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# Using Personal Mobile Devices to Increase Flexibility and Equity in Learning in Resource-Constrained Contexts

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## Abstract

This paper examines how, in a resource-constrained context, access to personal mobile devices for first-year university students increases flexibility of learning and creates an environment of greater inclusivity at university. In 2016, at the start of their first year, 201 students in an extended degree programme in the Humanities at the University of Cape Town were surveyed about their access to personal mobile devices (PMDs). Based on need, 68 students were given an entry-level tablet to use as their own for the duration of their studies. As a consequence of establishing a learning context in which all students had access to a PMD, the lecturers could engage students in a multimodal blended learning and teaching approach. This paper draws on data in the form of student surveys and focus groups and explores not only the challenges and opportunities for students in using PMDs for their learning in and out of the classroom, but also the flexibility of learning enabled by PMDs. The study shows that creating an equitable context in terms of physical access to digital technology extends students' learning opportunities, but also presents some new challenges.

**Keywords:** Personal mobile devices; digital divide

## Introduction

Over the past decade, universities in South Africa have recognised the role of educational technologies as tools to facilitate teaching and learning (Czerniewicz & Brown, 2009; Bozalek et al., 2013). However, there remains an economic and moral dilemma for universities in South Africa, as students come from diverse backgrounds, geographical locations, and material and technological capacities. Consequently, access to information and communication technologies (ICTs) cannot be assumed (Broekman, Enslin, & Pendlebury, 2002; Brown, 2014; Brown & Pallitt, 2014; Czerniewicz, 2015). This dilemma is not unique to the context of developing countries. While South Africa ranks as the most unequal country in the world in terms of the Gini Index (i.e., the social economic status of a country; specifically, the gap in the distribution of wealth for a country's residents) (World Bank, 2016), New Zealand ranks as the seventh most unequal country in the world (OECD, 2018).

Although the contrast in internet penetration between South Africa and New Zealand is quite marked (53% compared with 88%), (Internet World Stats, 2016), even developed countries such as New Zealand are faced with digital inequities. For example, the Māori ICT report shows that 68% of Māori households have internet access compared with the national average of 83% (Ministry of Business, Innovation and Employment, 2015). Disparities of digital access have also been observed amongst young people in New Zealand—socio-economic background influenced the number of digital devices in the home, the types of devices available, and whether the device(s) are shared or individually owned by students (Hartnett, 2017). This serves to remind us

that we cannot ever assume equality, and we need to consciously choose not to disadvantage particular groups of students due to their socio-economic or cultural contexts.

### E-learning and higher education

In the South African context, the *White Paper on e-Education* states that ICTs can create access to learning opportunities, improve the quality of learning and teaching, and deliver lifelong learning (Department of Education, 2004). In addition, this paper suggests that ICTs can accommodate differences in learning preferences and remove barriers to learning by providing expanded opportunities and individualised learning experiences. Higher education policy argues that the appropriate use of new media can support curriculum transformation and improve educational quality (Ministry of Education, 2001). Likewise, the New Zealand government has identified the need for tertiary institutions to use technology effectively if they are to maintain their relevance over the coming decades (Marshall, 2012). Marshall (2012) also notes that technology is seen as both driving the need for, and supporting, skills development. Globally, the higher education sector has moved into a position where using ICTs is both inevitable and necessary to produce graduates equipped for the 21st century. For example, the concept of personal learning environments (PLEs) has been gaining ground as a way to tailor students' learning experiences based on their strengths, weaknesses, and pace of learning (Educause, 2015), and as a way to develop students' personal and social learning spaces and experiences—thus empowering them to direct their own learning and develop self-regulated learning skills (Dabbagh & Fake, 2017). These changes further demonstrate that the discourse about technology-enhanced learning has moved beyond "if" to "how" students use digital tools in their learning (Hämäläinen, Kiili, & Smith, 2016; Davis, Mullen, & Feldman, 2017). But how do educators take advantage of these opportunities in the context of inequality?

## Study design/approach

In 2014, the Department of Higher Education and Training in South Africa commissioned the University of Cape Town (UCT) to "investigate whether the financial investment of a personal mobile device, whether on the part of the university or students themselves, adds value to the learning experience" (Brown, 2014). As the project lead, UCT collaborated with four other institutions across South Africa (who had been doing various types of research in similar areas), in an endeavour to understand how access to PMDs enabled greater flexibility and effectiveness of teaching and learning in the higher education sector, both in and out of the classroom (Brown, Haupt, King et al., 2017). The choice to explore PMDs in the aforementioned project was based on: i) mobile penetration rates in the South African context (92% of young people own a mobile phone and 69% own a smartphone) (We are Social Singapore, 2017), and ii) research on personal learning which showed that students having their own devices was valuable in effectively addressing issues of learner control and personalisation (Dabbagh & Fake, 2017).

While this scheme begins to address the issues of physical access, there is also the issue of epistemological access to educational technologies (Bozalek & Ng'ambi, 2015; Chen & Denoyelles, 2013; Johnson, Adams Becker, Estrada, & Freeman, 2015; Kilfoil, 2015; Moje, 2007). As Czerniewicz and Rother note, inequality in education is a complex concept that extends well beyond the objectified cultural capital such as devices (2018).

Although the collaborative project adopted a lens of inequality overall and worked towards common objectives and debate (Brown, Haupt, King, et al., 2017), each institution framed their own contextually appropriate approach and line of research inquiry aligned with the project's intentions (as can be seen in a paper by van Rooyen & Marais, 2018). In this paper we report on one sub-project which was located in the Humanities Extended Degree Programme at the University of Cape Town, South Africa. The project was conducted with 5 lecturers and 201

students who registered for this degree in 2016 (Brown, Haupt, & Hunma, 2018). The extended degree programme is an alternative way to complete the General Bachelor of Arts (BA) degree. In this version, students complete the BA degree in 4 years instead of 3. The students who participate in this programme showed potential on their university admission tests but required additional academic support. Lecturers' views and pedagogical strategies for incorporating PMDs in their teaching in this programme have been described elsewhere (Brown, Haupt, & Hunma, 2018). This paper focuses on the experiences and perceptions of the students who participated.

The funding enabled the project team to provide a PMD to students who did not have one—thus creating a relatively equitable context of digital access. In this pilot, the team sought a device that was good enough for students learning needs, yet economical (because we wanted something that students could afford to buy themselves). The Proline H0882M 10-inch tablet, with additional Bluetooth keyboard and protective cover, was identified as an entry-level PMD. The cost was approximately R2500 (NZ$250).

During orientation week—before students started their course—a needs assessment survey was conducted (with the assistance of the lecturers) to determine whether students owned a PMD (i.e., mobile phone, laptop, or tablet) and whether the device was good enough for student learning (i.e., internet connectivity). Seventy-five students (out of a class of 201) indicated that they did not have any device or had a PMD without internet connectivity.

**Table 1** Needs assessment

| **Needs assessment** | **n (%)** |
|---|---|
| Total class size at time of orientation | 201 |
| Did not have **any** devices | 75 (37%) |
| Of those 75 students | |
| under 18<br>18 to 22 | 25%<br>70% |
| Female | 63% |
| First-generation university student | 52% |

N = 201

In addition to the initial survey, a variety of other data-gathering methods was used, including focus-group discussions, classroom surveys and internet-based surveys (Table 2).

**Table 2** Overview of data collection strategies

| | When | n |
|---|---|---|
| Needs assessment survey (NAS) across programme | February 2016 | 201 |
| Digital literacy survey (DLS) across programme | April 2017 | 64 |
| Focus-group discussion (FG) | Nov 2015 (pre-pilot study)1 (FG1=14), May 2016 (FG2=37), Nov 2016 (FG3=3), May 2017 (FG4=27) | 81 |
| JISC tracker survey (JS) across programme | February 2017 | 55 |

Each year the focus groups comprised a different cohort of students. The focus groups that took place in May 2016 and November 2016 were therefore the same student cohort (but not necessarily the same students) in each focus-group discussion.

The focus-group discussions were unstructured and sought to explore students' academic and personal use of their device, the location of their use, and whether they experienced any benefits and/or challenges with the device. In this paper we use the JISC survey finding categories (JISC, 2017; Newman & Beetham, 2017) as a basis for a thematic interpretation and analysis of all of the focus-group data to provide qualitative illustrations of students' experiences of using PMDs.

# Findings

## Flexible learning

All students had a PMD as a consequence of the project, but over two-thirds (67%) had more than one device (usually a tablet and smartphone, or laptop and smartphone). However, 87% of students indicated they still relied on computer labs, and 67% still used university printers. This response showed that, while PMDs were useful for many activities, they did have limitations. Qualitative data highlighted both the benefits and limitations:

> It's a 50/50 for me because I use it for . . . my readings. I do it on my tab and then here . . . it's to take notes and stuff during lectures. (FG2)

The main reasons for using the computer labs on campus were to submit assignments and to print. Other students indicated some of the challenges of small-screen mobile devices for particular types of activities:

> . . . with assignments, yes . . . things like MAM [a module] which run the Excel things, I would go to the labs (FG1)

> Well, the thing is, I can't really . . . do my essays and stuff on it because I have to . . . email it to myself and then go print. It's a process. So, I would rather just go to the . . . labs (FG1)

One of the benefits of having a PMD should be the opportunity to study anywhere, anytime. To some extent this is true—most students indicated they regularly used their devices when they were on the move.

[1] We received funding for the pilot study late in 2015 and were able to distribute 31 devices to students in the extended degree programme in Aug/Sept 2015. We held a focus-group discussion in November 2015 with this group of students.

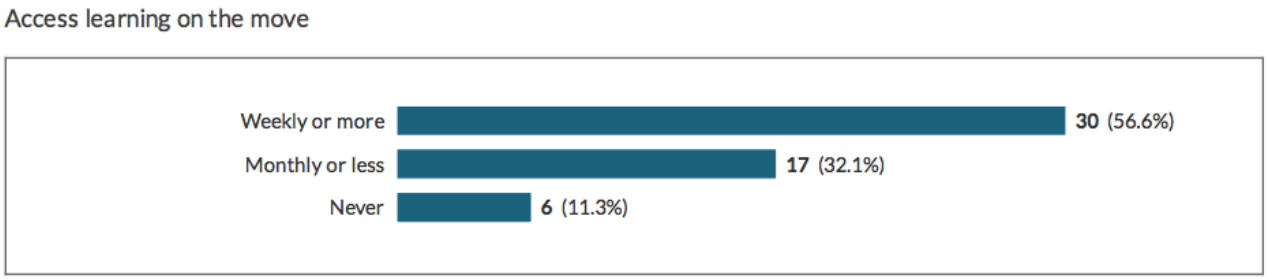


**Figure 1** Using PMDs to learn on the move
Source: UCT JISC Survey, 2017, n = 55

However, in a developing context such as South Africa, students' flexibility is constrained by such factors as safety and security. Students, especially those who live in low socioeconomic areas and travel to and from campus on public transport, are very aware of safeguarding their devices:

> When I go home during the weekend to the townships, you can't carry a tablet around with you. It will be gone. (FG1)

Students also expressed fear of their personal property being stolen when using public transport to commute to campus, and highlighted how easily their personal property can be stolen:

> . . . when you stand . . . in the mornings, then someone's following you. . . . You know what I'm thinking because everyone's bumping against you. It's like, tab, nice, close. Only when you get here, and you are here and you are like, where's my tab? (FG1)

Another limitation for students' flexibility is the lack of access to the internet. Ninety-five percent of students use wi-fi when on campus. Off campus, 23% rely on public access (e.g., wi-fi hotspots in libraries, cafes, restaurants, shopping malls), and 36% of students have no internet access.

**Table 3** Students' access to internet off campus

| Type of internet access | |
|---|---|
| 3G/4G | 22% |
| ADSL or multiple | 19% |
| Public | 23% |
| None | 36% |

Source: UCT JISC Survey, 2017, n = 55

Many students were frustrated at the lack of internet access:

> I can't get my assignments because I don't have the internet. So everybody else is, like, cool, I know what the xxx essay is about . . . but because I don't have . . . I have a device but no internet, it's just, you know, I'm powerless. (FG2).

However, students learnt strategies to deal with this challenge:

> . . . on campus, I download everything and when I go home it's available to me . . . for me to read. I don't need to go on the internet to go and download, it was already on the tab. So, that was accessibility even at home without wi-fi. (FG2)

Personal mobile devices therefore enabled students to engage in digital learning activities when they needed to, but were limited by other issues such as security, screen size and internet access. Students were aware of these issues and developed practices to work around the constraints. They used computer labs with desktop computers for aspects of work that needed a full-sized screen, downloaded resources to view offline when off campus without internet access, and didn't use devices in contexts that posed a security risk. These strategies highlight that, even when we try to remove barriers to inequality, students' life circumstances still provide challenges.

## Formal versus informal learning

Personal mobile devices were used for a range of activities—both formal (in class, lecturer directed), and informal (out of class, student directed). In the course, programme lecturers made an effort to provide a range of resources which drew on different media (e.g., video, images, podcasts, and texts) to engage students with materials digitally (Brown, Haupt, & Hunma, 2018). Vula, the learning management system (LMS), was a key means of disseminating these resources, and 74% of students indicated they relied on Vula for their coursework (see Table 4).

> . . . the tab came in handy because then my lecturer would put up slides, lecture slides on Vula. So, I could literally lie in my bed and look at lecture slides. (FG4)

Half of the students surveyed also indicated they liked the collaborative features of Vula. The chat feature was particularly foregrounded in focus groups:

> there's a chat forum on Vula on one of the side bars. I think that helps me a lot as well, because in there you can see what questions other people have, and also . . . with [xx] they respond very fast. So if you have a question and then I would like put it on. (FG3)

**Table 4** Use of Vula at UCT

| Activity | Agree |
|---|---|
| I rely on it to do my coursework | 74% |
| I enjoy the collaborative features | 50% |

Source: UCT JISC Survey, 2017, n = 55

The most frequent formal (course-based) activities were producing work digitally and finding information online. As a student commented in relation to their PMD:

> . . . all my notes are on there . . . lecture slides and everything [that's] part of the research subject, I do my research on (t)here. (FG2)

Students used their PMDs less to work online with others (perhaps because this was a campus-based course and it was possible to interact with classmates in person). In-class polls or quizzes and games and learning simulations were less frequently reported (see Table 5), and the latter were referred to in the focus groups as only a recreational (not learning) activity.

**Table 5** Weekly learning activities using PMDs (as part of the course)

| Activity | Weekly |
|---|---|
| finding information online | 94% |
| producing work in a digital format | 85% |
| creating a formal record of learning | 60% |
| working online with others | 49% |
| using a polling device or quiz to give answers in class | 42% |
| using an educational game or simulation for learning | 27% |

Source: UCT JISC Survey, 2017, n = 55

Using the PMD to make, manage and access resources was the most frequent learning activity students reported engaging with in their own time:

> So . . . I could type my assignments in the comfort of my room . . . Sometimes I would prefer not to watch the videos, but to record my own . . . stuff. So I would record the lecturers and . . . it would be much more better because I would use headsets . . . to listen. (FG4)

Over half of the students also looked for additional resources not prescribed by the lecturers (see Table 6).

**Table 6** Weekly learning activities using PMDs (in own learning time)

| Activity | Weekly |
|---|---|
| accessing notes and recordings | 92% |
| making notes or recordings | 73% |
| managing links and refs | 71% |
| watching/listening to learning materials | 67% |
| accessing learning on the move | 56% |
| looking for additional resources | 51% |
| discussing learning informally on social media | 36% |

Source: UCT JISC Survey, 2017, n = 55

Focus-group discussion findings supported the survey results, with students indicating a similar range of activities. More specifically, students highlighted research as being an important use of their PMDs:

> . . . all my notes are on there and . . . lecture slides and everything [that's] part of the research subject. (FG1)

> . . . with sociology you get people that you have to do research on, so I can just go on YouTube and hear what people say about that person and then I can go and read my book. (FG1)

Exam preparation was also a specific focus:

> I use the tab to download the past papers. (FG1)

> Yes, for the exams. I was preparing for the exams. And doing some assignments and stuff. (FG 2)

These examples demonstrate how having a PMD helped students with just-in-time learning support. These examples range from having course notes and recordings available for learning activities, to being able to search for information and explanations online to scaffold understanding of course content.

The positive aspects are clear, but what about the negative aspects of PMDs? Research has indicated that having access to devices and the internet makes it harder for young people because they are more distracted (Goyanes & Catalán-Matamoros, 2017), more isolated (Kitsantas, Dabbagh, Chirinos, & Fake, 2016), and (particularly in higher education) there is a concern that students are less likely to attend lectures (Edwards & Clinton, 2018). However, it appears from this study that these are organisational or educator perceptions and not how students see it. (See Table 7.)

**Table 7** Weekly learning activities using PMDs

| When a digital device is used in my course | Agree | Neutral | Disagree |
|---|---|---|---|
| I am more easily distracted | 25% | 25% | 47% |
| I feel more isolated | 14% | 23% | 60% |
| I find it harder to motivate myself | 10% | 36% | 49% |
| I am less likely to attend class | 16% | 20% | 63% |

Source: UCT JISC Survey, 2017, n = 55

Although a quarter of students indicated having a device was distracting, the majority didn't. However, it seems that some students do learn to manage their distraction, as one student notes:

> If you're distracted . . . you might miss something there. You're busy researching and [the lecturer] says something else. (FG1)

In terms of lecture attendance, nearly two-thirds disagreed that it made them less likely to attend class. This was reiterated in the focus groups where students concurred that:

> Yes, I don't . . . it's . . . cooler. I don't mind, I go to lectures. My parents paid, they expect me [to]. (FG3)

And they realised the value of being present in the physical space in order to interact with lecturers.

> . . . also now isn't it more like you can ask questions and stuff. (FG3)

Very few students indicated the devices made them feel isolated. In terms of their studies, one student indicated they used their tablet to:

> . . . communicate with my tutors through emails. (FG1)

And many indicated the tablet was valuable for keeping in touch with family and friends:

> . . . it's helpful for me, not only for academics but for my life as a whole seeing that I can communicate with family and everything using the tablet. (FG4)

### Inclusivity

The issue of equity and inclusivity is a significant reality in a resource-constrained context such as South Africa. As one student said:

> For me . . . when I came here I didn't have a laptop and financially I was not going to be able to have one. (FG3)

The opportunity value of having a device can only be expressed in students' own words:

> When I first came here it was . . . a different space coming from my school to university and everything was different. I didn't even have . . . access to . . . laptops . . . now that we have to submit everything online using [a] computer. . . . I was still staying in my township, so it was quite hard to make things . . . on time. Then the tablet came through. . . . But with the tablet I could actually do that at home and just submit on [the LMS] with it. Before I had the tablet, I had to . . . come here onto campus and work . . . write my assignment on a book and then come and type. So, it kind of made things a little bit more easier for me, to type, to save my assignments and to catch up even with my school things at home because. . . . Even our library doesn't . . . open [until] after eight. (FG3)

This finding demonstrates that students weren't completely without access to computers. They could come onto campus or go to the library to use a computer. However, this didn't necessarily provide anywhere/anytime access. Having the PMD meant they could combine their assignment preparation (which they had previously done off campus, on paper) with drafting their work. While this might appear to be a matter of efficiency, it clearly had a learning benefit for students because they could then continue with their study off campus when it best suited them.

Students reported very positively about the less tangible benefits of having access to a PMD and being able to learn digitally. Table 8 shows that over two-thirds of students agreed that having a PMD enabled them to fit learning into their lives more easily. However, fewer found digital learning connected them better with other learners or lecturers (a finding that was not necessarily surprising as the course programme was campus based).

**Table 8** Benefits of digital learning

| When a digital device is used in my course | Agree | Neutral |
|---|---|---|
| I am a more independent learner | 70% | 23% |
| I understand things better | 63% | 36% |
| I fit learning into life more easily | 67% | 25% |
| I feel connected with lecturers | 47% | 38% |
| I feel connected with learners | 34% | 52% |

Source: UCT JISC Survey, 2017, n = 55

## Discussion

A number of themes emerged from this study. We are reminded that inequality is not just a statistic but a lived experience. Although institutions enable student access to ICTs through computer labs and on-campus wi-fi, learning doesn't happen in only one space and at one time. Flexibility, in terms of being able to study and learn where and when you need to, is hugely beneficial for the learning process—not just because it is convenient, but because students can fit learning in and around their other life responsibilities (including family and financial responsibilities) and be more independent in their learning. In the South African context, flexibility of anywhere/anytime learning was constrained by concerns about security and access to the internet off campus. However, students could manage these constraints strategically.

Personal learning environments (PLEs) have been shown to be a critical part of how students negotiate and manage their own learning to "foster discussion, collaboration, and interaction, organisation" (Dabbagh & Fake, 2017, p. 28). However, a student can't truly engage in personal learning without a personal device. Students in this study indicated that having a PMD helped their understanding and connected them with lecturers and, to a lesser degree, other learners.

For formal learning activities, students relied on the LMS and used their PMDs to access resources provided by their lecturers, and to produce assignments digitally. In their own time, they used their devices to make notes, manage resources, and search for additional (multi-modal) resources online. In the focus groups, students described the PMD as being valuable for researching assignments, note-taking, and planning and drafting assignments. The computers on campus were used primarily for printing and submitting assignments. Lea uses the analogy of the assignment sandwich, creatively captured in a sketch note by Barbour (2014), to describe the outer layers as institutionalised practices of assignment brief, rubric and completion, and the inner layers (filling) as the work and meaning-making students engage in as they construct the assignment from beginning to end (Lea, 2013). The study found that PMDs were most useful in assisting with these "inner layers" of learning. Students used the PMDs for research, reading, thinking, understanding, and preparation. These are the invisible informal strategies and processes of learning. The computer and computer lab still had a vital role to play at the end of the process (i.e., for the outer layer) for the aspects that involved a large screen and printer. By combining this process with the flexible opportunity afforded by having a PMD, students can pursue truly personalised learning pathways.

## Conclusion

This study has shown how one cannot and should not assume equity of technological access. Even in contexts where access is assumed to be adequate, students' diversity of socio-economic backgrounds will always result in issues of equality. Although increasing numbers of students do have access to PMDs, they are not all necessarily suitable for learning needs. Campus-based facilities such as labs are very important and remain a necessity; however, the flexibility of personal mobile devices was highly valued by students and influenced how they used technology to support their learning.

While there is no indication that PMDs resulted in better marks or more success in terms of course completion, from a student perspective they did help to improve understanding, independence, and confidence. They also helped to achieve a greater sense of inclusivity. Although these subjective benefits do not provide quantifiable evidence of success, they do contribute to creating a positive environment conducive to learning. Negative concerns often raised by educators—such as distraction, isolation, and lack of motivation—are not foregrounded by many students in this study as barriers to learning. However, we acknowledge these difficulties and find ways to help students and educators address and overcome these issues. The study demonstrated that a relatively economical device such as a basic tablet was sufficient to help students bring their learning resources together and enabled them to undertake the invisible and private processes of learning—thus bridging the formal (lecturer-driven course-based learning) and informal (out-of-class, student-driven learning) contexts.

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Genevieve currently works as a researcher in the Centre for Innovation in Learning and Teaching at the University of Cape Town. Her broad interest areas are social justice and social equality in higher education. Over the last 10 years she has explored various issues (from access to success, etc.) in these areas of interest in higher education (i.e., primary, secondary, and tertiary). However, she has more recently engaged with issues of access to personal mobile devices in unequal contexts.

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