already caused by the intervention of automated processes such as notifications from social networking sites. While Kaptelinin and Nardi (2006) may be correct in arguing that there isn’t a complete symmetry between human and machine agency but there is an increasing likelihood that students will interact with humans and machines in similar ways.

Czerniewicz et al (2009 p 86) show clearly how “students are influenced by, but not determined by, the barriers they face”. Their research shows how students make exceptional efforts to overcome their disadvantages with regard to technology. Our research in a more advantaged setting would endorse their general conclusion that student activity interacts with the availability of
technology. We have argued that our research shows how agency cannot be restricted or reduced to the person. Social roles exist beyond the person and do not simply rely on the motives and motivation of individual selves; they are enforced by collective sanctions that can be physical, economic and moral. In our research we see students providing accounts of how their judgement of the reliability of sources rests on what they are told by academic staff, enforced in assessment regimes and sanctions in terms of what is and is not acceptable academic practice. Czerniewicz et al. (2009), following Archer, see the process as an interplay between social situations and the personal projects of agents (p 87). We argue that it is better understood as part of an activity system within which subjects try to achieve their objects but in which the activity system cannot be reduced to individuals and their goal directed actions.

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