Evolving modes of student use - whither the VLE?

Roger Boyle, Nick Efford, Royce Neagle

School of Computing, University of Leeds, UK, {*roger,nde,royce*} *@comp.leeds.ac.uk*

We consider the issue of where physically Informatics students choose to work. Technological change now offers them a range of points of access, at the same time as institutions are exploiting these modes to the full. In the context of a new institutional VLE, we have conducted a preliminary study of modes of use: we learn, unsurprisingly, that use of central bulk laboratories is diminishing, but that there may be subtle patterns of behaviour evident among individuals.
We note that these behaviours are driven by strong external forces and will not be countered, and further note that there may be cause to worry about students becoming 'virtual', both for their own academic benefit and their enculturation. We conjecture that conclusions for Informatics will be relevant to the whole academy as time passes, and propose work to monitor this issue.

Keywords

VLE, Digital Natives

1   Background and motivation

The Virtual Learning Environment [VLE] is now so common as to be a default piece of the academic landscape. First appearing during the 1990s and deriving from mechanisms designed to support distance learning[1], universities, colleges and high schools now routinely provide mature products as part of their teaching infrastructure. Their capabilities are very well known, but in summary, the VLE of 2008 will provide mechanisms for curricular repositories, coursework management, messaging between students and staff, video and audio handling, blogging and collaborative working using tools such as wikis.

The VLE has gone through a maturing phase: while once it might have been regarded as novel (often a drawback in educational domains), the number of competitors has shaken out to a very few: the market is dominated by BlackBoard [3], the public domain Moodle [13] and a small number of others.

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[1]Wikipedia, inter alia

1.1 Expectations and behaviour of modern students

For universities, there can be a drawback in the ubiquity of such products: new students often come to universities expecting the environment to be 'new', 'exciting', 'different', . . . , and there can be negative reactions to software environments that are just the same, functionally at least, to those they had at school. We might hope that the actual *use* that higher education [HE] puts them to goes some way to restoring expectation.

But there is another effect at work that presents more fundamental problems for HE which will be absent, or much less evident, in high schools: the modern student is a *Digital Native* [14] and comes to us with a far more blase view of technology in general. This is not a superficial or facetious observation – the preconceptions, attitudes and motivation of our learners is something that those of us who are Digital *Immigrants* (to use Prensky's useful definition) sometimes struggle to comprehend. This often deep social rift can be especially evident when we try to deploy the technology which they take for granted in pursuit of our aims – however well we understand things, we remain immigrants.

Prensky's useful terminology may well be viewed as one aspect of a much broader and well documented sociological effect: aspects of post-modernism that have been well documented by, for example, Bauman as *Liquid Modernity* [1], and Beck as *Second Modernity* [2]. These authors describe aspects of societies in the late twentieth and early twenty-first centuries: '*inhabitants live in a perpetual present*', '*people are constantly busy and perpetually short of time*', '*social networks are not being added on to the national container; they are changing its nature*', '*a society preoccupied with the future*'. Many would agree that features such as this are especially evident among current students and schoolchildren. The sociological thesis is that these effects are not cosmetic, but fundamentally affect the way we live, and it is easy to see that attitudes will develop that present serious challenges to traditional modes of education. Students often exhibit a 'here today, gone tomorrow' approach with scant regard or interest to the longer term or historic causes – credentials as Digital Natives simply represents the communication channel they choose to use. These are major issues that others address – here we consider only that aspect which might impact on mode of computer use in education, particularly as exemplified by a VLE.

1.2 Implications for technology in teaching

The consequences for these issues may become significant, and may already be so. Habits of computer use among Informatics[2] students are often advanced, and often not representative of the broader community, but *do* often become so – what our students are doing this year is standard practise in science and engineering a few years later, and across the institution shortly after that. In computer demand and use, our students can be a signpost. And in many universities, Heads and Chairs of computing departments are reporting much reduced demand for the bulk facilities that have been essential provision for decades. The reasons are easy to

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[2]In this paper, we use the term 'Informatics' to include degree programmes in Computer Science, Computing, and a wide range of cognate areas.

understand: consumer electronics are at a price that permits many students[3] to own platforms at least as good as the university provision, and domestic broadband Internet connection is ubiquitous. In addition, laptop users frequently have easy wireless access throughout their institution. Ergo, significant amounts of work are being done 'somewhere else', leaving the university sweatshops underpopulated.

An early reaction to this is approval: bulk laboratories are expensive to procure and maintain, and need regular upgrade – how much better if the institution has no need to provide them. But there may be drawbacks:

- Institutions commonly state expectations on student hours (in the host institution, 10 hours per credit point, aggregating to 1200 per academic year). Only a small proportion of these hours is formally scheduled and expectations are made about independent study, often cited as a feature of the successful student. In Informatics, this private study is rightly dominated by some use of computers. Various studies sound warnings about the assumptions made about this use of time, and these warnings carry more weight as the pool of students becomes broader, and pre-university education does less to encourage independent learning.

  It seems clear that student time investment and, more particularly, nature of use of time, can be critical to the quality of their learning [6, 11, 12]. Moving to systems such as VLEs where by design time is much less directed, may well have unanticipated pitfalls.

- Secondly, one of the major benefits of higher education is the *enculturation* of the student into her chosen discipline (whether it be Informatics, Physics, Philosophy, . . .), and this comes most easily from physical interaction with peers and academics. Acceptance into the community [19] is not a luxury, but is an essential part of the transition that HE provides: '*students are too often asked to use the tools of a discipline without being able to adopt its culture*' [17], '*student do not only learn knowledge in the classroom, they learn a set of practises*' [4].

  Acquiring community membership (in all disciplines) has historically been semi-automatic as successful students live and work physically within a department among some of that community's strongest exponents. While physical participation in the academy is not essential, it is customary, and the consequences of its loss deserve consideration and caution.

1.3 This study

So we consider a scenario in which we detect – anecdotally – major changes in the patterns of work of some of our students that may give cause for concern, both for their curricular experience and their induction as computer scientists. In the host institution, a new VLE is being commissioned at significant expense and the scope for accelerating the change in these patterns is obvious, and in some quarters applauded and encouraged. We mean, accordingly,

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[3]In informal surveys, we learn that nearly all students have private provision of a quality that matches the institution's.

to discover what we can about the nature of this use, and whether it influences in any way the quality of the student experience and their evolution into proper members of the community of Informatics. Earlier related studies [6, 16] evidence that collecting accurate data of this nature is not easy, and an objective approach to this is one of our aims: but it is also noted [16] that quantitative data alone is insufficient fully to understand behaviour, and qualitative follow-up is essential.

This paper considers the nature of the modern VLE, and an overview of the range of technology-based teaching that is currently seen and being developed. We note the extent to which these technological developments provide the potential, at least, for significant changes in student working practise. We then present results and comments on a preliminary study conducted at Leeds on the effects we have discussed, and draw some conclusions on what it means for the modern academy.

2   Technologies to supporting learning

There is a wide range of technologies on offer to modern HE: some of it (bulletin boards, plagiarism detectors etc.) is well established and mature; other aspects (e.g., pod-casting) are recent, hinging on pervasive ownership of consumer electronics. At the other end of the spectrum, special-purpose installations may be procured to facilitate specific modes of learning. An example is the 'Techno-cafe' (for example, [8]) where large screens are provided in a group working environment, making cross-site collaborations an easy possibility.

It serves to stand back and think about a time 10, or even just 5, years ago and to consider the contrast in usage. Various factors are simultaneously at work;

- The range of communication and digital electronics that teenagers will expect to own – phones, cameras, iPods, . . . – has grown significantly, as has their capability.

- Their relative cost to the consumer is dropping, certainly when capability is considered.

- Internet access by domestic broadband and public (or institutional) wireless has grown enormously.

- All of the above have been noted and used or acknowledged in schools.

These are statements of the obvious, but we stress that we are seeing the Digital Native here, not people exercising luxury choice, or recreational behaviour. This is of course less true of installations such as 'Techno-cafes', where a sense of novelty and difference will perhaps exist. Overarching all this is the VLE: well established in nature since the 1990s, it continues to evolve and will these days routinely provide teacher and students with video and audio facilities, and easy cross linking into popular repositories such as *YouTube* and *Flickr*.

The Universities and Colleges Information Systems Association[4] conduct a regular survey monitoring the penetration of VLEs and MLEs in the UK: it is being conducted in 2008, but the last published report (2005) [10] tells us that:

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[4] http://www.ucisa.ac.uk/

- They are widespread: at that time [in the UK], post-1992 institutions (ex-polytechnics) predominated.

- Majority use was for for accessing course material. PDP use was growing.

- Central university units usually provided support and future strategy, with close interaction with external national agencies.

- It was becoming an expectation on staff to use them, where they were available.

We can confidently expect these features to be more evident rather than less in the survey underway; the VLE has demonstrably become an academic 'must have', and not a Learning and Teaching option or luxury. The survey by design concentrated on HE, but we have abundant, if anecdotal, evidence that VLEs are similarly widespread in the pre-university sector. For students, they are routine.

The host institution for this work has used a homegrown VLE, 'Bodington' [5], for ten years. Some faculties within the institution have developed considerable experience over this period in the use of a 'blended learning' approach that combines VLE-hosted materials and activities with traditional face-to-face teaching via lectures, seminars, laboratory sessions, etc. There is a long-held desire to build upon this experience and develop an institution-wide blended learning strategy that addresses key institutional goals such as translating excellence in research and scholarship into learning opportunities for students, or refining assessment practise and improving academic feedback.

Two years ago, it became clear that the existing VLE solution would struggle to meet the future need for widescale adoption of a blended approach to learning and teaching, and the institution agreed the business case for procurement of a new VLE. The procurement process began in January 2007 with an invitation to tender via the European Union's OJEU tender process and concluded in June 2007 with a decision to purchase licences and services from Blackboard. This decision was motivated by a number of considerations, among them the fact that Blackboard's system offers a wide range of functionality, along with the ability to extend this further via a 'plug-in' architecture and integrate with the institution's existing e-learning tools—notably Questionmark Perception [15] and Turnitin [18]. Blackboard's widespread use by partner and peer institutions of similar size and complexity was also a factor in its favour.

The institution has a two-year rollout strategy for the new system, based on an expectation that early adopters (largely comprised of users of the existing Bodington VLE) will spearhead its use during the 2008-9 session and that the majority of modules will be making some use of the VLE during the 2009-10 session. Implementation of this strategy is being supported by appointments within each faculty of a full-time support officer and a part-time coordinator. These individuals have the job of assisting teaching staff with the transition to blended learning techniques using the VLE and with the migration of teaching materials and activities from Bodington to Blackboard.

The two-year rollout strategy is part of a broader, five-year vision stating that, by 2011-12, the use of the VLE and other learning technologies to provide a blended learning experience will be the normal expectation for all staff and students. To help the institution achieve this goal, funding is being provided to each faculty for pilot projects that explore innovative uses of the VLE.

Question	Yes
Do you have access to a desktop computer or laptop where you live, while you're at university?	100%
Regularly use mobile	88%
Allow university to communicate using mobile	75%
Regularly use SMS	88%
Allow university to communicate using SMS	81%
Regularly use IM	81%
Allow university to communicate using IM	47%
Regularly use social networking sites	83%
Allow university to communicate using social networking sites	44%
Regularly use sharing sites	64%
Allow university to communicate using sharing sites	37%
Regularly use virtual communities	5%
'Social networking sites are to talk to friends or make new friends'	80%
'Social networking sites are to search or share information'	36%
Not using social networking sites, but with no reason	10%
Not using social networking sites, because of no Internet	0%
Always have a mobile phone	98%
Always have an mp3 player	49%
Always have a PDA	10%
Always have an iPod Nano	15%
Always have an iPod Video	14%

Table 1: Selected results from University of Newcastle questionnaire. This work was conducted as part of CETL ALiC [7].

3 Technology Utilised and Owned by Students

The Digital Native of today is very technology savvy, and we present a snapshot.

A preliminary survey performed on first year students at the University of Newcastle in 2007[5] demonstrated a high percentage of access to technology – this is summarised in Table 1. In addition to institutional provision, all seemed to have independent access to a desktop computer or laptop while at university. One aspect to materialise from this survey is how students communicate with the University: only a third of students were found to have a landline with most students using mobile phones.

Additionally, there was widespread use of PDAs and similar 'this year' consumer devices. The data summary given above is but a snapshot - behind this the trend is clearly toward such accessories.

Many students use instant messaging and social networking sites such as Facebook and MyS-

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[5]In preparation for publication.

pace. About half the students allowed the university to communicate using these means, and see social networking sites as a means to communicate with friends and make new friends. Only a third of students use social networking sites to search and share information. There is a wave of interest from HE in exploiting social networking which is proceeding with mixed success [9]; the Natives do not always welcome the Immigrants onto home ground.

The details of these data serve to verify what we may expect: all our students are Digital Natives and the way they choose to conduct their lives is determined by this. Their range of opportunities is broad, and they have mixed feelings about 'the university' intruding.

We anticipate that these patterns will strengthen within a small number of years – certainly, such a survey conducted 5 years ago would have shown weaker patterns of behaviour.

4 Working Habits of Students

We have set out to determine where and when students choose to work within the range offered to them: at simplest this is within traditional laboratories, 'at home' (which may of course imply a student residence), or using a laptop on the move, probably using the intuition's pervasive wireless. This is a crude classification that conceals many other modes of use and communication such as WAP and, for example, iPhones. For this initial study, we sought to learn (i) by percentage, where work is done; (ii) at what time(s)work is done; (iii) by percentage, where work requiring specific resources is done.

This is an indicative survey only and we make no suggestion that it is exhaustive or thorough. Students were canvassed via:

- Online bulletin boards

- An e-mail canvass

- Via a 'spot questionnaire' in a lecture

(The first two here may well have a self-selecting effect on the respondents). The following questions were put

1. There are three places you can study and work: Lab Computer, Home Computer, Roving on a Laptop. Please estimate the percentage of time you spend on each, and why.

2. Approximately how many hours a week during term time do you spend on a computer to study and complete work during Morning, Afternoon, Night, and why?

3. Estimate the percentage of time you spend while accessing University resources (e.g. coursework specific applications) in the areas of: Lab Computer, Home Computer (VPN, CITRIX or other), Roving on a Laptop (VPN, CITRIX or other).

4. How do you access School of Computing and University of Leeds resources?

The survey had 27 responses via email (5), bulletin board follow-ups (5) and paper submissions (17); it provides interesting outcomes and will serve as a very crude benchmark for fuller surveys in future years.

4.1 Results – how and where Students Work

Given the rough and ready nature of the survey (a small sample, almost certainly not fully representative), we can only present the roughest of results, but nevertheless they are food for thought, suggesting a bimodal split in the use of computers. Arbitrarily selecting a threshold of 60% to determine where subjects spend a majority of their time working, we found that 11 subjects preferred to work from home, while 10 preferred to work from a computer in the university lab (Figure 1, left).
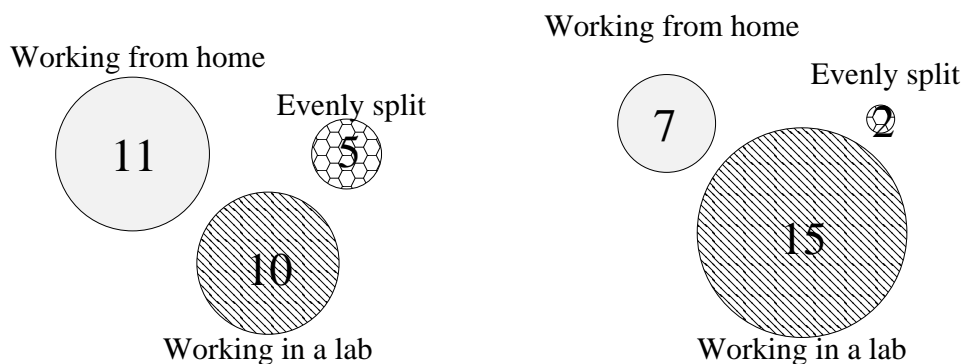

Figure 1: Number of students working in labs, at home, or both. On the left, general computer usage and on the right, doing coursework requiring specific resources.

Considering where work is done when resources within the university are required, we know that many students are able to replicate the university environment almost perfectly (perhaps to higher specification) on private systems – we might hypothesise that these are among the 'better' students.
Students who prefer to work from home but are unable to utilise resources from the university would probable work in the university lab. Our crude analysis of responses has some support for this (Figure 1, right)
Considering preferred hours of operation, the variability in behaviour is again very evident. There is no such thing as 'average behaviour', with some students preferring to finish academic work before the evening, and others preferring to work at night and only doing during daylight what the timetable strictly requires.

Working in Comfort and the Working Environment

Of greater interest than the raw numbers are the reasons and opinions that lie behind some of them; many of these appeared to be related to environmental issues. A representative sample of comments from 'home workers' is:

- *Lab computer chairs are quite uncomfy and the labs tend to have extreme temperature changes! I prefer the home comforts whilst working also.*

- *I would stay more in labs if there would not be freezing [sic]. Air conditioning was sometimes crazy. And also Labs were sometimes quite noisy.*

- *The main lab. is far too busy and freezing! The smaller one – quiet but far too hot! Home – nice surroundings, can grab a cuppa, quiet! 20% in uni is usually group discussion.*

- *. . . convenience, comfort, quietness . . .*

- *My work environment at home is a lot better than labs, e.g. quiet, more relaxed. Computer setup is a lot better than the labs.*

We note several comments on home comforts: interestingly, students that worked more often from the labs cited the good working environment they provided, with fewer distractions: *Prefer to use SoC computers as its easier to work in Uni (less distractions) . . .*

Support and Resource

Another prime motivator was access to help. Students who generally worked in the labs cited two main reasons: the resources available, obviously, and help was available from staff and peers if there were problems.

- *Work in labs when help is available or don't have tools that I need at home. Working at home makes it easier to take a break, and save time walking in and back.*

- *Lab is good for group work and moral support.*

The comments here are not all from weaker students who might be expected to be seeking help: we have held follow-up conversations in a small number of cases with the strongest individuals of the cohort, who intentionally occupy space near the staff they like to access. They are overtly joining the 'community' [19].

5 Discussion

We consider, despite a small and probably biased dataset, that we have identified an issue that may develop into a problem. The choices in front of students lead to very variable modes of behaviour, and the move toward more elaborate electronic support – by design – will increase this. Of course, increased affordability of suitable electronics will at the same time do so as well. This variety is largely untracked (although we uncover it here), is evolving, and is consequential. Does it matter? Our entry point for this study was twofold: the time students actually spend studying, and their success or failure, howsoever, in engaging with the community that is the academic department. Disentangling either of these is probably a deep and long-term issue, most unlikely to be answered by superficial surveys. Thus, our conclusions here are primarily a catalyst for future work, described below.

This brief survey does go slightly further: in collecting data conversations were held with two students who, entirely by coincidence, represented extremes of the spectrum:

Student A: (Very strong - a clean sweep of First Class results). A adopted a mode of working with 10% at most of his time 'at home', although he had a highly sophisticated domestic installation on which everything was possible. He preferred to avoid laboratories because of environmental concerns, but made tactical use of his personal laptop, occupying space

frequented by other students and the staff that were key to his study. Being strong, he was a major asset to other students he worked with and presumably derived benefit from speaking with them: he derived much more direct benefit by frequent, planned interaction with staff.

Student B: (Very weak - a 'results struggler' who failed his capstone project . . . most unusual). B conducted nearly all his practical work at home, citing technical superiority and 'convenience'. The former reason is probably unarguable (laboratory machines look old very soon after bulk purchase), but in conversation he went on to explain that he often had difficulty motivating himself in an environment of distraction. Having established an absence habit, he was rarely seen in the Department and was a poor attender at project supervision meetings.

A here is the student we all want: clever, motivated, communicative, good study skills, good problem solver; B is the antithesis. The interest in these examples is that they have both managed to maximise their strength/weakness by chosen mode of operation – working at home, maybe A would be just strong, not very strong, while more academic interaction might have pulled up B's performance just enough to get a degree.

Of course, other examples will exist of home dwellers excelling and laboratory denizens failing, and for many reasons. This just confirms our view that there is a range of behaviours that we need to understand and track, and then plan (or compensate) for.

This study thus defines a range of questions that we seek to answer

- Across a full cohort, is our sample in any way representative?

- Do these patterns evolve as students become more senior, and how?

- Is there any correlation between student performance and mode of working?

- Is there any correspondence between a sense of community membership and mode of working?

The advent of an entirely new VLE environment is opportune: institutional policy directs that maximum use will be made of it (trivially, every module will have at least a rudimentary presence). VLEs come equipped with monitoring facilities, but we will augment these with the wherewithal to monitor the points of access of students, thereby automatically deriving the raw data illustrated in a sample here.

This is simply raw material, however: it then becomes important to disentangle truths in a qualitative fashion and we will conduct interviews and deeper studies to try to determine the academic effects of modes of working, and how these evolve during and after university study. The benefit should be some understanding of what – for the Digital Natives – works and what doesn't, and thereby an opportunity to play to strengths; to seek a balance between working virtually and direct contact with staff that is optimal for the individual. This is likely to imply modes of VLE use that are different to historical approaches.

6 Conclusion

Conclusions from a brief and unrepresentative survey are clearly of little value, but we consider we know enough to present an issue. We feel we have confirmed that a significant number of students are voting with their feet, and choosing to work away from the institution; probably a significant number of others are doing this 'to some extent'.

We take the view that wholesale absence from the university environment is not good for dual reasons:

- Private study time is critical to winning a degree of quality, and there are doubts that it will be optimally or well spent in private home comfort, especially among newer or weaker students.

- Physical interaction with the discipline – the staff – should not be seen as optional in the education of the next generation of Informaticians.

Nevertheless, Knut-like we recognise that we cannot roll back the tide. The Digital Natives will behave as they wish and it is up to us to bend our processes to help them.

We will continue to monitor the mode and nature of use, with more precision than the simple survey presented here. We suspect there are patterns of use related to student prior experience and possibly to intellectual aptitude, but that may be hard to demonstrate. We are confident that these patterns are fast evolving in time, and it behoves us to be ready for what is to come.

7 Acknowledgements

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