Laptops and learning spaces: online, offline and in between

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Abstract

Researchers in the field of networked learning have recently sought to understand the sociomaterial practices involved in networked learning (McConnell et al., 2012). This paper investigates the sociomaterial influence of laptops as students traverse a variety of learning spaces and considers the role of these devices in changing learning. Current conceptions of learning spaces in Higher Education prioritise physical 'places' such as libraries and lecture theatres. The mobility of laptops and related technologies challenge this perception. This paper brings together some central ideas for understanding learning spaces (Boys, 2011; Temple, 2011; Savin-Baden, 2008) and positions these in relation to networked learning. We consider the interrelationship between physical learning places and immaterial, technologically mediated spaces. The paper reports on data from a one-to-one laptop pilot at the University of Cape Town, South Africa. While the initial project was conceptualised as an evaluation of students' laptop use in four courses, the pilot evolved according to the needs of the project and became more akin to participatory action research over time. We consider dynamics related to networked learning in a resource constrained higher education environment, where personal computer access and internet connectivity is not the norm. In our context, many students rely on mobile phones as their primary means of internet access off campus (Czerniewicz, Williams & Brown, 2009). Students' laptop use suggests that learning spaces cross boundaries between formal and informal learning, include a range of physical settings, and involve learning both online, offline and in between. Our analytic focus has shifted from separate contexts or bounded spaces to a continua of activities across domains. This paper contributes to previous research on reconceptualising learning space in networked learning (Smith, 2012) and concurs with Ryberg & Larsen (2008) that we are seeing increased opportunities for individualised as well as connected learning. As a mobile device, the laptop facilitates interactions, challenges traditional learning spaces and influences educational practice. We argue that the notion of learning spaces allows researchers to attend to the nuances of teaching and learning interactions with technologies in a variety of physical places. In relation to laptop use at university, networked learning involves the orchestration and personal management of learning spaces online, offline and in between which depends on students' discipline-specific needs.

Keywords

Learning spaces, networked learning, laptops, mobility

Introduction

Learning spaces, within the context of Higher Education, now extend beyond traditional, physical environments such as computer laboratories, lecture theatres and libraries. Such spaces are increasingly mediated by new technologies. Current research on learning spaces tends to prioritise the design of physical places (Oblinger, 2006), view online and offline spaces as separate i.e. physical places and electronic spaces (Jamieson et al., 2000), or distinguish between different types of learning spaces based on their possibilities for engagement (Savin-Baden, 2008). Leander, Phillips and Taylor (2010) argue that mobilities and their relation to learning within education are still understudied and undertheorized. They consider the relationship of learning to space and place in educational research, and highlight a dominant discourse of the classroom-as-container. According to Leander et al. (2010), this discourse functions as an 'imagined geography' of education, constituting when and where researchers and educators should expect learning to 'take place'. Temple (2011) also considers the relationship between space and place. He argues that understanding space and place in universities goes beyond the notion of ideas embodied in buildings, or that buildings help to create the brand, and instead proposes the

notion of how space becomes place, and how it may shape the academic work of the institution. He presents a more nuanced perspective of universities as learning spaces involving the creation of social capital.

Like Leander et al. (2010), Boys (2011) also attends to learning spaces and invisibility. She argues that embodied experiences (and learning) are social and spatial practices, deeply informed both by their situated context and what individuals and/or groups brings to a space. Citing Sagan (2011), she frames learning space as the patterning of socio-spatial practices and asserts that "the 'space' to be explored is not so much the external, physical environment itself, as the spaces in-between what we bring to a situation, and the material context in which we find ourselves" (2011, p. 51). Boys (2011) uses architectural and educational theory to inform built space and does not have a particular interest in technology per se, a contribution made by Savin-Baden (2008).

Savin-Baden (2008) delineates between different types of learning spaces (writing spaces, dialogic spaces, reflective spaces, digital spaces, troublesome spaces, immersive spaces) and the possibilities for engagement that these create, as well as considering the importance of liminality for transformative pedagogy. In this paper, we argue that laptops transform places and sometimes create troublesome spaces, drawing on Savin-Baden's emphasis on disjunction and liquid learning in these spaces. The notion that "there appears to be a shift away from containment and control though the kinds of digital technologies that have become spaces of interruption" (2009:8) resonates with our work.

Sociomateriality and networked learning

Burnett (2011) highlights the (im)materiality of educational space and the need to consider interactions between the material, connected and textual dimensions of networked technology use. She explores dimensions of the educational spaces associated with using networked technologies in contemporary classrooms, and considers how educational spaces may be 'produced' by drawing on narratives of classroom practice to explore three dimensions of educational space (material, connected and textual). Burnett (2011) considers the implications that these relationships may have for the use of networked technologies in education. She argues that the need for such research is particularly pressing, given increased calls for transformative pedagogies which demand new ways of interacting within and between educational spaces.

Benfield and De Laat (2010) argue that networked learning is an alternative approach to technology-enhanced learning, preferring a broader perspective open to individual and collective learning, as they feel researchers often place too much focus on the role of the computer. They define networked learning as "the use of ICT to promote collaborative or cooperative connections between learners, their tutors and learning resources (Steeples & Jones, 2002) and to enhance the efficacy of learning among its members" (2010, p. 186). However, De Laat (2008 cited in Benfied & De Laat, 2010) notes that interest has now turned to the social learning aspects of networked learning, with a focus on building and cultivating social networks and seeing technology as a part of this rather than as an end in itself. We argue that learning spaces and devices such as laptops are part of the picture, as these change the space for learning and the affordances of the physical place (i.e. wireless access, power plugs) form part of the sociomaterial aspect of networked learning.

Laptops in Higher Education: A South African perspective

While the integration of laptops in Higher Education is not new, access cannot be assumed in resource constrained universities, such as in South Africa. Even at the University of Cape Town – South Africa's oldest University – we cannot expect that all students have access to ICTs, nor can we adopt the view that everyone has the digital skills they need for University (Brown, 2012). In the South African context, technologically immersed and savvy youth are in the minority and represent an elite, rather than a majority (Brown & Czerniewicz, 2010). Many students entering university are outsiders to the digital world, and can thus be described as "digital strangers" (Brown & Czerniewicz, 2010, p. 363). This cautions against uncritical adoption of the concept of young students as "digital natives" as espoused by Prensky (2001).

Complex relationships exist between students' access to ICTs, home language and socio-economic background. "Sixty three per cent of students from low socio-economic backgrounds indicated that they had below-average ease and adequacy of access to computers off campus, compared to 49% of students from high socio-economic backgrounds" (Czerniewicz & Brown, 2009, p. 66). Brown argues that this is not unique to South Africa as:

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Findings from elsewhere show that amongst youth globally, access is concentrated in the middle/high socio-economic groups (World Bank, 2007) and that people who suffer social disadvantage are much more likely to be disengaged from ICTs than the socially advantaged (Helsper, 2008). (Brown, 2012:43)

Brown (2012) reports that students who spoke English as a first home language had much more access to a computer off campus than those who spoke English as a second language; 31% of English second language speakers had no access to a computer off campus compared to only 10% of English first language speakers.

Description of the courses

One of the aims of this project was to enable new teaching and learning opportunities through universal ownership of a mobile device. Lecturers in four courses opted to participate in the pilot which would make laptops a compulsory requirement for their students. Given the resource poor context of many South African students, the University of Cape Town approved the provision of laptops for students on Financial Aid.

Each course had a different vision of how laptops would be integrated into the curriculum. In the first year Law course, students used their laptops to type lecture notes and access online resources, such as lecturers' slides, vodcasts, an electronic version of the course reader and additional readings. Laptops were voluntary in the lecture theatres, but essential for accessing Learning Management System (LMS) based resources and assignments. In Chemical Engineering, lecturers encouraged students to use their laptops during lectures and tutorial sessions. Students engaged in audience response systems during lectures, annotated lecture slides, and completed class assessment and group activities. By contrast, lecturers in the second year Architecture course requested that students put their laptops away during lectures, but the laptop became in an integral device in studio sessions where students worked on their assignments, and discussed projects with tutors and fellow students. In the first year Physics course, students had 'laptop rich days' where the device became part of lectures, was used in lab sessions and was critical for the submission of tutorial assignments.

In this paper, we aim to understand how students use laptops to create learning spaces in, across and in tandem with physical places. We examine students' use of laptops in these varied disciplinary contexts. Exactly how technology is being brought into physical learning spaces depends on the subject cultures of these fields, what is perceived as legitimate or not, lecturers' use of educational technology, students' appropriations of the laptops, and what social interactions they engage in to reproduce or transform the learning space (Burnett, 2011).

Rationale and research questions

Educational technologists are often confronted with formal versus informal dichotomies when discussing learning or settings in Higher Education. We argue that the notion of learning spaces allows researchers to attend to the nuances of teaching and learning interactions with technologies in a variety of physical places. The physical place does not predetermine the kind of learning taking place. Conceptually, learning spaces is also well-suited to seamless learning perspectives, where learning occurs "across a combination of locations, times, technologies or social settings" (Innovating Pedagogy Report, 2012).

In this paper, we are particularly interested in the role of laptops in transforming or disrupting the physical learning space, as well as how such devices enable the crossing of boundaries between learning online, offline and in between. Thus, our research questions can be summarised as follows:
* How do the interactions between students, lecturers and mobile devices (in this case the laptop) transpire both in and outside the lecture theatre?
* How do laptops shape and challenge the meaning of traditional learning spaces?
* What new learning spaces are being created through the legitimation of ICTs within the classroom and how are students producing or transforming the learning space?
* How does the subject culture or disciplinary space influence the educational practice of laptop use both in and outside of the classroom?

Ito et al. (2009) mention different genres of participation that young people undertake when using ICTs in different settings ('hanging out', 'messing around' or 'geeking out'). They argues that beyond access (to the Internet, technological resources, etc.) media ecologies, including communities of expertise, enable young people to engage in more sophisticated socio-technical practices. More generally, their work suggests that

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various forms of connectivity (to the Internet, peers, resources, etc) shape what one is able to do and how one's potential for networked learning opportunities depend on various sociomaterial conditions.

Methodology

The project team comprised members of the University's Information Communication and Technology Service (ICTS), the Centre for Educational Technology (CET), lecturers involved in the pilot and a part time researcher. We met monthly to share challenges and successes, and to discuss progress and issues. The initial research project was conceptualised as an evaluation of students' laptop use in four courses. However, the pilot evolved according to the needs of the project and became more akin to participatory action research as engagement with the community involved a range of ethnographic methods, such as observation, in-depth interviews, and the findings were continuously linked back to the initiative to enable the project's development (Tacchi, Foth & Hearn, 2009).

The researcher became a part of the course in the sense that her role in researching and evaluating the pilot was made clear to students at the start of the first semester. She attended lectures and studio sessions to observe interactions, conducted unstructured interviews with students throughout the semester, and seven structured focus groups with students at the end of the semester. These groups comprised four to ten students, one from Physics and two from Chemical Engineering, Law and Architecture. 43% of 486 students in the pilot (N=127 Chemical Engineering, N=70 Physics, N=221 Law, N=68 Architecture) also completed a survey about their experiences. In this paper, we use a mixed methods approach including student focus groups, interviews with both lecturers and students and observations of interactions (captured photographically) in both physical and virtual learning spaces.

Textual data relating to issues around space and place of learning were extracted from the transcripts and coded in Excel. After an initial reading, data was grouped into three categories; namely references to learning space online (eg a facebook group), references to learning space offline (eg lecture theatres) and references to spaces in between (eg mobillity). We coded thematically and drew on Savin-Baden (2008) different types of learning spaces to understand the types of learning occurring in each space.

Findings

Laptops online

Savin-Baden defines digital spaces as those in which "communication and interaction are assisted, created and enhanced by digital media" (2008, p. 91). She highlights various examples of digital spaces that include LMSes, social media, e-portfolios and mobile learning. Savin-Baden is particularly interested in the spatial organization of digital spaces and the influence this has on pedagogy. However, she does not separate out the nuances of when students are online and offline. This may be because her context is a resource rich environment where digital equates to the internet.

By contrast, we find students using their laptops as learning spaces in different ways depending on the nature of the work they are doing and their level of connectivity. In our context, when students are on campus, we can assume that they are able to be online as our ICTS has developed a structured approach to wireless access with access to "Wifi" being increasingly rolled out across campus. So whilst on campus, we can assume students are online.

Laptops on campus: in the lecture theatre

Savin-Baden (2008) sees lecture theatres as formal learning spaces which imply tradition and knowledge. She argues that particular spatial practices represent the way in which space is produced and reproduced. Lecture theatres are striated learning spaces which are enacted in classroom practices with a sense of subordination to an expert, students are expected to take notes and learn, and subsume disciplinary practices, rather than challenge them (Savin-Baden, 2008, p. 13).

In this context, students' use of laptops form part of classroom discourse. The spatial design of the lecture theatres with desks facing the front of the room reinforces this pedagogic relationship. However, the legitimisation of laptops in lecture theatres starts to disrupt this practice. In the Chemical Engineering course,

collaboration is scaffolded during lectures and students participate in group projects. Students, tutors and the lecturer were often seen walking around the lecture theatre to communicate.

As a course lecturer noted, the use of laptops in the lecture theatre increased engagement between the lecturer and the class: "we have quite nice discussions around… like, there was one, it was, like, four in the afternoon, everybody wanted to [stay till] it was four thirty". Thus, the lecture theatre also allowed more dialogic spaces, which Savin-Baden (2008) defines as spaces where critical conversations occur and give rise to dialogic learning where "insights and understandings emerge through dialogue in a learning environment" (2008, p. 54).

The adaptation of the pedagogy to the learning spaces (Savin-Baden, 2008 p. 22) did change the dynamics of engagement both between the lecturer and students, and amongst students themselves. Savin-Baden argues that "smooth learning spaces are open, flexible and contested, spaces in which both learning and learners are always on the move" (2008, p. 13) and are "encouraged to contest knowledge and ideas proffered by lecturers and in doing so create their own stance toward knowledge(s)" (2008, p. 14). She argues that striated and smooth learning spaces can pervade, emerge from and even invade each other. The lecturer also noted the more fluid engagement between students from different social backgrounds and noted that although there was a "slight upward middleclass shift [more] than 20 years ago" there was now "a lot more crossover of who is checking out whose computer".

The introduction of laptops into the formal learning space also increased opportunities for feedback. In the Physics course, a student commented on how an audience response system increased engagement: "because it's anonymous. And I think he (lecturer) changed the course of the lecture based on the answers. Like if too many people go wrong he'd go over it again." Although this is a move towards transforming lectures into more dialogic spaces, the lecturer still has control of these forms of question-and-answer interactions, whether or not they will take place and at which point during the lecture. In some cases, lecturers felt the need to keep some of that control. For example in the Law course, the Lecturer notes that "I don't want them to have the power to alter the slides, so instead I've just typed them up as Word documents and then they can do it there." Thus, while she managed to open up opportunities for sharing her lecture slides, she still desired control over the content by restricting students from annotating her presentation slides.

Laptops on campus: in the lab and studio

In two of the courses students also used laptops in the laboratory and studio learning spaces to undertake and complete practical assignments. While assessed, these environments may be considered as smooth learning spaces. Here laptops fitted in more comfortably into the desired curriculum as the learning was more exploratory and participatory.

A lecturer in physics noted that laptops were "useful in labs" and that "students found it more natural to use their laptops in labs". This was confirmed by students who reported that it was

> nice to hear about like the concept and then to see a program illustrating the concept at the same time. Like I think that helps strengthen your understanding quite a lot, especially with strings.

We see evidence of the learning space enabling revision, reinforcement, and greater engagement with content. Whereas the Physics lab is only a weekly activity, Architecture students spent most of their time in a studio where they work on projects and attended 'crit sessions' with tutors from industry. The studio was used in both a formal way for 'crit sessions' where tables in the centre of the room resembled a boardroom as well as a space to build models and complete course work. The flexibility of the laptop was vital here as for the formal sessions, they were completely invisible, pushed to the periphery of the class or packed away. Once the students begun to undertake course work, the laptops emerged as a learning tool as this student describes,

> Already I think a lot of people have been importing their hand drawings and polishing them up on computer and consolidating them. It's much easier to get the effect you want, you can use the same drawing in different ways and not have to redo everything. So digitising all the drawings, even though they started off by hand, they are all consolidated on the computer.

Previously, students needed to leave the studio space and walk to a computer lab in order to make the transitions from hand to digital. Large drawing boards were also removed from the studio, as these took up a lot of space and students hardly used them once they all had laptops. Additionally, the incorporation of the laptop in the formal learning space not only saved time but facilitated greater peer collaboration:

> The nice thing about working in studio with our laptops, sometimes we will all sit together and then we would like work together, like ask each other questions and stuff, so you don't have to stand up and go to the lab. (Architecture student)

Laptops online: LMS and social media

The formal or official online learning space for students is typically the University Learning Management Systems (LMSes). At UCT we use a Sakai based system called Vula (which means 'Open' in isiXhosa). In three of these courses, Vula was used as a central online space to manage resources and interactions. As one student notes:

> You need it all the time unless you have access to the library every, like, half an hour because they're always posting things on Vula… (Law student)

Lecturers in the four courses used the LMS in different ways. While some lecturers used the platform to make resources available to students and post announcements, others encouraged student interaction by participating in the chat room and question-and-answer features. In the Chemical Engineering course, the chat rooms have been very active. As one Lecturer notes, "The chat room is used WAY more than I ever saw it used in the previous course. And it is quite a range but does indeed tend to be quite simple questions like these which are technology enabled". The chat room is often used for peer support where students assist one another with technology-related queries.

However, students also use the online space to engage in conversations outside of the formal learning environment. The Architecture students did not participate in their LMS, and set up a secret Facebook group instead. One of the Architecture students explained this decision as follows: "I think with Vula is that the lecturers can still see what we've said on chat, so it's just that privacy, not that it's a big issue or we have anything to hide from them, we feel just more comfortable". This is an unexpected learning space as result of a disjuncture between students' and lecturers' learning stances, and their perceptions of what counts as curricular spaces (Savin-Baden, 2008 p. 23). The students' decision to use a secret Facebook group rather than collaborating with classmates using the university's LMS also resonates with Benfield and De Laat's (2010) notion of the academic panopticon where students are aware of their online activities potentially being viewed or judged.

Another result of legitimization of laptops in the learning space is that students have increased their use of external resources into the curriculum, such as some Architecture students' use of Pinterest:

> We use the Internet as a resource, so just being current and also getting information from stuff that's current or even from stuff from before, it's quite a valuable resource, and stuff like Pinterest helps to catalogue all of that stuff.

Lecturers' roles as keepers of knowledge are changing more as this student argues,
> I find that I used a lot of the things that I would have used in a social way, still in my learning, so I still use YouTube, but now for my course… they kind of interlink for me. (Law student)

Whilst in some contexts devices such as laptops and being online are synonymous, this is not the case in our context. Keeping power up to the devices is a new challenge experienced by students, as physical learning spaces aren't equipped with enough plug-points.

Laptops offline

As mentioned earlier, in the resource-constrained South African higher education environment personal computer ownership is not the norm and many students rely on campus-based infrastructure and mobile phones for computer access and use (Czerniewicz, Williams & Brown, 2009). Mobile phone ownership, however, is ubiquitous, and students often rely on mobile phones as their main means of internet access off campus. However, we cannot assume this to mean smartphone access.

Whilst the university does have wi-fi coverage, students off campus cannot be assumed to have internet access: "The other thing they need really is the Internet access wherever you are, the actual laptop itself is not enough, you need to be able to get on to the Internet"(Physics lecturer). Students are cognizant of the disadvantages and in fact, have to plan for being offline better:

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I can't get my assignments because I don't have the Internet. So everybody else is, like, cool, I know what the politics essay is about, or I can just check the resources folder, but because I don't have… I have a laptop but no Internet, it's just, you know, I'm powerless. (Law student)

While being offline is a disadvantage, students also acknowledge how the mobility of the laptop has empowered them even if they are not online all the time:

I think also for me the major advantage is that I'm not tied down to campus, especially last year when we didn't have the 24 hour shuttle, even now, with the strike, it was very difficult to have to be coming into the labs on campus, which would have the software I need, and we do have computers in res… it doesn't have the software we use and it's not quite up to speed with everything, it doesn't have an A3 printer. So it made a lot more sense for me to be able to have a laptop so I can work on my stuff no matter where I am. (Architecture student)

In addition, the laptop takes on a new role as a means of recreation and relaxation. Students described this form of offline use as follows: "sometimes I use my laptop to listen to music and sometimes the music helps me concentrate when I do work" (Physics student) and "I've been working hard the whole day, then before I go to bed, I'll like watch a movie or an episode of a series or something like that, listen to music" (Chemical Engineering student).

The other reality in South Africa is that while students are not always connected to the Internet by computer, they are often connected by mobile phone. Previous research shows that the phone is not usually associated with academic activity. However, students begin to realize its potential for learning:

I think with the modern phones these days, like I didn't realise how much, how academic my phone could become until, actually, this year, and how much I use my phone to actually scan documents and to actually edit things, to submit things, like, you can actually really use… it's not as convenient, obviously a smaller screen, and things like that, but in a sense of what it can do, its functionality, you can use it actually as a replacement if you really wanted to. (Law student)

Laptops in between

The perception of a learning space as being a lecture theatre or a desk at home is no longer dominant. The mobility of the laptop affords students opportunities to learn where they choose:

With a laptop especially you can work wherever you want rather than… like I'm not a big fan of sitting at a desk and working. So you can go sit on the grass and do stuff on the laptop, or sit on the couch and do stuff on the laptop. (Physics student)

Students like the opportunity and flexibility to choose where to do University work:

I think the best thing is having that access and you don't exactly have to be confined to, like, a space. Especially, I like to work outside or in coffee shops, so I can go to… I can just sit on the nice couches and work… sometimes being in the same space all the time, for me, is not very productive so I have to, you know, explore different places to keep my mind fresh. (Law student)

More flexible learning afforded by the mobility of laptops offers lecturers the freedom to confidently set tasks for students to undertake outside of class, knowing that they do in fact all have the means of access. Students report positive responses to such approaches:"when we had our rewrite, our test, we could just access the test on Vula wherever you are, and me, personally, I was at home at the moment in my PJs and could access the test and just do it. So that is really convenient, instead of coming here and sitting in a lecture theatre" (Law student).

Conclusion

Laptops follow students through various learning spaces and could be considered a learning space themselves, not only because of the flexibility they offer, but also because they carry with them all students' digital learning content. Whilst there is unsurprising evidence of laptops as recreational spaces, we have not focused on this here, rather we have sought to understand how the laptop as a mobile device facilitates interactions, challenges traditional learning spaces and influences educational practice. We have seen how different physical spaces (both formal and informal) alter the way the laptop, as a device, is used for learning. In our context the laptop has empowered students by offering them greater choice about when, where and how to learn, and facilitating the connection with a learning community of which the lecturer is in some spaces a part, and in others not. We

argue that while laptops are mobile, students use these technological objects in situated ways which highlight interactions between the material and immaterial, place and space, and different domains of knowledge. By viewing laptops both in and as a learning space we get a better understand of the role of the 'device' in enabling and constraining networked learning. It has also helped us better understand how laptops facilitate different kinds of networked learning across different types of learning spaces. In summary, the contributions of this paper have included the following 1) For lecturers: a better understanding of how students construct their own and interpret designed learning spaces across devices and physical places; 2) Theoretical: we offer an extension of networked learning theory as a diverse and fluid experience by attending to the sociomaterial impact of laptops and its relationship to learning spaces.

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