

University of Cape Town

Laptop Project Report

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UCT Laptop Project

Introduction

In 2017 the University of Cape Town made a decision to roll out a programme to provide a new laptop to every first year undergraduate student fully funded through the National Student Financial Aid Scheme see <http://mg.co.za/article/2017-02-16-00-flip-varsity-lectures-for-equal-success/> Over a period of four years between 2013 and 2016, four courses at UCT (PHY1004W, CHE1005W, RDL 1008H/9H and AGP2039W) piloted the use of laptops in both formal and informal teaching and learning. This report summarizes the lessons learnt from this pilot programme.

Laptop Project: Beyond 2015

ICTS and CILT (Kira Chernotsky, Cheryl Brown, Stephen Marquard), July 2015

Extracts from the report presented to Senate Executive Committee in 2015

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Section 1: Executive Summary

A pilot laptop project has been implemented in UCT in four courses across three years (2013 to 2015). This document sets out the key lessons from the pilot project and recommends a universal access model to provide personal computing devices (laptops or tablets) to all incoming first year students on Financial Aid from 2016 onwards.

The project was funded in 2012 to investigate both key logistical issues and the potential teaching and learning benefits arising from requiring all students in the pilot courses to have laptops, and providing students on Financial Aid with their own laptops. Enabling infrastructure and services were funded in parallel, including the rollout of ubiquitous wireless connectivity and lecture recording facilities in selected venues.

The pilot has been successful:

- The project team (ICTS, CILT and participating academics) identified, implemented and evolved practical solutions for the acquisition and distribution of laptops and the provision of training and support to students. Limited laptop battery life and sparse access to power plugs has on occasion been inconvenient but not disabling.
- Personal security and theft emerged early as perceived risks; however almost no laptops have been stolen, and students have felt that laptops increased their personal security by removing the need to travel to and from labs late at night.
- The impact on teaching enabled by universal laptop access has ranged from changes in classroom practice through to curriculum changes across majors and programmes, such that the participating academics believe it is not possible to return to a pre-laptop world for their courses.
- Students reported significant learning benefits from personal laptop ownership, regardless of whether laptops are used actively in classroom situations; for example, students believed they were able to submit higher quality assignments because their laptops allowed them to spend more time on the task and obtain formative feedback quickly and easily.

The pilot project has demonstrated significant benefits for students, enabled new teaching approaches, and enriched the educational experience for students in the pilot courses. Laptops support the development of the graduate attributes essential for professional careers, and narrow the equity gap between students from different backgrounds.

There is therefore a strong case to scale up the programme:

1. to support the university's strategic goals, including improving the quality of graduates through developing essential graduate competencies;
2. to address transformation imperatives and close equity gaps: of significance is that a large majority of UCT students already own laptops¹, and so students without the financial means to afford one find themselves ever more disadvantaged;
3. to improve the student learning experience; and
4. to support innovative pedagogy and transformation in classroom practices and curricula.

Additional practical benefits include:

¹ 95% of 463 UCT students who responded to the 2015 ECAR Study of Students and Technology survey report owning a laptop (89.2%) or intending to obtain one (5.8%).

- reducing pressure on computer labs (and potentially reducing the investment required for maintaining student computer labs over time, enabling more spaces to be transformed into flexible social learning spaces),
- reducing printing costs, and
- mitigating the effects of load-shedding on scheduled teaching activities.

Section 2: Project background

In 2010, a project to enable flexible learning through ICTs (information and communication technologies) was launched at the request of the Vice-Chancellor. It sought to put a laptop into the hands of every student, implement an effective set of support services, and create an enabling environment for the innovative use of ICTs in teaching and learning.

Various aspects of the project were funded and implemented in 2010 and 2011:

- making UCT a wireless campus
- installing lecture recording technology in selected teaching venues
- making low cost laptops available to UCT students through the national Student Technology Programme (STP)
- enhancing support for students' use of ICT

In April 2012, the SEC considered a report on the project, noted that there was no doubt about the place of technology in enabling teaching and learning and supported a plan to conduct a pilot with first year courses in Physics (PHY1004W), Law (RDL1008/9H), and Chemical Engineering (CHE1005W), and a second year course in Architecture (APG2039W).

The pilot began in 2013 and has been running for three years at a cost of approximately R900k per year. This funding was used to provide laptops to students in the pilot courses who received financial aid from UCT and to appoint a part-time researcher in CILT. The project investigated laptop use from several perspectives including campus infrastructure, student experience and the role of laptops in teaching and learning. The research and evaluation component of the study gathered feedback on laptop use from academics and project staff at regular project team meetings, interviews with lecturers and students, observations in lectures and training sessions, focus groups and student surveys.

Each course had specific objectives they wished to trial or improve among their students:

First Year Physics: Use of e-resources such as books, calculations and simulations using open-source language VPython, computational problem solving as a modelling tool, real-time acquisition of data in teaching labs through apparatus connected to laptops, experimenting with Vula as a 'clicker' response system, lecture capture and casting, out-of-class homework and self-study using digital resources.

First Year Law of Persons & Family: Use of e-resources such as books, increased ICT literacy, use of podcasts to supplement PowerPoint lectures.

First Year Chemical Engineering: Use of e-resources such as books, earlier and increased use of Excel, Visio and written work, lecture capture and casting.

Second Year Architecture Design & Theory: Increase the speed at which the 'technophobe' students become comfortable with technology, particularly for design, increase overall understanding of 3D space and visualisation, improve the presentation of work, especially amongst students who don't draw well.

Section 3: Logistics, infrastructure and enabling services

The laptops

ICTS worked with Faculties to determine the appropriate specifications for the laptops for the students on Financial Aid, with the aim of providing them with the most affordable model from the national Student Technology Programme (STP) range that would meet their needs throughout their degrees.

For Architecture, this was determined to be a high-level notebook which could process sophisticated graphics (i7 processor, 8GB RAM, 1TB hard drive), while the others chose an entry-level notebook (i3 processor, 4GB RAM, 500GB hard drive). ICTS considered quotations from the two STP vendors and chose Lenovo. Due to the decline of the Rand, the 2013 prices of R8,663 and R5,136 rose to R10,942 and R6,350 respectively in 2015.

Finance advised that the best insurance option was for UCT to self-insure by purchasing spare laptops. ICTS made provision for replacing laptops if a student appealed to the Financial Aid board, but there have been no appeals.

Students were informed via a communication sent with the Faculty letters of offer that they were required to have a laptop that met a minimum set of hardware and software specifications. The letters indicated that UCT would assist students on Financial Aid to acquire one. The requirement was also included in the Faculty handbooks. Chemical Engineering informed companies who provide bursaries. There were no reports of students or bursary providers being unable to meet the requirement.

The table below documents the number of Financial Aid laptops (and free backpacks) distributed. It is lower than the count of students on Financial Aid in 2013 because one student declined the offer, and in 2014/5 because some repeating students had already received a laptop in the previous year.

Course	2013		2014		2015	
	#FinAid students	Total enrollment	#FinAid students	Total enrollment	#FinAid students	Total enrollment
PHY1004W	23	140	35	123	36	102
CHE1005W	19	130	14	132	18	123
RDL1008H/9H	37	223	36	199	36	267
APG2039W	5	70	9	60	6	67
Total	84 (15%)	563	94 (20%)	460	96 (17%)	559
Laptops distributed	83 (15% of total)		87 (19% of total)		73 (13% of total)	

Table 1: Laptops distributed by course and year

To be sure that there would be enough laptops, despite not being able to accurately predict how many would be required, ICTS made arrangements with the vendor to provide extra and to return the excess for credit.

The laptops have proven to be robust. Most of the laptops brought into the ICTS Front Office for attention required re-imaging to resolve problems caused by students loading problematic software.

Distribution



Figure 1: The first recipient of a laptop, ChemEng student Priyashnie Govender

In 2013, students on Financial Aid were instructed via SMS and email to collect their laptops at the IT shop on Upper Campus. Many of the students however needed multiple reminders, the most effective of which came from their lecturers.

By 21 Feb of that year, only 43 of the 82 laptops had been collected. Further investigation showed that many of the students thought that getting a free laptop was simply “too good to be true” and they didn’t believe that the communications they’d received were genuine.

Interestingly, as word of the laptops spread among students, many who didn’t qualify arrived at the shop to pick one up and were disappointed to be turned down. ICTS met with the SRC to clarify

the qualification criteria.

Unfortunately, the IT shop closed its doors at the end of 2013, requiring a new method of distribution. In 2014 and 2015, each of the participating departments specified a delivery date for the laptops (typically just before registration) and nominated a staff member in the faculty to administer the process. Either this administrator or the lecturer told the students where to collect the laptops. ICTS provided lists of qualifying students and the paperwork they needed to sign. On these forms, students acknowledged receipt of the laptop and accepted a set of terms and conditions. The paperwork was sent to the Student Financial Aid office and a record was made of the laptop on their fee accounts.

One condition was that the laptop had to be returned if a student dropped out, switched to another programme of study, or had their financial aid withdrawn as a result of receiving other funding. No students came forward to return their laptops, and the project team decided not to collect them, but rather to include them in the research. Another condition was that they were responsible for replacing the laptop if it was damaged or stolen. Since the pilot began, only 3 students have reported that their laptops were stolen, and none of them appealed to the Financial Aid board for replacements.

Some students did not have their laptops during Orientation when training was offered, or indeed, in some cases, for a number of weeks after term started. These included students who switched into the laptop pilot courses after registration, students who were recipients of bursaries and students for whom financial aid approval was delayed, often because they took time to submit the necessary paperwork.

Software

Software was made available to students in a variety of ways:

- Software was included on the Downloads page of the ICTS website.



- From mid-2014, Microsoft Office 365 was made available to all registered students at no cost for installation on up to 5 devices. Windows and Office were pre-loaded on the financial aid laptops.
- ICTS gave each student a 4 GB USB flash drive pre-loaded with software (either covered by a site-licence or free-to-use) including: McAfee VirusScan, Adobe Reader, Rapid Typing, Firefox, Chrome, and KeePassX (a password manager). The flash drive also included information on how to connect to the wireless network and what other ICT services are available to students.
- ICTS built two application virtualisation environments (Cloudware and Remote Desktop Services), to allow students to run applications remotely from any device without needing to own or install the software. However, most students did not need to make use of this as the pilot courses used predominantly open source software (including Draftsight, DIA, SketchUp, and VPython) which students installed and ran on their own laptops. Some, but not all, of the course textbooks are available as e-books. Application virtualisation may become more important in future if students have less powerful laptops or tablets, or courses require students to use resource-intensive proprietary software packages.

Figure 2: Flash drives received by students

Digital literacy and student support

ICTS conducted ICT@UCT information sessions during orientation for each course. Each 1-2 hour session included a presentation on the ICT services and resources available to UCT students followed by a practical hands-on session to help them set up their wireless connections, reset their passwords and access various resources. Training was adjusted every year in response to feedback from CILT's researcher and the academics involved in the pilot. In 2015, the following topics were covered:

- Getting access to the UCT network & Password self-service
- The ICTS website
- UCT mobile
- MyUCT email, Office 365, Vula
- Internet quota, online storage and access to files off-campus
- Lynda.com and the Microsoft IT Academy
- Mailing lists and social media
- Staying safe on-line & what to do if your laptop is stolen
- Expanding your laptop's battery life

A supplementary day-long training session was provided to ChemEng students. It included basic training in Internet access, Word and Excel.

The success of the training depends on timing and duration. Sessions of less than 2 hours negatively impact on the practical component of the training during which students access various ICT services and create their profiles. Having it during orientation also creates difficulties for those students who

don't yet have their laptops. A final challenge is that students can't activate Office 365 accounts until they are registered.

ChemEng also used tutors to circulate among students and provide technical assistance during lectures, and embedded digital literacy skills into the curriculum. Feedback from students shows that strategies for ongoing support are necessary and valuable.

Direct IT support to undergraduate students is provided in student labs, the Library Knowledge Commons, by Faculties directly and at the ICTS Front Office on Upper Campus. ICTS also introduced social media channels (Facebook and Twitter) to provide support 15 hours per day and to establish an ICT community of practice amongst students and staff at UCT.

Charging the laptops

Charging the batteries was a concern for students, especially in courses which required use throughout the day. Students make conscious decisions about when to use their devices and plans to charge on campus throughout the day.



Figure 3: ChemEng students find power by any means necessary

Four charging stations, located in the atrium of the Humanities building, the entrance foyer to the RW James building, the basement of the Chemical Engineering building and the foyer near LT2 in Kramer Law, were installed to support the pilot.

Charging points (one for each of the 680 seats) were installed in 3 large classrooms as part of the Classroom Renewal Project - Kramer LT3, NLC in the Anatomy building, PD Hahn 2 - and in each of the 9 new Snape classrooms.

When surveyed in 2013, 45% of students said that their battery lasts if they use the laptop only when necessary. The majority of students (65%) said that they are charging their laptops on campus during the day in order to be able to use it for all their lectures.

Security and thefts

Contrary to expectations, relatively few thefts of laptops occurred. In 2013, 2 students reported that their laptops were stolen, in both cases while they were at home during a vacation period. In 2015, an Architecture student lost his laptop in a mugging on Main Road.

When asked in 2013 which situations would result in them not bringing their laptops to campus, only 7% of students felt that they might be

"We have mastery and competency tests, even computer literacy tasks, that enhances our knowledge of computers and typing, most of all."

"I just plugged it wherever I found a plug. Then I would use it then and there. Public places, even inside the food court, I used it there when I am having lunch"

"I'm using a taxi ... there is a lot of robbery ... now I make a point of putting it in my bag."

mugged in transit and 4% were afraid that the laptop would get stolen on campus. Students indicated that they were more concerned about the weight when carrying laptops and keeping them dry in wet weather than the possibility of theft. In the 2014 survey, students were asked if they were worried if their laptop would get stolen if they brought it to a lecture or tutorial and 37% said yes. Despite this concern, when asked how often they bring their laptops to class, 41% said 'every day', 2% said 'twice a week' and 17% said "most days of the week"

During focus group discussions, students showed an awareness of crime, security and privacy issues. Consequently, students adopted strategies that were sensible in public places.

Wireless

The UCT wireless network coverage has been extended to the whole campus, as well as student residences, with a total of 3500 access points installed.

Wireless was also specifically densified in the venues used by the pilot courses to ensure connectivity during lectures. Academics and students reported that the Wi-Fi connection was reliable and that the network coped well with the traffic. The densification of wireless in other classrooms is proceeding in line with the Classroom Renewal Project, with a total of 48 venues having been completed so far.

Students can also use their laptops and wi-fi in the social spaces created by the MySpace project, which includes 700 seats in more than 40 public spaces in 15 buildings.

Lecture recording

Lecture recording facilities have been installed in 54 teaching venues to date, in large part through alignment with the Classroom Renewal Project. Lecture recording is now a standard service provided by CILT and ICTS.

The Chemical Engineering, Physics and Law courses all made use of these facilities, and recordings have been extensively used by over 2000 students weekly.

Support for academic staff

Staff teaching laptop classes experimented with a range of new applications and more intensive use of existing systems such as Vula. CILT and ICTS worked intensively with staff at times on request to support experimentation and pilot new approaches.

Section 4: Teaching and learning impact

Research activities

Over the duration of the project, data collection comprised:

- classroom observations,
- two surveys of a total of 574 students (representing 55% of the 2013 and 2014 classes respectively),
- interviews with 41 students,
- 8 focus groups comprising 33 students, and
- interviews with course convenors and members of teaching teams.

At the start of the project, the focus of inquiry was on how laptops created an enabling environment for innovative uses of ICTs in teaching and learning. Research questions were framed in relation to effects on teaching and learning both in and out of the classroom.

As the pilot settled into a degree of fluency and logistical issues and concerns were largely ironed out, the focus shifted to examining specific questions such as students' perceptions of the academic value of laptops for their learning, in particular the benefits for students on Financial Aid.

Details of the research findings are provided in Appendix 2 (2013) and Appendix 3 (2014/15). A summary of key findings is presented here.

Connectivity and portability

Laptops provided students with the ability and opportunity to easily and seamlessly engage in university work wherever and whenever they needed to.

With media reporting a prevalence of smartphone ownership amongst university students ², we assume students are always "connected" in some way. However a spot poll at the start of 2015 amongst the 130 PHY100W students indicated only 66% had smartphones.

It's not that students are unable to make a plan if they don't have their own device, but that ease of access enables students to have their study materials available when they need them and manage their learning around their other commitments.

"I do the majority of my work on a Sunday and late at night as I work during week nights and on weekends and then the computer labs are closed"

The flexibility in both teaching and learning that having a portable mobile device enabled was such an interesting finding that the research team concluded that "laptops follow students through various learning spaces and could be considered a learning space themselves, not only because of

² <http://www.studentmarketing.co.za/what-students-cant-live-without/>

the flexibility they offer, but also because they carry with them all students' digital learning content" (Brown and Pallitt 2014³, Appendix 4).

Influence on learning

Students didn't always know upfront how having laptops would enhance their learning until they had experienced using them as learning tools.

In the 2013 survey, students overwhelmingly agreed that laptops were essential for completing their course (82%) and essential for their learning (72%).

*"now that we have a laptop we're going to use every single day in class ... you discover more about the internet and you're starting to have a passion for it and now everything is, like, **oh** ..."*

³ Brown, C. and Pallitt, N. (2014). Laptops and Learning Spaces: Online, Offline and In Between. 9th International Conference on Connected Learning. Edinburgh, Scotland. April 2014. Available <http://www.networkedlearningconference.org.uk/abstracts/brown.htm>

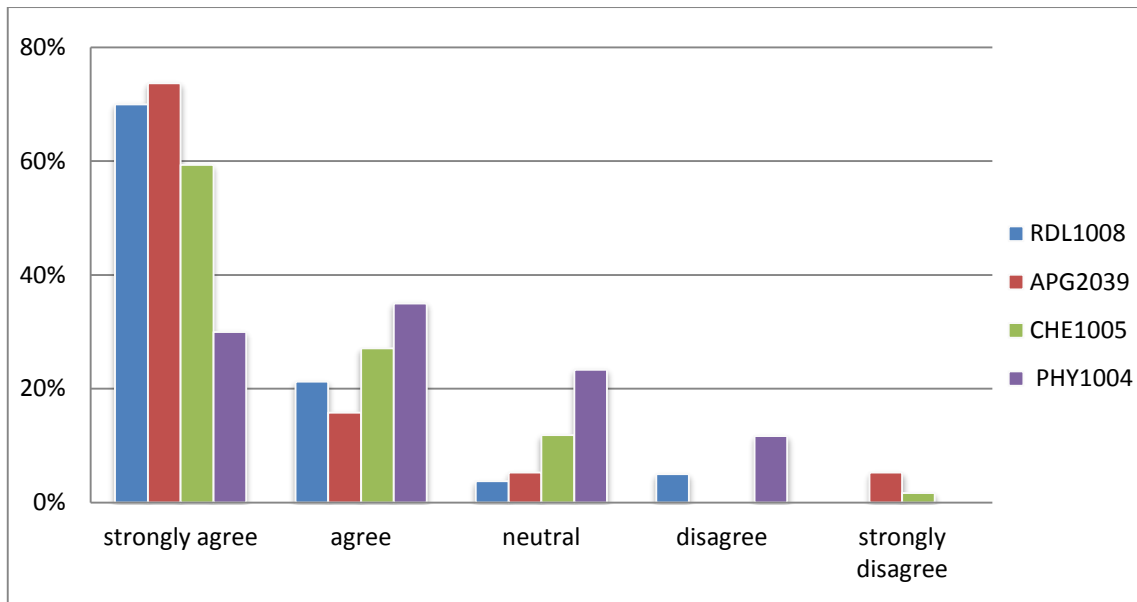


Figure 4: Laptops are essential for completing coursework [Source 2013 Survey n = 218]

Learning activities included

- access to internet generally and Vula specifically (which was used to download slides, watch lecture recordings, do readings and keep up with announcements)
- reading and Internet-based research
- note taking and writing assignments
- disciplinary specific activities (including CAD, case books, Python, Excel)
- engage with study groups, interact with tutors and communicate with lecturers

“I would interact with my tutors ... like she or he could see what I was writing while I was writing and get feedback instantly. You don't have to wait for the tutor to come around and first look at your stuff, she or he could give you feedback right now, while you are writing your essay.” [ID 252 tablet 2014-2 EB]

The laptop as a mobile device facilitates interactions, opens up traditional learning spaces and enables a wide range of educational practice. In our context the laptop has empowered students by offering them greater choice about when, where and how to learn, and facilitating connections with other students, tutors, lecturers and resources as and when needed.

Using a laptop in lectures

Lecturers reported that having devices in the classroom, studio or laboratory increased opportunities for exploration, feedback, and engagement. While laptops were ubiquitous across the four courses, students made choices about when and how often to bring them onto campus depending on necessity.



Figure 5: Students completing practical assignments in the Physics laboratory (left) and architecture studio (right)

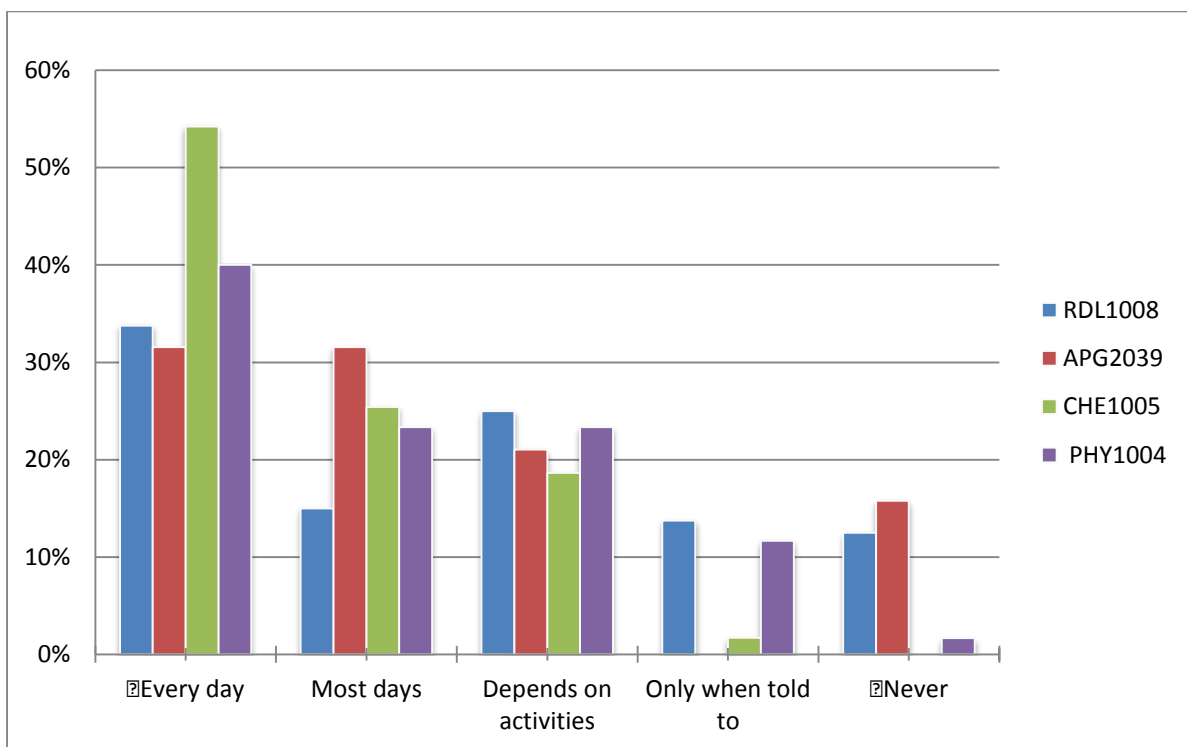


Figure 6: How often do you bring a laptop to campus? [Source 2013 Survey n = 218]

The 2014 survey was based on a study⁴ from the US that examined the reasons why students choose to take laptop computers into college classes. The US study concluded that lecturers' behaviour wasn't the primary driver in the student's decision to bring a laptop to class and that they were

⁴ Houle, P. A., Reed, D., Vaughan, A. G., & Clayton, S. R. (2013). Using Laptop Computers in Class: A Student Motivation Perspective. *Journal of Learning in Higher Education*, 9(2), 83–92.

intrinsically motivated by their own drive to achieve effective learning. The same appeared to be true of our UCT cohort.

The learning activities which dominated the “classroom” or formal learning space in the UCT courses were using the internet to locate and use relevant materials and capturing information.

	Agree	Disagree	Uncertain
Allows me to more easily locate relevant materials	83%	6%	11%
Allows me to more easily use relevant materials	80%	7%	13%
Allows me to better capture all of the information presented	60%	15%	25%
Allows me to better process the information presented	52%	21%	27%
Allows me to better summarise the important information presented	49%	24%	27%
Allows me to better communicate with the lecturer	36%	32%	33%
Enhances my learning of the subject matter of the class	58%	14%	27%
Enhances my learning in general	62%	13%	25%

Table 2: [Source 2014 Survey n =356]



Figure 7: Chemical Engineering students doing group projects in a lecture theatre

In terms of other aspects of learning, 59% of students noted that having a device allowed them to use their time more effectively in order to get work done and 70% said that it helped them to better organise and process information.

	Agree	Disagree	Uncertain
Improves my problem solving skills	35%	29%	36%
Improves my critical thinking skills	26%	31%	44%
Improves my analysis skills	38%	25%	37%
Allows me to better organise and process information	70%	12%	18%
Gives me an opportunity to better participate in class	41%	28%	31%
Allows me to use my time better in order to get work done	59%	20%	21%

Table 3: [Source 2014 Survey n =356]

In the 2014 survey, the majority of students (87%) indicated they used their devices and internet in lectures to access more information.

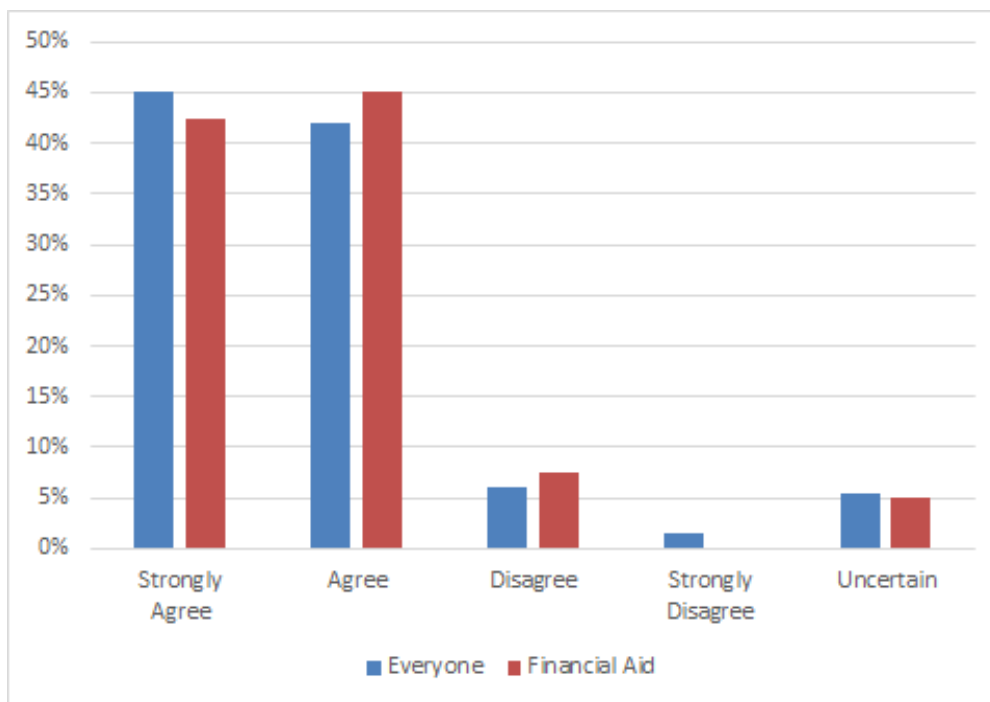


Figure 8: Using a laptop during lectures gives me access to more information [Source 2014 Survey n = 356]

Students also indicated it gave them easier access to information (87%) and enabled them to search for information more quickly (97%).

This activity dominated the qualitative data as well (comprised 29% of comments about learning activities) and occurred both in- and outside of class. Students described the value of having a connected device in lectures as a

“nice thing ... when you're in lectures, when the lecturer saying something you can quickly look it up. Because ... you have Wi-Fi right there and it's like a book, so you can look up anything instantly” [ID 823 Tablet 2014 - 5 EF].

They also described the value of being connected so they could follow up on ideas and research as they needed.

“Most of the times I could just research about anything I wanted to research about, like sometimes the readings, you could go to research journal on the same authors, and see what they are about and get more information about a certain topic you are learning” [ID353; Tablet 2014-2 EB]

Using the device for writing and note-taking was also a main theme (comprised 24% of comments about learning activities).



Figure 9: ChemEng student with laptop, notepad, calculator, textbook
Tablet 2014-7 EH].

Photos taken in classrooms showed that in an average lecture theatre accommodating textbooks and devices, note-taking was often a challenge. Student responses to this challenge varied– for some, the process of taking notes by hand was still preferable:

“I prefer to write ... I wasn't comfortable enough so I preferred my old way of doing things.” [ID652; Tablet 2014-4 EE].

Others found it added value to be able to annotate lectures slides on their device:

“my notes were already there ... I've downloaded the slides, then just actually it gives you an option to actually tab in the slides and you add more notes to the slides” [ID1178;

Survey results from 2014 (Table 1) show that 60% of students used their devices in lectures to capture the information presented. This doesn't negate the value and role of pen and paper but certainly shows many student use the laptop as an active learning tool in lectures.

Influence on teaching

The evidence of the influence of these devices on teaching is presented in the form of reflections from the teaching staff involved in the four pilots (Appendix 1). After teaching in this way for the third year running, none of them can imagine successfully convening their courses in an environment where devices are not part of their class landscape.

While each course integrated laptops into their teaching and learning differently, some common themes emerged.

- It is an essential **graduate attribute** not just to be able to use technology but to engage with it in your **disciplinary context** to find relevant information, produce digital content, solve problems and undertake projects.
- Enabled a shift in **pedagogy** and in some cases sparked rethinking of the **curriculum**.
- Increased opportunities for **interaction**, formative **assessment**, feedback and revision.
- Decreased the dependency on central resources such as labs and library, enabling computer related tasks to be undertaken **as and when needed**.
- Enabled improved organisational **clarity** of the course.

“The laptops have made possible a radical shift in pedagogy where computers are now on hand for use at any point in the class, including in tutorial or project sessions.”
Chemical Engineering

Addressing equity

Over the course of the three-year pilot, there were 1582 students registered across the four pilot courses. Of these, 274 students (16.6%) were identified as being on Financial Aid and 243 students (88%) were given a laptop through the project.

Those who didn't receive a laptop were either repeating the course and had already been given a laptop in the previous year. One student in 2013 already owned a laptop before coming to UCT and therefore declined the offer.

“A lot of the students didn't have access to laptops before so it's not just this new course and new content and the whole experience of coming to university but it is this device and this device that is yours that you never owned and it is making sense of how to use this new tool. I don't do computer science but I have felt the need to learn different things about the laptop even though it isn't part of my course. The laptop opened my eyes to a different side of life.” [N Focus Group 2014]

The project was clearly set up with an equity focus. The reason students on Financial Aid were given laptops was to ensure equity of access within the student cohorts participating in the pilots so that all students were on an equal footing. Students on Financial Aid were very positive about the opportunity and in interviews indicated their appreciation:

“I am very pleased and happy that I received a laptop and very grateful” [100 Focus 2014-1 CC];
“I live off campus and without a laptop it would've been tough”

However students on Financial Aid are also acutely aware of the disparity of access amongst their friends and peers. They are under pressure to explain why they have this opportunity:

“They said it's not fair, what did you do to get this opportunity? I said I don't know, I was chosen, I don't know why.” [376, Tablet 2014-2 EB]; “at first I lied to them, I said I bought it for me” [371 Tablet 2014-2 EB].

An important dimension of the project is that through the pilot students on Financial Aid become integrated into the mainstream student cohort rendering them less distinct. In a focus group with second year ChemEng students, they wondered whether all the students on Financial Aid from the previous year had moved course or dropped out. In fact, this was not the case but rather students on Financial Aid had become less visible as a distinct group in the second-year cohort.

"I think it does give me an edge over my peers because I have a friend who doesn't have a laptop and she really has a hard time with getting stuff done and she doesn't live on campus. She has to organise and plan her time.... and I've seen the difference between my work and hers. There is a major difference there."

The value of this pilot for students on Financial Aid clearly went beyond a tool for learning. It extended their digital literacy, enabled them to assimilate with mainstream students and made the task of studying at university much easier.

Impact in subsequent years of laptop ownership

It can take time for the benefits of an intervention to be realised or acknowledged. In focus groups with students in their second year, it became clear that it took a while for them to develop optimal learning strategies with their devices and to integrate them effectively into their learning.

"Well this year I started having problems with my laptop. So for one I feel like that's when I really started realising that it's so important to have a laptop on campus and there's so much that you don't realise - I had the laptop but I didn't put it to much use as I should have but this year I feel like the lecture recordings helped me take notes faster. It can compile things faster than when I do it by handwriting so I kind of like saw the need for it this year." [Focus Group 2014]

Students come to realise the edge that having a device has given them. They can see the difference it makes in terms of managing time and the quality of the work they do.

Laptops vs other devices

Students favoured laptops above other devices. Asked whether or not they felt they could manage with a smartphone or tablet, the majority of students surveyed in 2013 were neutral or disagreed.

This corroborates data from the international Educause 2015 Study of Students and Technology Survey where UCT students rated laptops as extremely important for their academic studies.

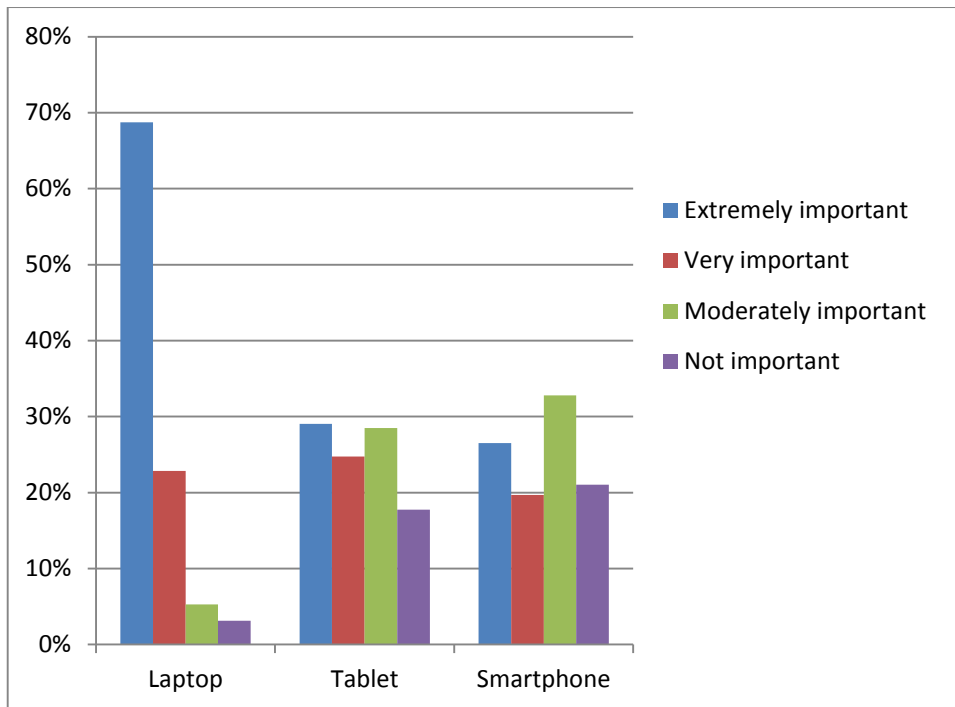


Figure 10: ECAR 2015 Study of Students and Technology Survey: UCT student data (n=416)

Some of the discussion regarding the pros and cons of different devices is situated around practical considerations especially the benefit of carrying something light and less visible. However, the general feeling is that if one had only one device, it should be a laptop due to its versatility:

“A tablet is like... I have this extra device that i can use just in case something goes wrong with my laptop. But the laptop is the main thing that everyone uses” [B Focus group 2014]. “It’s like, a laptop is a laptop, it’s just so much better; it’s like a mini computer. The tablet, I don’t know, it’s like more of a phone. [3790 Focus 2013-2 AA]”

In addition, tablets have limitations for writing.

“So it seems to be good for reading but not necessarily good for writing, like if you had a lot to write ... if you didn’t have a laptop you’d go to the labs.”

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Architecture

Kevin Fellingham

Laptops as an interface for learning about design and modes of representation

The Second Year Design and Theory Studio (APG2038W) has taken part in the Laptop pilot project for three years. For the first two years, under the former studio Co-ordinator, the use of technology to empower students was a clearly defined pedagogical strategy. Students were required to use several modes of representation in order to capture, organise and creatively process information.

Given that the most basic of mobile phones has a camera, often with video capabilities, and that in the exercise of their profession students will ultimately be entirely dependent on the digital production of design work, it was felt that rather than denying the students the right to generate work digitally, it would be beneficial to integrate the devices and attendant skill-sets of incoming students into the creative process. It was felt that the laptop could be pivotal as an interface between the eye, the hand, the handheld device and the studio space.

Re-establishing a studio and discussion culture

Whilst the school of architecture has a number of computer labs, these are organised for the teaching of large groups, or for individual, and importantly, quiet work: whereas the studio is organised around small group tutorials, individual tutorials and informal, interactive work. The laptop, whilst not replacing the lab appears to have been helpful in maintaining and in some cases re-establishing a studio culture.

The small size and portability of the laptop enables it to be used as a focus for discussion, in the same way as a sketchbook has traditionally been used. Some staff members have found the transition to viewing work on screen somewhat challenging, some have found it entirely natural, which would seem to suggest that it is a matter of opinion rather than of fact that work should be printed out in order to be engaged with.

Producing international architects

Without the Laptop pilot project, the pedagogical model would need to be returned to the pre-digital mode so as not to stigmatise those students not able to afford the technology. This would mean denying access to all students to the international norms of contemporary architectural education and practice, further contributing to the already widening gap in productivity between South African schools of architecture in a world in which digital technology allows architectural work to be undertaken almost anywhere in the world, wherever the – now almost entirely digital – skills are available.

Given, further, the growth of African economies – which means building – along with the probability of very low growth rates in South Africa – which means little building – it is imperative to enable our students to develop the skills to compete for that work, which is currently outsourced to other continents.

Chemical Engineering

Prof Jenni Case

We are in the third year of the laptop pilot in the Department of Chemical Engineering. The 2013-15 first-year entry cohorts (CHE1005W) have all been required to have laptops, and UCT Financial Aid students have been allocated these by the university.

Last year we introduced a requirement for our then third-year class to have laptops, and we obtained a small amount of departmental and faculty funding to support Financial Aid students who did not enter during the laptop pilot years. At this point all students in the four years of our undergraduate programme have laptops, and they are being intensively used in a number of core ways.

In 2013 we introduced our new first-year course, and this year in 2015 the new second-year course has been rolled out. These courses have been explicitly designed around the possibilities of using laptops in class. The specific impact of the laptops in the programme are summarised under the following headings.

Bringing the computer lab into the class

We used to have to book the computer lab if we wished to use any computer tools during class tutorial sessions. This was becoming increasingly complicated as our class sizes grew, and also as the need to do these exercises became more frequent in the programme. The administrative demand on academics was not inconsiderable. The laptops have made possible a radical shift in pedagogy where computers are now on hand for use at any point in the class, including in tutorial or project sessions. The main tools that we use include spreadsheets, programming and high end simulation packages (in the first three years these are all open source software, except for the Microsoft package which students get through UCT).

Bringing the library into the class

Having laptops in class has made it possible for students to access discipline-specific databases and resource materials through the library while in class. This has significantly extended the quality of the project work that we are able to do in class, and our ability to support students in developing high level information search skills. We are also noting students using the laptop during class as a kind of 'online dictionary' to clarify unfamiliar terminology.

More interactive teaching

The first-year course spearheaded experimentation with tools like Classroom Response Systems and this has now also been taken up elsewhere in the programme. Last year we ran a pilot on a backchannel system in our third year. Lecturers, especially newer lecturers, have been skilled at adopting these new technologies and using them to shift the typical passivity of the lecture space.

More regular formative assessment

We run regular online assessments in both our first and second-year courses, termed 'mastery' (conceptual) and 'competency' (skills-based) tests. This has increased the possibilities for students getting early formative feedback in the course, and also for stimulating continuous engagement with the course.

Better administration of undergraduate courses

We are making extensive use of Vula in our courses – online assessments, submission of assignments, gradebook, Q&A, as well as the regular provision of information. This has significantly increased the organisational clarity of our courses (as experienced by students) and has also lessened the burden on staff and improved the rigour of our records. The reduction in printing has not only a financial impact but also has reduced an unnecessary administrative burden on lecturers and departmental staff.

An unexpected benefit has been in continuing to teach during load-shedding – we have implemented a protocol whereby students download lecture slides and materials in advance of a load-shed, and thus the lecture can continue on battery support during this interruption. Students follow slides on their laptops and the lecturer delivers commentary from the front, supported by blackboard work.

Support for student work out of class

In this programme students are required to do extensive work out of class, revising course material, practicing problems, and working on projects and assignments. This work has been significantly supported by all students having laptops – an important levelling of playing fields especially as previously it was more privileged students who would have easy computer access out of class. Students make extensive use of social learning spaces on campus, and virtually connect with their peers over a range of media.

We have been using lecture recording for some time already but the laptops have substantially supported the value of doing this – we have evidence that many students do use this resource. This is a further impact on a diverse class where different levels of fluency with verbal English are present.

One challenge

We have noted the positives of this new ‘laptop culture’ and the ease with which students in the first three years of the programme now use laptops in a range of ways with ease. We are however also grappling with potential for distraction during the lecture class, noted especially in these three cohorts. This is complicated as often students do need laptops to take lecture notes or to follow lecture slides. But for many the temptation to do off-task work appears to have grown. During the 2nd semester of 2015 we aim to develop a protocol for class engagement that uses our tutors in class to maintain on-task behaviour, especially as off-task behaviour is distracting to peers.

Recommendations

From the perspective of our undergraduate programme there is no possibility to go back to a situation where students do not have laptops from the first day of first year. We would have to significantly diminish the quality of the undergraduate programme to do this, and potentially lose its current levels of professional relevance.

Some of our staff have been working with ICTS to enable delivery of licensed simulation material to our fourth year students on laptops and we hope that this can be achieved by 2016.

We have found both Classroom Response Systems and backchannels extremely useful lecturing tools and would like to see these incorporated into the broader suite of Vula tools – many of our lecturing staff indicate that they really appreciate this one portal.

Finally we would like to request assistance in developing more robust tools for ensuring validity of online assessment modes – lock-down browsers, etc. For example, we would like to use an open book mode for our senior examinations where students could use the library database, but we need to be sure that they can't be communicating with other students during the examination. The current technological solutions do not appear workable through laptops (only through computer labs).

In conclusion, we have really valued being part of this pilot and strongly urge the university to allocate the commitment in order for this crucial aspect to improving the quality of our undergraduate programmes to be expanded.

Law

A/Prof Amanda Barratt

For Law of Persons and Family (RDL1008/9H), I have not used laptops in the classroom very much. I have tried using quizzes and polls to encourage the class to try MCQ or True-False questions to introduce a discussion on 'legal reasoning' but have not found this particularly effective.

On the other hand I think that the project has been extremely successful outside of the classroom. I have asked students about their perceptions of the online tools in their course evaluations and have received extremely positive responses.

Formative quizzes for developing legal reasoning skills

Interactive quizzes are intended to develop students' understanding of the material and to develop their legal reasoning skills. The quizzes provide immediate and detailed feedback and students can work through them as often as they like at their own pace and at their own convenience. In my experience students improve their skills dramatically through practising the quizzes.

In the 2013 course evaluation, 95% of the respondents reported that they had found the quizzes useful for developing their legal reasoning skills [75% responded 'strongly agree' and a further 20% responded 'agree' to the statement "I found this resource useful for developing my skills and understanding."] The pass rate in the course is extremely high, and the class grades are higher than those in any other first-year law course. I believe that the interactive quizzes have played an important role here.

Podcasts for developing understanding

Podcasts are helpful particularly for those who would prefer to learn by listening rather than reading, and provide me with an opportunity to 'explain things slowly and repeatedly' for those who find it difficult to keep up with the pace of the lectures. There has been very positive feedback from those who used the Podcasts.

In the 2013 course evaluation, 79% of respondents reported that they have found the podcasts useful for developing their understanding of the material [63% responded 'strongly agree' and a further 16% responded 'agree' to the statement "I found this resource useful for developing my skills and understanding."]

Online course resources

I have used Vula as an organising tool for the course materials. Everything the students need is put up on Vula in good time. There are online Course Readers and extra reading, all tutorials and assignment questions, and administrative materials. Students have responded extremely positively to the Vula site for the course and say that it has helped them to get organised.

In the 2013 course evaluation, 82% of respondents responded positively to the statement "this course was well organised" and many mentioned the Vula site in this regard.

Writing Essays

Law is an 'essay-heavy' programme. Students must learn how to write a legal argument. We require essays to be submitted as a word-processed document. This is why we think that a laptop is more appropriate than a tablet: students have their own computer when writing essays.

Students noted how useful it was to have their own computer and not be dependent on the shared computers in the Law Library (the Law Faculty has no computer lab but the Faculty pays for at least half of the PCs in the Law Library). The feedback emerged from the surveys done by Ian Barbour and Nicola Pallitt.

Physics

Prof Andy Buffler

The course and students

PHY1004W “Matter and Interactions” is the introductory physics course for prospective physics majors at the University of Cape Town. Typically around 90 – 120 students register for the whole year course. These students usually include the very best incoming students in the Science Faculty, but the class spans a wide range of abilities and school backgrounds. Our introductory physics course is based on the Matter and Interactions textbook (see <http://www.matterandinteractions.org/>) which highlights the relationships between microscopic and macroscopic phenomena, and emphasizes the analysis of physical systems using a small number of fundamental principles. This allows the integration of novel topics which in more traditional courses are dealt with in a fragmented way. The modelling of physical systems is a central theme in the course, and computational problem solving with VPython (open source) is introduced as a modelling tool. Students learn to programme with VPython and simulations are used frequently by lecturers.

Use of laptops in class, for simulations, homework and self-study

With each student in PHY1004W having their own laptop, we have fully engaged with the consequences of this situation, both in and out of class. In-class activities which previously used card-based interactive voting and simulations used by the lecturer have been renovated into digital wireless voting and simulations used by students. Problem solving sessions in tutorials has been enhanced by digital resources such as ebooks and simulations being available. Computational problem solving sessions using VPython previously run under the conditions of 2 or 3 students at a desktop computer in the lab have been enhanced by every student working on their own device. Laboratory activities have evolved through the use of interfacing apparatus to the laptop which allows real-time acquisition of data. Students complete their data analyses on the laptop as well as their reports. Out-of-class (homework and self-study) activities require students to engage with digital resources (podcasts of lectures, other movies, software, simulations, etc.).

Upgraded Senior Teaching Laboratories

Since the scheme has run for three years now, we have benefited from all majors in physics having their own portable computing. Last year (2014) we physically renovated our senior teaching laboratories to embrace this opportunity fully. Students in second-year labs now work in pairs with a complete set of electronic devices, coupled to their laptop. In many cases the interfacing software LabVIEW is used. Half of the second-year laboratory comprises computational activities in which students learn how to solve problems numerically and undertake analyses of data sets. In third year students learn how to write lab reports in the scientific publishing package LaTeX.

Portable computing is a fundamental requirement for Physicists

The key point is this. UCT Physics believes that it is a fundamental requirement for an undergraduate student intending to major in physics to have his/her own portable computing. It is not fundamentally about how the laptop is used in lectures, or in tutorials, or in laboratories. Modern physics teaching and learning is significantly enhanced by each student being “wired in.” Modern physics research is relying more and more on computational techniques and hence it is appropriate for UCT Physics students to learn to solve problems being fully armed with the tools of computation and connectivity.

Equity

Yes, a student can make do without a laptop. But the same can be said about buying the textbook or attending lectures. The financial aid support ensures equity, but in some ways has brought new challenges to bridging the gap of disadvantaged. Students who have used computers since a young age have a natural ability to learn how to enhance their lives digitally. Another interesting development is that more students, in addition to a laptop, also are carrying a tablet or smartphone, and strategically make choices about when and how to use these devices, as we all do in our own lives.

No way back

UCT Physics is sincerely grateful for being part of the laptop pilot. It changed the way we think about our major. We will never revert to a “pre-laptop” paradigm. Our curriculum at first, second and third year is completely infused with the assumption that students have computing at hand, and are also linked in somehow.

Laptop Pilot Project: Enabling flexible learning through ICTs

2013 Research Report

Cheryl Brown & Nicola Pallitt
Centre for Innovation in Learning and Teaching

Abstract

This report describes the Laptop Pilot Project at the University of Cape Town. Project implementation was led by the Information and Communication Technology Services (ICTS), with the involvement of the Centre for Educational Technology (CET), Department of Student Affairs, Properties and Services and participating Faculties and academic staff. The pilot forms part of a wider project to enable flexible learning through ICTs. It aims to understand the implications of laptop use at a variety of levels, from campus infrastructure and student experience, to the influence of laptops on teaching and learning. This report explores the implications of ubiquitous access to laptops for teaching and learning in particular. One-to-one laptop ownership became mandatory in four undergraduate Physics, Chemical Engineering, Law and Architecture courses in 2013. ICTS provided laptops to 67 financial aid students to facilitate personal ownership. The study involved 476 students across the four courses. The researchers gathered feedback on laptop use from academics and project staff at regular meetings, interviews with lecturers and students, observations in lectures and training sessions, focus groups and a student survey with a response rate of 43%. The report acknowledges project successes and challenges following the initial roll-out, emphasises the need for further research and provides recommendations for the second phase of the pilot.

Project background and description

In 2010, the Vice-Chancellor requested to launch a project to enable flexible learning through Information and Communication Technologies (ICTs). The Laptop Pilot Project is part of this broader project¹. Various aspects of this project have been funded and implemented since 2010:

- * making UCT a wireless campus
- * installing lecture recording technologies in selected teaching venues
- * making low cost laptops available to students through the national Student Laptop Initiative
- * enhancing support for students' use of ICTs
- * opening an IT shop on campus²

The pilot involved mandatory laptop ownership by students in four undergraduate courses: Physics (PHY1004W), Chemical Engineering (CHE1005W), Law (RDL1008/9H) and Architecture (APG2039W). In 2012, the SEC supported a plan to conduct a pilot in 2013. A project budget was approved and covered providing laptops to all financial aid students in the pilot courses and appointing a part-time researcher. ICTS worked with Faculties to determine the appropriate specifications for the laptops and provide affordable models. Different courses had different needs. For example, Architecture required a high-level notebook (R 8, 663) while the other courses needed

¹ This project is managed by Kira Chernotsky, director of the Customer Services Division of ICTS.

² The IT shop has subsequently closed down following two large break-ins and high rental fees.

an entry-level notebook with additional memory (R 5, 136).

Students were informed in advance that they would be required to own a laptop for the course and that financial aid students would be assisted in acquiring one (N=67, 17% of enrolled students across the four courses). Companies who provided bursaries to their students were also informed of the new requirement. There were no reports of students being unable to meet this requirement. The initial rollout involved administrative complexity of issuing laptops to financial aid students, wireless densification, additional student training during Orientation, trial use of a new web-based classroom response system (Learning Catalytics) in some of the courses and effort by academics in integrating laptop use into curricula and teaching practices.

Completed project phases thus far can be summarised as follows:

April 2012

SEC considered a report on the Enabling Flexible Learning through ICTs/student laptop project. They noted that there was no doubt about the place of technology in enabling teaching and learning and supported a plan to conduct a pilot in 2013.

SEC asked the ED:ICT to:

- identify and get buy-in from a faculty or programme for a pilot, or pilots, to be rolled-out for 2013;
- ensure that the academic staff in the faculty/programme were adequately supported in order to ensure the success of a pilot in enabling teaching and learning;
- get budget approval for the cost of the pilot(s) in consultation with the Dean(s) involved;
- identify and get approvals for the way(s) in which mandatory access to a suitable device for the students in the pilot(s) would be achieved.

August 2012

- Laptop pilot spanning 4 courses approved by VC-MAG on 3 August.

February–September 2013

- Research conducted: interviews with lecturers and students, survey, focus groups, classroom observations
- The project team met regularly to discuss implementation and share their experiences, concerns and preliminary findings.
- Staff involved in training met with faculty representatives and the First Year Experience (FYE) team about gaps in students' digital literacies which could be addressed through initiatives such as the Learn@Lunch programme and 'tech buddies' from First Year Experience (FYE).

August 2013

- Report prepared and submitted to SEC before going to the university's budget committee (RAAG). This detailed report involved written input from across the project team and was prepared for submission by Kira Chernotsky. Members of SEC gave feedback on the report before it was submitted to RAAG.

October 2013

- RAAG's reported the final decision following 2014 budget meetings. They urged that the current pilot should continue with the same scope, departments and funding (R 600K) in 2014 rather than scaling up the project (R 6 million).
- The researchers and two of the academics involved (Assoc. Prof. Andy Buffler and Prof. Jenni Case) presented their project experiences to the UCT community at the university's annual teaching and learning conference.
- ICTS started planning their training and resource packs for students for 2014, liaising with the project team on issues such as the anticipated number of students, content, free software, etc.

The research problem

The initial goals of the Flexible Learning Project were to put a laptop in the hands of every student, implement an effective set of support services, and create an enabling environment for innovative uses of ICTs in teaching and learning. The pilot aimed to provide UCT with valuable information to enable a decision about the value of extending the initiative to more (or all) UCT students.

Preliminary research questions were framed in relation to effects on teaching and learning:

- What was the impact on teaching?
- What was the impact on learning in and out of the classroom?
- What was the impact on general IT literacy?
- Were the academic objectives or concerns stated by Chemical Engineering, Law, Architecture and Physics achieved?
- Did students perceive that the laptops added value?

Objectives

The budget emphasised making laptops available to financial aid students. The overall objectives of the Laptop Pilot Project were related to practical implementation and campus infrastructure as well as to teaching and learning. As afore-mentioned, this report focuses on teaching and learning. While the wider objective of the pilot was to explore the implications of ubiquitous access to laptops for teaching and learning, lecturers also had their own objectives that they imagined as possible gains from their own and students' participation in the project.

Before the pilot commenced, lecturers identified the academic objectives of their courses in relation to student laptop use as follows:

Physics	Chemical Engineering	Law	Architecture
<ul style="list-style-type: none"> ● Use of e-resources such as books ● Calculations and simulations using open-source language VPython 	<ul style="list-style-type: none"> ● Use of e-resources such as books ● Earlier and increased use of Excel, Visio and written work ● lecture capture and 	<ul style="list-style-type: none"> ● Use of e-resources such as books ● General IT literacy ● Podcasts ● Online Quizzes 	<ul style="list-style-type: none"> ● Increase the speed at which the "technophobe" students become comfortable with technology, particularly for design ● Increase overall

<ul style="list-style-type: none"> ● Computational problem solving as a modelling tool ● Real-time acquisition of data in teaching labs through apparatus connected to laptops ● Experimenting with Vula as a 'clicker' response system ● Lecture capture and casting ● Out-of-class homework and self-study using digital resources 	<p style="text-align: center;">casting</p> <ul style="list-style-type: none"> ● High-level simulations ● 'good laptop behaviour' ● typing skills 		<p style="text-align: center;">understanding of 3D space and visualisation</p> <ul style="list-style-type: none"> ● Improve the presentation of work, especially amongst students who don't draw well
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It is noticeable that some course objectives highlighted access to resources or skills development, while others considered these foci alongside the active use of technology both in and out of class. Additionally, two of the courses (Law and Architecture) conceptualised academic objectives in relation to students rather than achieving learning outcomes by using educational technology in their teaching practices. Though all courses used educational technology, the extent to which it was integrated into curricula and teaching practices differed across courses.

Methodology

The researchers gathered feedback on laptop use from academics and project staff at regular meetings, interviews with lecturers and students, observations in lectures and training sessions, focus groups and a student survey with a response rate of 43%. The assistant researcher was formally introduced to students and tutors in the four courses. In addition to classroom observations, she also conducted informal interviews with students before or after classes. The researcher reminded students to complete the online survey and told them about upcoming focus groups.

The focus groups allowed the researchers a better understanding of students' experiences of using laptops in their courses. The assistant researcher approached lecturers about appropriate times for focus groups i.e. when students were most likely to have a free period. She then included these time slots on a sign-up sheet and students volunteered to participate by sharing their details under their preferred time slots. The researcher sent the students an email with details confirming the sessions and venues. Although there were structured questions, the researcher asked additional questions for the purpose of clarifying student responses. Focus groups were generally relaxed and students were treated to pizza and coke during the sessions.

Regular interactions with students during classroom observations and focus groups enabled the

assistant researcher to provide feedback to lecturers and at project meetings. Thus, the pilot had an iterative dimension as research informed teaching practice. Survey and focus group questions were circulated beforehand to academics and project staff who provided additional questions, suggested revisions or offered insights. The survey results and transcripts were subject to the same process to ensure regular engagement in the research process for all parties concerned.

Course	Number of students registered	Number of students on financial aid who received a laptop	Number of students who completed the survey	Number of students who participated in focus groups	Lecturer interviewed
Physics (PHY1004W)	90	22	60	7	Andy Buffler
Chemical Engineering (CHE1005W)	130	20	59	12	Jenni Case
Law (RDL1008/9H)	223	40	80	15	Amanda Barratt
Architecture (APG2039W)	72	5	19	10	Kevin Fellingham

Table 1: An overview of courses and students who participated in the laptop pilot.

Findings

Case studies of laptop use in four courses

The following case studies identify how lecturers negotiated the objectives they set out to achieve through laptop use in their courses and reports on student feedback in relation to course specific objectives.

1. First Year Physics

PHY1004W is a calculus-based introductory Physics course for Science students intending to continue with second-year Physics. Students must have passed or be taking MAM1000W (notorious for being one of the most difficult mathematics courses among undergraduate students) concurrently. It is a fast-paced and intensive course.

Associate Professor Andy Buffler highlighted the role of electronic books and using digital resources for self-study as one of the objectives for laptop use in his course. However, he later expressed the view that students might not be engaging with these resources for ‘deep’ learning:

I suspect they read less because they have it all with them and carrying bits of texts and textbooks and notes around is paramount to reading it I think so you keep it in your (pockets)

and somehow it gets transfused out of the laptop and into your head by just carrying it. Um, so I'm a bit worried about that, if they don't have it printed out, or don't print it out at some point, don't scribble notes on it so they probably don't read it properly.

He did a classroom 'experiment' where he distributed printed copies of the lectures slides to students and found that they wrote more. Due to the mathematical notations and symbols used in Physics, note-taking on a laptop is difficult to do in Physics. This was confirmed by one of the students during the focus group who felt a tablet may be a better option for taking notes digitally in Physics because one could use a stylus to write. Another student reported that:

...there are ways and means of taking notes on a laptop. I think you have to get used to it. It's like a shift and once you make that shift it will be fine.

How students choose to engage with information and take notes seems to be a matter of personal choice. Whether their preferences are optimal for learning is beyond the scope of this pilot.

Students report the importance of accessing online resources from other universities:

And sometimes when I'm doing tutorials late at night it helps to have like the ability to just Google whatever you're doing to get like a different resource on what you're doing. Plus universities like MIT have like open content, the same as UCT does, so they have lecture notes.

Buffler also got students to use their laptops for calculations and simulations using an open-source language (vPython) during lab sessions. He did so on Thursdays which he called 'laptop rich days'. On these days, he also integrated laptops in his lectures and used a student response system (Learning Catalytics). This was one of the other objectives he wished to trial in his course.

Students acknowledged the need for being able to practice their programming skills and complete programming related assignments on their own personal devices with vPython rather than working in a departmental computer lab:

...the biggest parts of programming is trying stuff yourself, and getting things wrong, and fixing and finding the bugs, and that's how you learn to code properly.

And I think being limited to the number of hours when you can access a computer, when you are on campus, specifically if people have to leave early, and if you have courses when there is time to use the computer, and (...) computer laboratories then that's a pretty big disadvantage. I would find it much more difficult to do all my subjects if I didn't have a laptop.

Students also appreciated lectures featuring simulations and the rewarding experiences of being able to create their own.

Students reported positive experiences related to the student response system used in the course:

I think people answered more on learning catalytics, because it's anonymous. And I think he changed the course of the lecture based on the answers. Like if too many people go wrong he'd go over it again.

Another student reported that he thought student answers to the poll enabled Buffler to be 'more responsive' in his lecturing.

Buffler felt that Physics students found it more 'natural' to use their laptops during lab sessions than lectures where they were told to use it to, for example, participate in using Learning Catalytics for answering questions on a poll related to lecture content. Buffler also expressed the view that he was not confident that having a laptop in lectures is a prerequisite for better lectures. A student said the following regarding laptops in lectures:

I don't know, most of us don't really use it that much. In the beginning we used it a lot because it was compulsory to have a laptop. So I think the mindset was that, okay, it's compulsory to have a laptop, I should have it always, but then Andy said, you know, if you don't see any need for it on that day just leave it at home. And then I think it slowly started fading away.

Buffler found that while laptops were useful in some of the learning spaces in the course, in others it was not. In addition to vPython programming, the laptops were valuable for real-time data acquisition through apparatus connected to laptops in the labs. These kinds of group projects involving calculations based on live data logging were not possible before the integration of laptops in the labs. The mobility of these devices meant that they could be transported across the lab.

Buffler also made use of lecture casting in his course. Students acknowledged the value of these in particular situations, such as not being able to attend the lecture:

I missed the first week of Physics-lectures because I only decided to take the subject later and I watched all of the lectures I missed, which was really helpful.

While these resources may be valuable for second language students, interviews with Buffler and the students suggest that lecture slides are more important than lecture recordings, which are rarely mentioned.

The timing of the survey and focus groups is important to note, as the extended degree students had been identified and left this mainstream course already. It is likely that the majority of these students may have been second language and financial aid students who would also have reported the lecture recordings to be more useful for the revision of lecture content.

2. First Year Chemical Engineering

CHE1005W is framed as an introductory Engineering and professional development course. UCT's Chemical Engineering degree focuses on the development of technical expertise, problem-solving, teamwork, communication skills, while being both generalist and practical³. The lecturers are very conscious of doing professional and academic development work within a mainstream course while at the same time, teaching a very diverse group of students.

As part of the original objectives, Prof. Jenni Case highlighted the importance of the use of laptops and typing skills for written work, increased use of Visio and Excel and 'good laptop behaviour' which

³ The EBE Guide to Undergraduate Studies <http://www.ebe.uct.ac.za/usr/ebe/apply/EBE2011.pdf>

came to mean laptop use (and building associated graduate attributes) which resembles the real-world uses in professional life as explained in an interview:

They have to take charge of their...of the laptop as a tool, and of the internet as a space to get information, and I like to think that we've got them going on that in the course. So, that's been... I guess if I want to say, another real advantage, I think, I mean, they're just learning skills they have to learn any rate, but we're making it more explicit from upfront, using Excel, using Word, writing e-mails; these are things that run throughout their degree and into their professional life, and they're building that skill now.

The notion of 'taking charge' also suggests that students have to take responsibility for their own development regarding ICT skills as part of their learning. This included completing typing tutorials, as this course included small typing tests as part of its requirements.

Prof. Case and fellow lecturer Harro von Blotnitz also integrated the use of laptops in lectures (except in the technical drawing component of the course). Original objectives included the use of lecture capture and casting, as well as high-level simulations. The lecturers accomplished this and more, such as experimenting with a student response system (Learning Catalytics), setting online tests in lecture venues (with some initial issues), and creating opportunities for innovative project work (such as using Google Earth to map the density of a contaminated river before calculating mass balances of chemicals and tabulating variables in Excel). Case (with Fraser *et al.* 2007) has published a paper on how students learn particular concepts through experimenting with computer simulations.

In relation to lecture recording, Case sees this as particularly valuable for second language students:

And so language, I think, but I'm very aware of it, and I think there're things that I historically did in my teaching that this laptop environment tells me to do better. I think the lecture recording is absolutely essential. I feel it should be mandatory... And I think that there're students who make huge use of it, and so in terms of this gap thing, and the crowd at the top don't use it at all, and it's absolutely fine.

Case has also published work with fellow colleagues, Brandon I Collier-Reed and Angela Scott, on this where they argue that "there is a particular benefit for students who are not first language speakers of the medium of instruction" (2013:329). They found that a majority of students in the Engineering course contexts they studied elected to use the podcasts, that physical lecture attendance was not adversely affected and that few students use podcasts in the mobile mode - most use them as an additional resource in their private study spaces. They found intense use of podcasts in the build up to tests and examinations and substantial evidence of many students using podcasts as a means towards better understanding.

Students who perform poorly in the mid-year mastery tests also have the opportunity to attend a three week boot camp in the June-July holiday. This first year course thus has a strong support framework in place for struggling students in addition to being very student-centred through the provision of online resources (before and after lecture slides are provided) and daily announcements.

Students expect online resources such as lecture recordings to be the norm for other courses and

perceive academic departments who do not do so as being 'behind':

when you come to chemistry and physics, like, everything is on Vula, they put everything on Vula, and everything is on PeopleSoft, I think the math department's a little behind.

However, a minority of students report access to video recordings to be difficult off-campus:

Video streaming of recorded lectures is a bit broken up. Also, the download option is not very realistic unless a student has access to uncapped internet bandwidth. Most students will have limited bandwidth and as such cant afford to download or stream lecture recordings.

Online submission of assignments result in a faster turnaround time for feedback which students appreciated:

Quick access to useful resources; relevant youtube videos explain certain concepts better than written text; interactive polls and tests quickly establish how well the class is doing at understanding what we've learned by taking each individual into account and giving us feedback immediately/within a few days, as apposed to weeks in other courses.

While students were grateful for the support they received in the course in the form of resources, some reported experiencing too much support from tutors, who rather than showing them how to solve IT or Excel-related problems, did these things for the students, possibly as a time-saving strategy:

It's too much support. No, but it's like sometimes the teachers, like, when you ask for help to understand, they give the answer instead of, like, showing you how to get there slowly, like, some of them are, but sometimes you just need to, like, guide yourself, just that helps, somebody there to help you, I could, like, walk that way, not to pick you up and put you down on the spot.

Ja, that's how they are sometimes because they'd, like, take the laptop and then they show you, like, this is what you must do and then they do it for you, it's like sometimes, it's not good for us.

It's like when you doing a class in Excel and you're asking them how you do like a (...) column, they, like, do it for you...they shouldn't do that because, I mean, they're not going to be there one day in the workplace.

Case also mentioned that online submissions, email communication and class projects assisted in providing students with early and regular feedback, an essential aspect of monitoring student development:

...in the prac sessions, in the e-mail students send to me, we are very explicit in our feedback around, like, you know, your Excel spreadsheet, I can't make head or tail of it, you need to format it like this, or, you know, your...so they had writing feedback. That's the other thing; maybe just...it has allowed us to do, because the tutors, I have to say, have had to more...so, in terms of the...let me start at the start. I'm talking about the project space, and in the project they were in a group, but they have to do some little individual tasks, some writing, some drawing, which I think is really important in terms of giving students early feedback, are they

someone with...they need to work on that, some they don't. We turned it around within 24 hours of submission, which just about killed me, because the tutors marked it and then I moderated it, one in five I moderated. But I feel like the value of a student having got a piece of feedback on half a page of technical writing of their own, twice already within the first six weeks of varsity, you know, and they know, and they've got explicit stuff, like, you need to work on this, you need to go to the writing centre, or no, you're actually fine. I have to say, in general, I'm actually quite impressed with students' writing skills. I'm not...in fact, their Excel surprised me; I thought they would be...I thought they would come here with more Excel skills, and I think we haven't taught that well; if we run this module again, we slipped up on that, we should have had one or two sessions that were a bit more explicit teaching them Excel.

While students had the option of attending an Excel training session during Orientation week and access to training modules on Lynda.com, Case's point suggests a demand for more discipline specific and just-in-time training related to particular software such as Excel (to be discussed in more detail later on).

3. First Year Law course

Students enrolled for RDL1008/9H are not all in the B.A. Law stream, some are doing the *Law of Persons and Family* course as an elective as part of a Social Science degree, for example. The course can be described as information-heavy compared to many first year undergraduate level courses. While students report the course textbook to be user-friendly, they are required to read many additional cases from a course reader.

Initial objectives for laptop use in this course included general IT literacy and access to e-resources. When the course convener Dr Amanda-Alexander Barratt taught on the course, there was a strong emphasis on the electronic version of the course reader, lecture slides (which make reference to particular readings and cases within the reader and pages of the textbook) and screencasts. Barratt invested in Camtasia Studio software and a good quality microphone to produce screencasts of her lectures. She felt that these were essential for second language students who might not always be able to keep up in class or prefer to use this mode for revision. This view is shared by Pinder-Grover *et al.* (2011) who argue that screencasts are able to address the various academic needs of students in a large lecture environment.

Barratt felt that the podcasts addressed the needs of the bottom half of the class who are second language speakers or desire repetition:

So I can actually do the basic things in the podcast because it's really intended for and mostly used by, I believe, the bottom half of the class, so the top half of the class don't even look at them because, why, they've got the textbook, and the bottom half of the class I can really do that. So I'm not really answering your questions except that I feel that the basics can be done with the technology...

Students receive a printed version of the course reader but the electronic version thereof gets an unusually large number of downloads from the Vula site, suggesting that students download it multiple times. Barratt admitted she was not sure why this was the case:

But I think the online course reader has got a lot of hits and it's still getting hits, and I'm not sure what they're doing, why they would still need to look for it new, because I explained to them, you have to download it and open it in Adobe if you want to use the bookmarks and all of this, it won't work on the web version. So they should have it and they should have pegged it on their own computer which then means they wouldn't need to go again. But you can do nice things, you can do obviously searches for words and phrases and I've made lots of nice indexes that you can use to jump around the document.

Students may be downloading the reader onto multiple devices and locations rather than the laptop as the primary centralized space.

Students used their laptops to take notes during lectures and complete assignments, MCQs and class tests both off and on campus. For some students, whether or not they preferred to use e-resources or the printed version of the course reader was a matter of personal choice:

I wouldn't touch my foundations course reader. Like, I always use the laptop, the E-version.

I don't like to use paper anymore, so I have a computer and a NetBook, so my NetBook will be here with my case and whatever I need to read. Then I'll be typing on the computer.

I do not agree with making it mandatory for students to bring laptops to class. We all have our own preferences; some prefer writing down notes while others prefer typing them. Some prefer ebooks whilst others prefer the conventional textbook. I believe that the university should let each student decide on which method they want to use.

One student mentioned how reading on the laptop meant not disturbing others at night by having a light on, typical of university residences with shared rooms:

And then I use the ebook, and I read it. Because even, although it's bad for your eyes, in the dark, when everyone wants to sleep, you don't want to disturb anyone, you can just scroll down.

While students found online resources off campus very useful, they used laptops in lectures for note-taking but were easily distracted by students using their laptops for other activities:

I wouldn't go on Facebook or things like that, but, like, you see other people on it. It's quite distracting, like someone on front of you with their laptop open, and the lecturer would obviously think you're doing the lecture slides or whatever, but then they're on Facebook or doing... surfing the internet or something.

Students report finding the screencasts useful:

Her podcasts are really good, because they're like a podcast and she'll go through a problem set, so you, it will be like a full, it will be a lecture, and you could do some work at the same time.

Please buy her and all the other lecturers the software so that they can continue making these podcasts! (anonymous survey response from a student)

Access to the podcasts is an advantage as they are excellent summaries of each section which are quick and informative. (anonymous survey response from a student)

While laptops had less value for students in lectures, the pilot points to the importance of students' use of online resources to manage information in a content-heavy course.

4. Second Year Studio and Design Architecture course

APG2039W is located in the Bachelor of Architectural Studies (BAS) degree programme and is run by Kevin Fellingham. Studiowork encourages 'learning by doing' with an emphasis on developing students' analytical skills, performance criteria and spatial design. Thus, the objectives for laptop use in this course were student-centred. While PowerPoint slides via laptops and iPads were used in lectures to display lecture slides, images, drawings, etc. the main purpose of laptops in this context was its use in the studio and off campus. Initially, Fellingham had the following outcomes in mind: to increase the speed at which the 'technophobe' students become comfortable with technology (particularly for design), increase their overall understanding of 3D space and visualisation, and improve the presentation of student work, especially amongst students who don't draw well.

Fellingham argues that laptops are both challenging and essential for teaching spatial design:

...the ability to organise things in space in a complex way is best understood by making a model. Whether that's a physical model, or a digital model, you have to achieve it, and I've been quite surprised at the ability of ... or put it this way, it liberates some people who don't have model building skills, and don't have graphic skills, and don't naturally come ready made as architects, to understand the implications of what they're doing in three dimensions.

The negative side, there are those who get ... who are enamoured with the output, and just stop thinking, and it's sort of what can this thing do? It's pushing every button, and trying every process, and every piece of software. It doesn't necessarily have a good output for ... or good results for their project output, but it's fine, they're learning. We make judgments on that as to whether it would appear to have any utility, or not.

...I think it's just the having of a laptop, it's done two things. It makes people able to work in the studio more, because the computation kind of setup in this building is in a bunch of laboratories as a pool, which were set up for teaching design, but they are quiet spaces. There's no space to lay out your drawings, you can't make a mess, you can't have your lunch, you can't have your coffee. So, it started from the bit of creative space. So, people are able to work in studio and do more, but then there's also the side that people are able to work at home and do more.

The mobility afforded by laptops means that they can become part of the studio as a creative space. Fellingham is thus highlighting that activities which take place in computer labs and design studios do not have to be separate. Technology is becoming central to design and therefore needs to become more embedded in studio culture as students have to be 'literate' across a range of modalities: "equally fluent with a pen, a piece of polystyrene, a piece of plaster of paris, complex 3D modelling

software, Sketchup, AutoCAD". In the survey, one of the students reported that "it makes the studio environment like that of an actual Architectural office". Thus, the campus studio mimics the workplace, and not just prepares students for it. Fellingham also noted that the drawing boards were removed from the studio because they were taking up too much space and the students never used them. He also mentioned that drawing boards are no longer a common fixture in architectural firms.

Students report using their laptops in the studio during crit sessions with tutors:

Also with our design, we will be talking about an idea, and for instance, if the tutor is struggling to understand what you're saying, then you have like these models to show in front of them, and it's a 3D model, and you can orientate her then. So that basically gets the idea across.

Students understand that there is a place for using software, hand drawings and other media in design work. They see the laptop as essential for this kind of work, particularly in relation to preparing work for presentations:

I think it will improve our like, AutoCAD drawing, more final presentation drawing abilities, but the beginning thing, I think we've had readings, we've had lots of discussions about the beginning process of any design needs to be done by hand, conceptual little sketches of... because you can't do that with a mouse. So there is always going to be a need for hand drawing, but the final result I think is definitely better with a laptop.

We will end up competent in both hand drawing and computer drawing, so I think any design as to which will be better for our presentation, 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.

Students in this course also made use of a secret Facebook group. Student use this online space to communicate course-related information, arrange lifts to hardware stores to buy materials, exchange files for group projects, have group chats and so forth. It is a vital platform for peer support and students prefer it to the official university LMS:

We highlight hand it dates on there, and if we're getting stuck on things, then like people who are both stuck on it, they realise, that person's also stuck on it, I'm going to go sit with them and we're going to try and figure it out together.

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.

Some students also used Pinterest to collect online images ('precedents' or visual references) for projects. Thus, social media platforms were used for networking, collaboration and research.

Content analysis of key themes

The project identified a range of benefits and challenges in relation to the implications of ubiquitous

access to laptops for teaching and learning. The main benefits can be summarised across a set of key themes: the teaching and learning context, student life outside of the classroom and beyond the university, equity and access, computer literacy training and digital literacies, staff development and support, and campus infrastructure.

1. The teaching and learning context

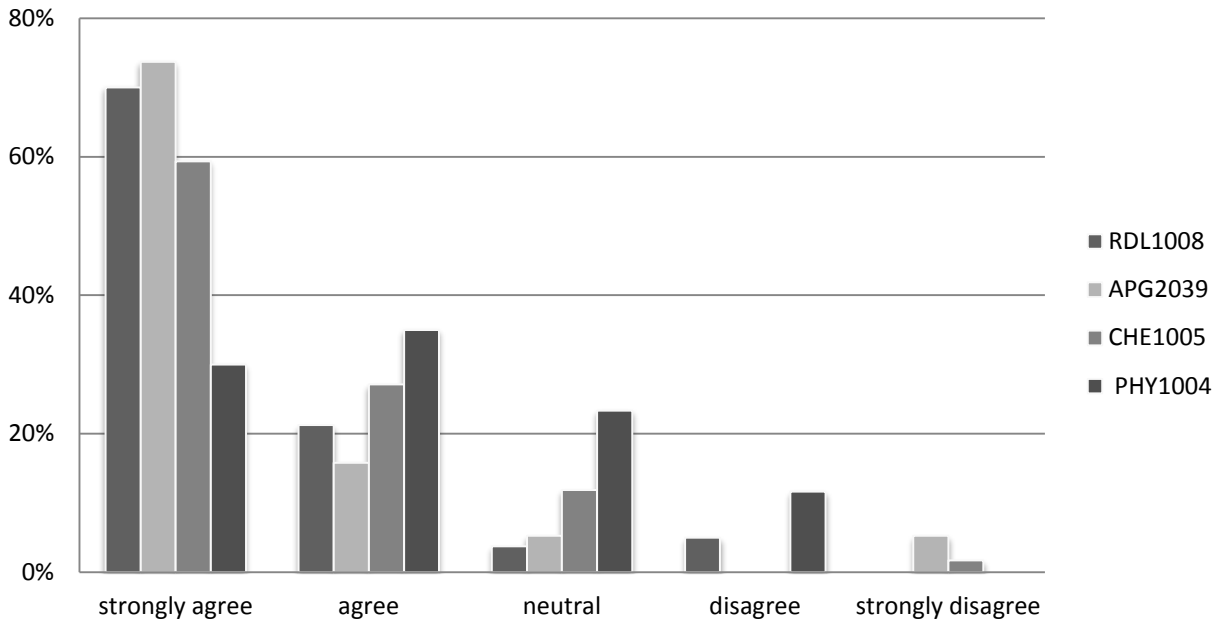
Within the course

Universal access to laptops had a positive impact on how lecturers approached their teaching. However, this differed across courses, as lecturers chose to integrate laptops as they saw appropriate for their course content and field of study. Additionally, some courses relied more on resources and being online than others. Laptops were used primarily for accessing resources and note-taking in Law, laptops proved most beneficial for lab sessions in Physics on 'laptop rich days' and similarly in the studio rather than the lecture in Architecture, whereas laptops were integrated across teaching spaces and activities in Chemical Engineering.

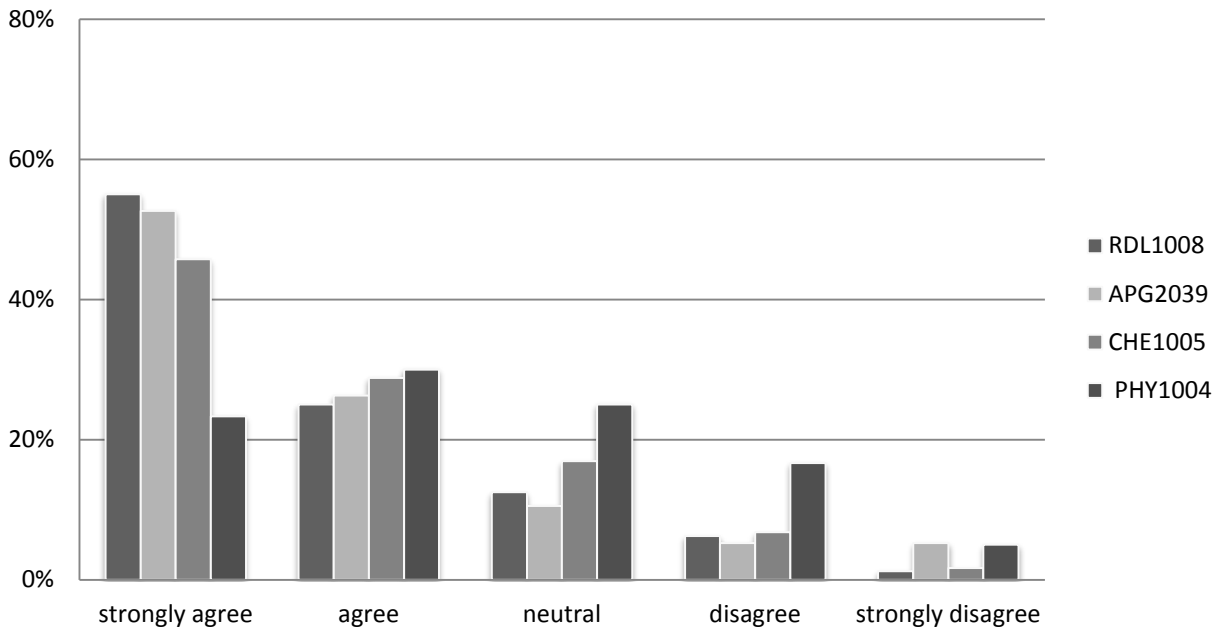
Lecturers were able to transfer structured activities that used to take place in computer labs to lecture theatres. Lecturers in Physics and Chemical Engineering reported being less dependent on securing lab bookings. After some initial issues stemming from wireless glitches, the network performed well in the teaching venues and lecturers reported setting online tests in lecture venues to be a smooth experience. Lecturers reported that as the year progressed, this became smoother, probably because of their growing comfort at setting these tests, improved wireless and support.

The majority of students (across courses) who completed the survey agreed that laptops were essential for completing coursework, for learning in their course more generally and that course assignments required them to use laptops in ways that allowed them to learn new things.

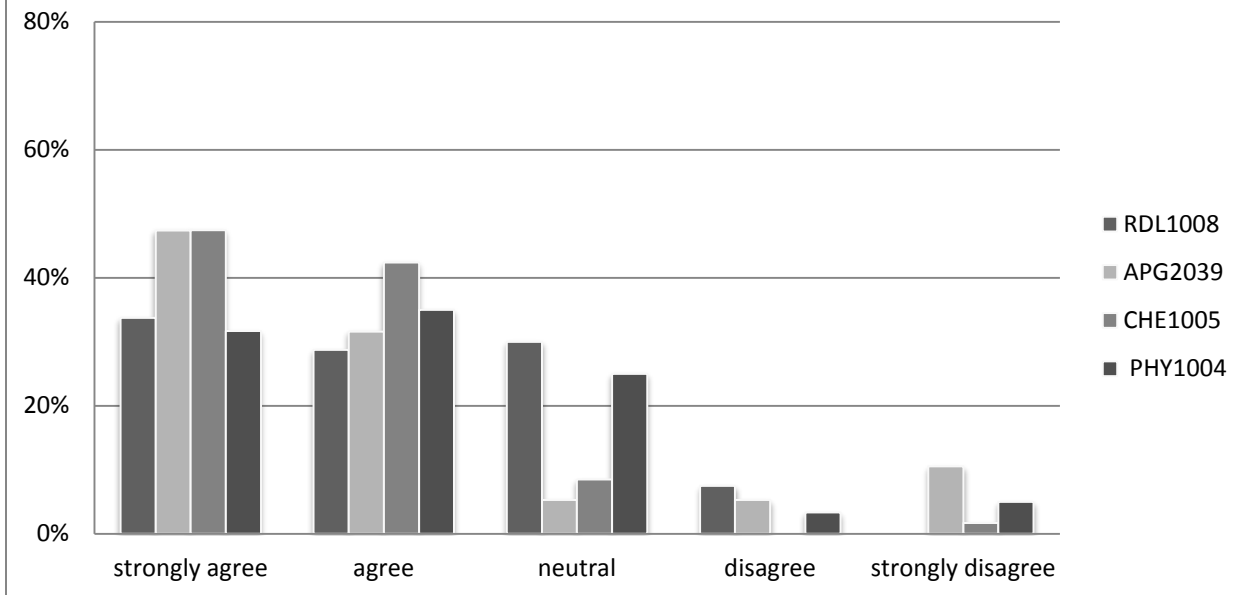
Laptops are essential for completing coursework



Laptops are essential for learning in this course



Assignments in this course require us to use laptops in ways that allow us to learn new things



Survey results for questions pertaining directly to laptops and learning.

Students experienced enriched educational experiences in courses where lecturers engaged in new teaching approaches. Such innovative methods included the use of student response systems, simulations and podcasts:

I think people answered more on Learning Catalytics, because it's anonymous. And I think he (the lecturer) changed the course of the lecture based on the answers. Like if too many people go wrong he'd go over it again. (Physics student)

It is 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. (Physics student)

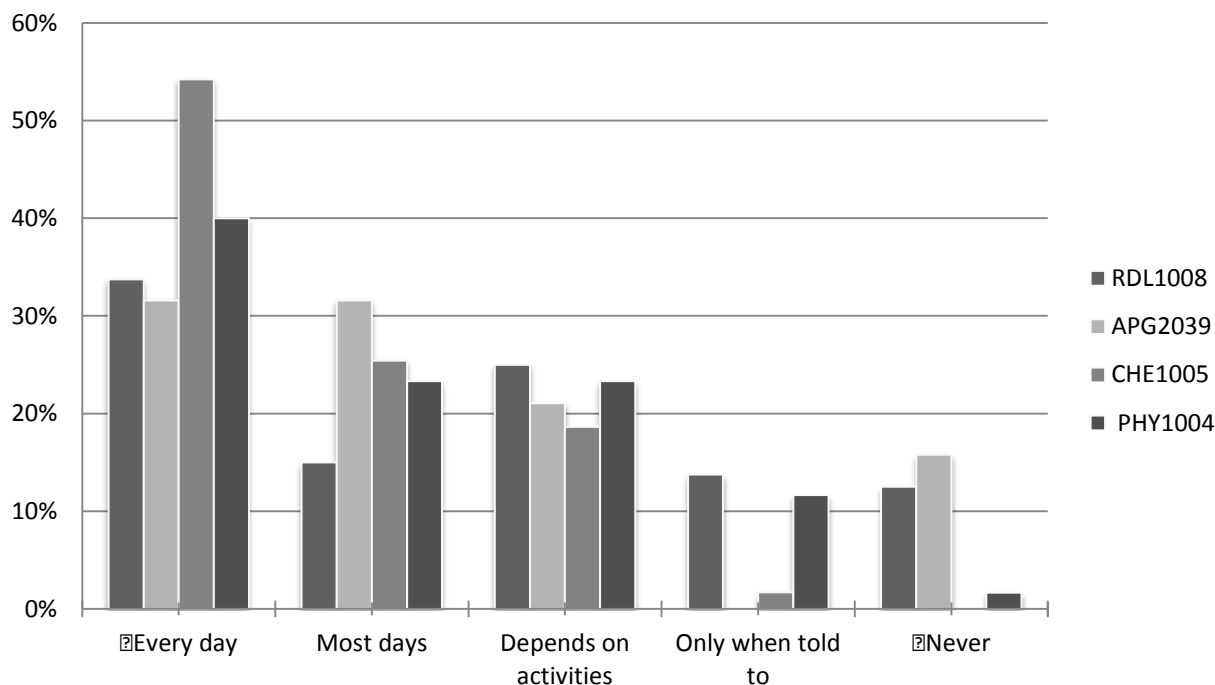
Access to podcasts is an advantage as they are excellent summaries of each section which are quick & informative. (Law student)

The project thus constitutes an investment in promoting innovative pedagogy and teaching renewal.

On the negative side, students reported fellow classmates' use of social media, watching series or playing games to be a distraction during lectures. This concurs with existing research (Fang, 2009) which highlights the importance of implementing a laptop policy (from classroom management strategies to zoning) in formal learning spaces.

While laptops were ubiquitous across the four courses, not all students brought their laptops to campus every day although a large portion of students reported doing so. This suggests that the students interpreted the need for laptops as dependent on whether or not it was necessary for their course. As discussed earlier, laptops were integrated differently across the four courses. Additionally, there was a minority of students who while owning their own laptop, never brought it to campus.

How often do you bring your laptop to campus?

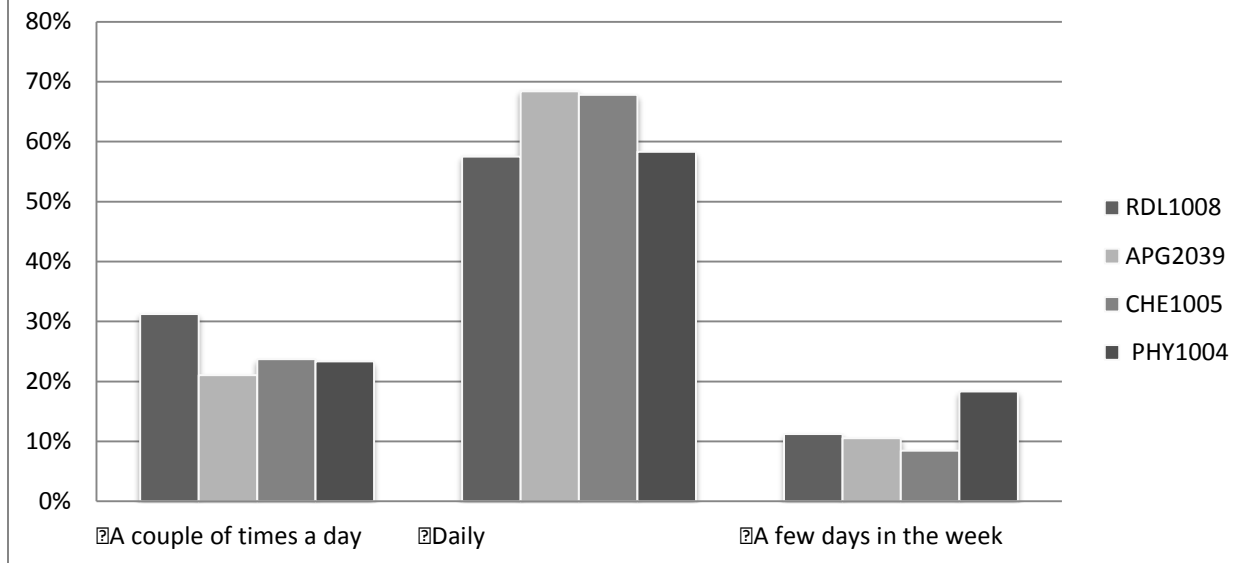


How often do you bring your laptop to campus?

Across courses

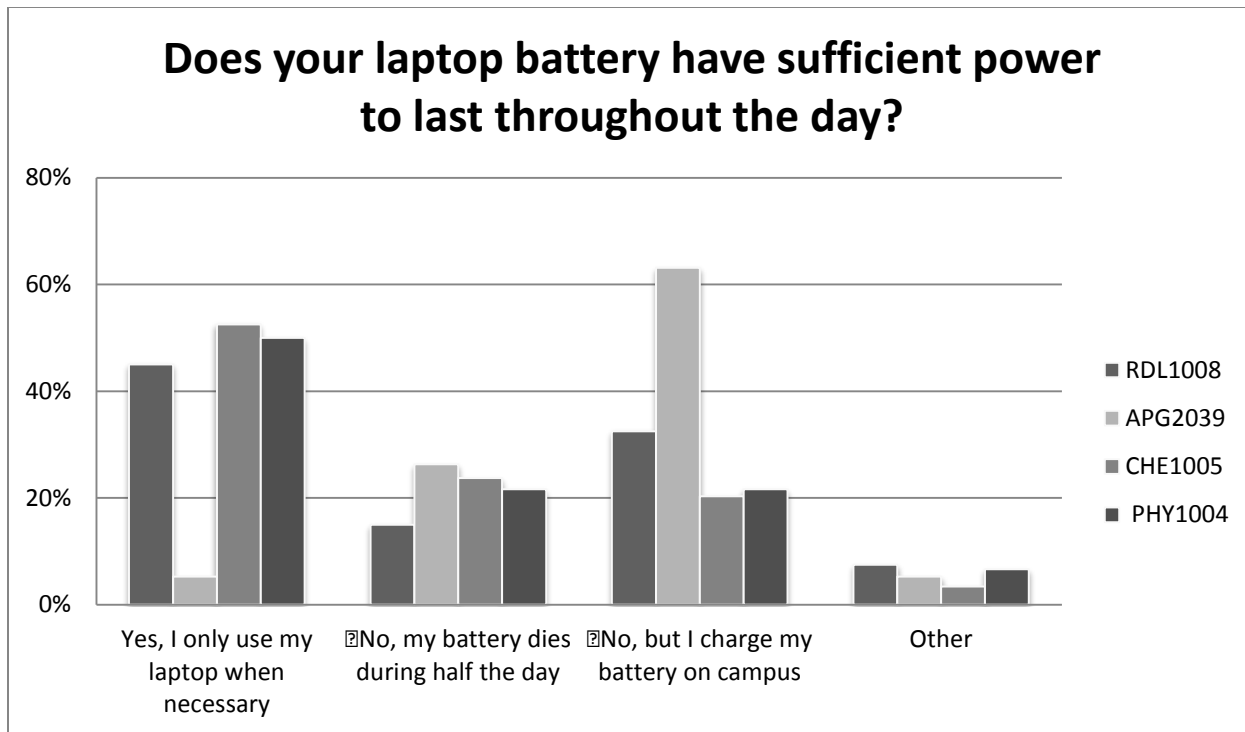
While the laptops were mandatory for one course, it meant that students used it for other courses as well. However, some students mentioned that they would conserve battery power for use in their laptop pilot course. The majority of students admit to using their laptops for course-related work on a daily basis (i.e. every day of the week) or even a couple of times a day.

How often do you use your laptop for course-related work?



How often do you use your laptop for course-related work?

The use of laptops in other courses is related to battery power issues, where a large portion of students report only using their laptop when necessary. The shortage of plug points in lectures may result in off-task laptop usage and distraction being minimal in our context, since power is a scarce resource (ie. students conserving battery power for essential use).



Does your laptop battery have sufficient power to last throughout the day?

Mandatory laptop use in more than one course would require improvements in campus infrastructure with the installation of additional plug points in lectures or the use of tablets with a longer battery life, depending on the needs of particular courses.

Some benefits of using laptops were course specific:

*...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.
(Architecture student)*

However, students also reported benefits that cut across courses such as the convenience of having all their resources on one device, ease of communication with lecturers and fellow students, and being able to submit better assignments, since owning their own laptop afforded them more time to work on them. This included practicing particular skills in their own time, such as programming in Physics:

*It offers an easy way to keep all material and related resources neatly organised; provides easy access to all of these while studying and doing the weekly problem sets. Also, having my own machine I can practice vPython and other software applications in my own time at home.
(Physics student)*

2. Student life outside of the classroom

Students valued the mobility afforded by laptops which allowed them the opportunity and flexibility to do University work in a variety of places:

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)

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)

While the project team suspected security to be a major concern, students reported that they did not feel that they were at an increased risk and many reported that owning a laptop increased their personal security, as they no longer travelled to work on campus late at night.

Students also reported accessing a range of media on their laptops for the purposes of concentration, relaxation and entertainment:

Sometimes I use my laptop to listen to music and sometimes the music helps me concentrate when I do work. (Physics student)

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)

Law students enjoyed the opportunity to complete online tests (for assessment purposes) at home:

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)

Thus, more flexible learning afforded by the mobility of laptops offers lecturers the freedom to confidently set tasks for students to undertake outside of class. Students' comments therefore suggest the importance of mobility and ubiquitous (anytime, anywhere) learning.

Laptops also facilitated social engagement with classmates, such as Architecture students' use of a secret Facebook group. The class representative reported that students use this platform to arrange lifts and exchange jokes as well as to engage in chats related to group projects and sharing project files and other resources. The Facebook group became an important part of their studio culture, as it facilitated peer communication rather than lecturer-to-student communication which took place via the LMS.

3. Student life beyond the University

Laptops support the development of graduate attributes essential for professional careers. Students in all focus groups highlighted the importance of using laptops while at university to prepare them for the workplace. Lecturers and students are equally aware of the variety of digital literacies students

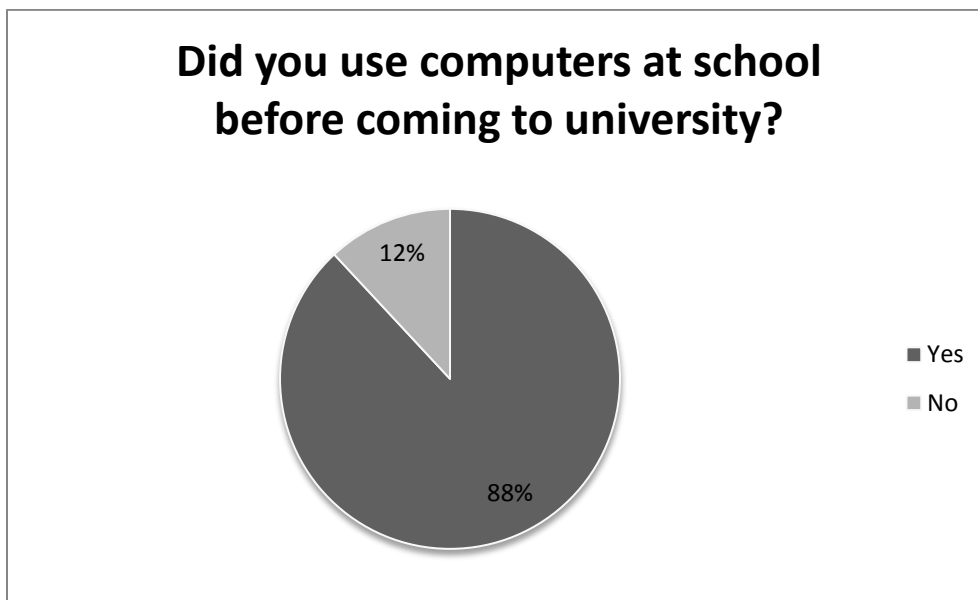
need to become adept at using while at university.

...university is like preparation for the workplace, right? And usually when you get in the workplace you usually have to, like, work with laptops and stuff, so when we're here, the things that we do are actually training for the workplace, so if you don't own a laptop here, how are you going to survive in the workplace? (Chemical Engineering student)

I don't think the world's any better for having become digital, but it's the world that you're in, and if you can't operate in that you're disabling your students beyond belief. (Kevin Fellingham, Architecture lecturer)

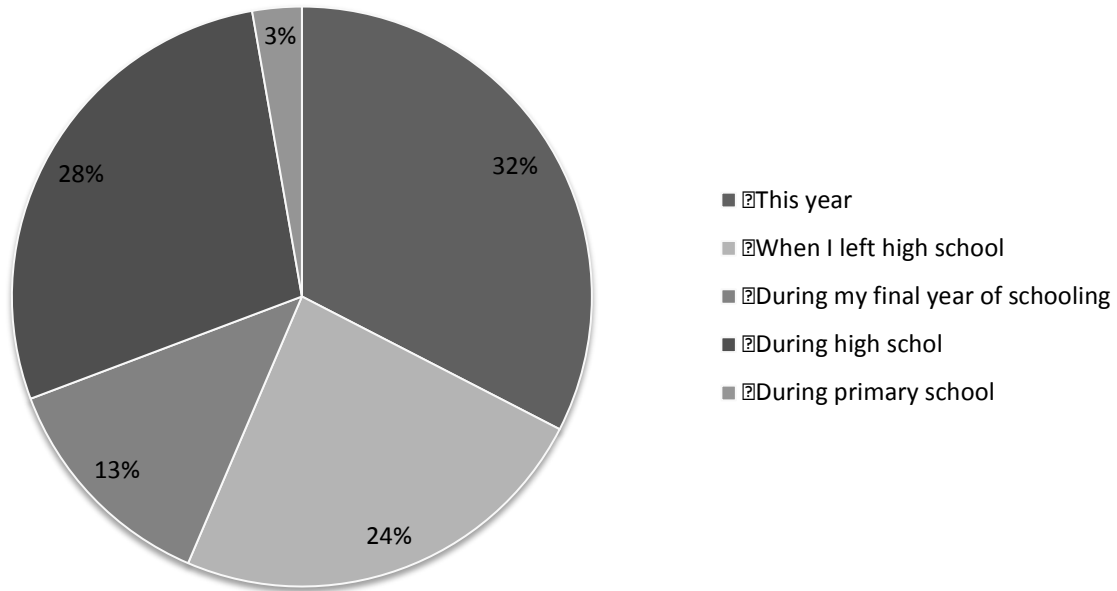
4. Equity and access

The majority of students reported using computers at high school level, but *owning* their own laptop after high school. This means that for many students, laptops are still relatively novel resources in their lives more generally and further novel for the minority who did not have access to computers at school.



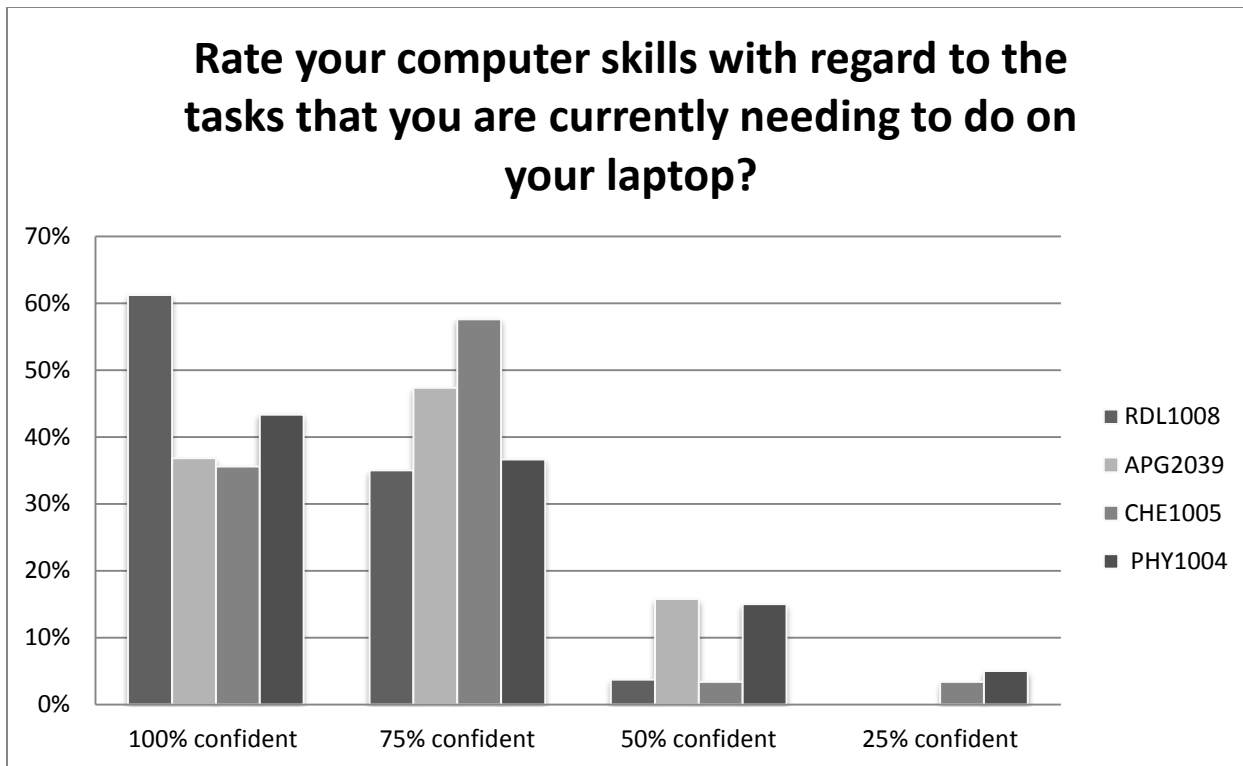
Did you use computers at school before coming to university?

When did you first own your own laptop?



When did you first own your own laptop?

While the majority of students reported that they felt confident in their computer skills in the survey, interviews with lecturers and student responses during focus groups (reporting on peers) suggest that students are not as 'tech savvy' as they present themselves to be, over-reporting their confidence in their computer skills. There is a need for developing computer skills and digital literacies tailored to students' diverse needs.



How would you rate your computer skills with regard to the tasks that you are currently needing to do on your laptop?

Universal laptop access may narrow the equity gap between students from different backgrounds, but it might also widen it. Lecturers reported different views on the relationship between ubiquitous access to laptops and equity:

I think this generation more than anyone else are very fluid and nimble and dynamic and look at the seating arrangement in the class, just to...that will tell you about how, you know, on average I guess the class is maybe, there's a slight upward middleclass shift than 20 years ago, but then that also goes for South Africa as a whole, and there's just a lot more crossover of who is checking out whose computer. (Jenni Case, Chemical Engineering lecturer)

You hope they're self-organized enough to put it onto dropbox or have some way of getting the notes, they can get it off the website off info whereas laptop (...) phone, wonder how sorted they are on that. Might need some tips and tricks, the level stuff you know, how to organize their life a little bit better, there are some kids that are totally lost in their organization – the laptop became a burden rather than a help. (Andy Buffler, Physics lecturer)

By contrast, students expressed that having access to laptops creates a sense of equality, but inequality is manifest in classmates' differential IT skills:

The fact that it's compulsory just makes everyone equal. (Chemical Engineering student)

I actually know somebody who can't type to save her life, she's, like, could you just open Word for me? She literally types, like, a, b, c, she literally has to look for all of the letters and I can understand, because, I mean, she hasn't, she couldn't afford a laptop and they couldn't afford a computer and the only thing she could have was the 1, 2, 3 pads on the phone and they haven't, they didn't have a Qwerty phone, so every time she types it takes forever and a day and I think that's really, like, bad... how is she going to manage?... it's like sad that people from our generation can't keep up the technology of today... (Chemical Engineering student)

Students reported differential skills between classmates in terms of typing, experience with using particular software and hardware (i.e. a student reported that her friend had never used a USB flash drive until university). Some students reported that the laptop mandate erased disadvantage because everybody had one, while at the same time, they reported that students in other courses perceived them (students in the pilot courses) as being in an 'elite' academic stream because of the mandate.

A focus on training to enhance student digital literacy and ICT support is necessary to avoid exacerbating disadvantage between students.

5. Computer literacy training and digital literacies

Lecturers and students identified training needs that extended beyond technician 'how to' in relation to software use and computer literacy to the need for more contextualised support:

It's not the coal face kind of stuff so you probably may need a senior student or somebody who's been through the system and says look here, this is how you practically manage, this is where it's useful and get onto this, and then a place or hotseat kind of help. (Assoc. Prof. Andy Buffler, Physics lecturer)

Sometimes you're expected to write a test online and you're timed but then the timing might not be adequate for all of us. It might be adequate for someone who has a lot of experience with laptops, but then someone who is slow in typing the answers, even though, had they written their test by hand on paper they would have gotten the marks and finished quickly, but then because they can't really use the laptop that disadvantages them somehow, yet they need to learn. So I don't know how that can be... I think we should have had a longer training session, we only had like a workshop that was two three hours long and I feel that other people might be disadvantaged... (Chemical Engineering student)

While training during Orientation tends to assume a 'one size fits all' model and is often aimed at the 'lowest common denominator' in terms of students' computer literacy skills, lecturers' and students' feedback suggest more of a nuanced view that differential skills exist not only in terms of IT fluency, but also digital literacies. However, these boundaries are not clear-cut.

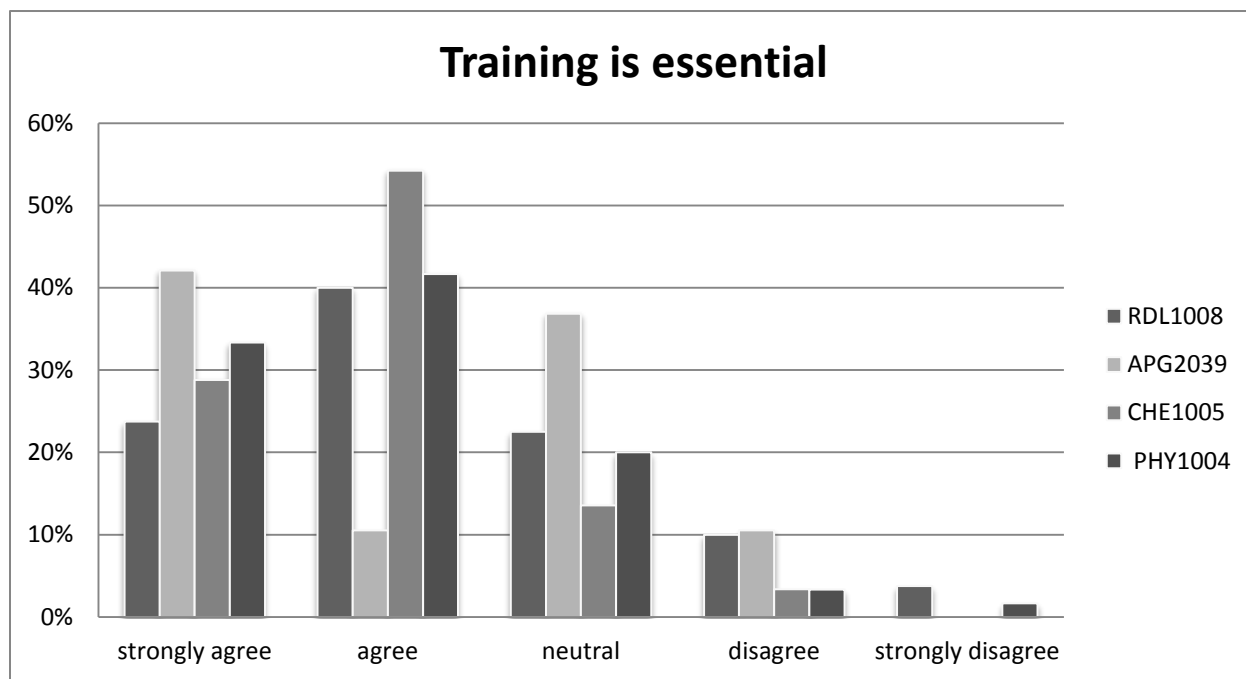
As noted by Brown (2012):

ICT literacy is not an isolated skill or need and should not be treated as such. It makes sense, given links between digital inclusion and social inclusion, that ICT literacy is tied up within other academic development issues. As boundaries between information literacy and other academic literacies become more porous, it is essential

that librarians, educational technologies, and language development professionals work together to develop students' digital literacy within the context of their background and their current discipline. (2012:55)

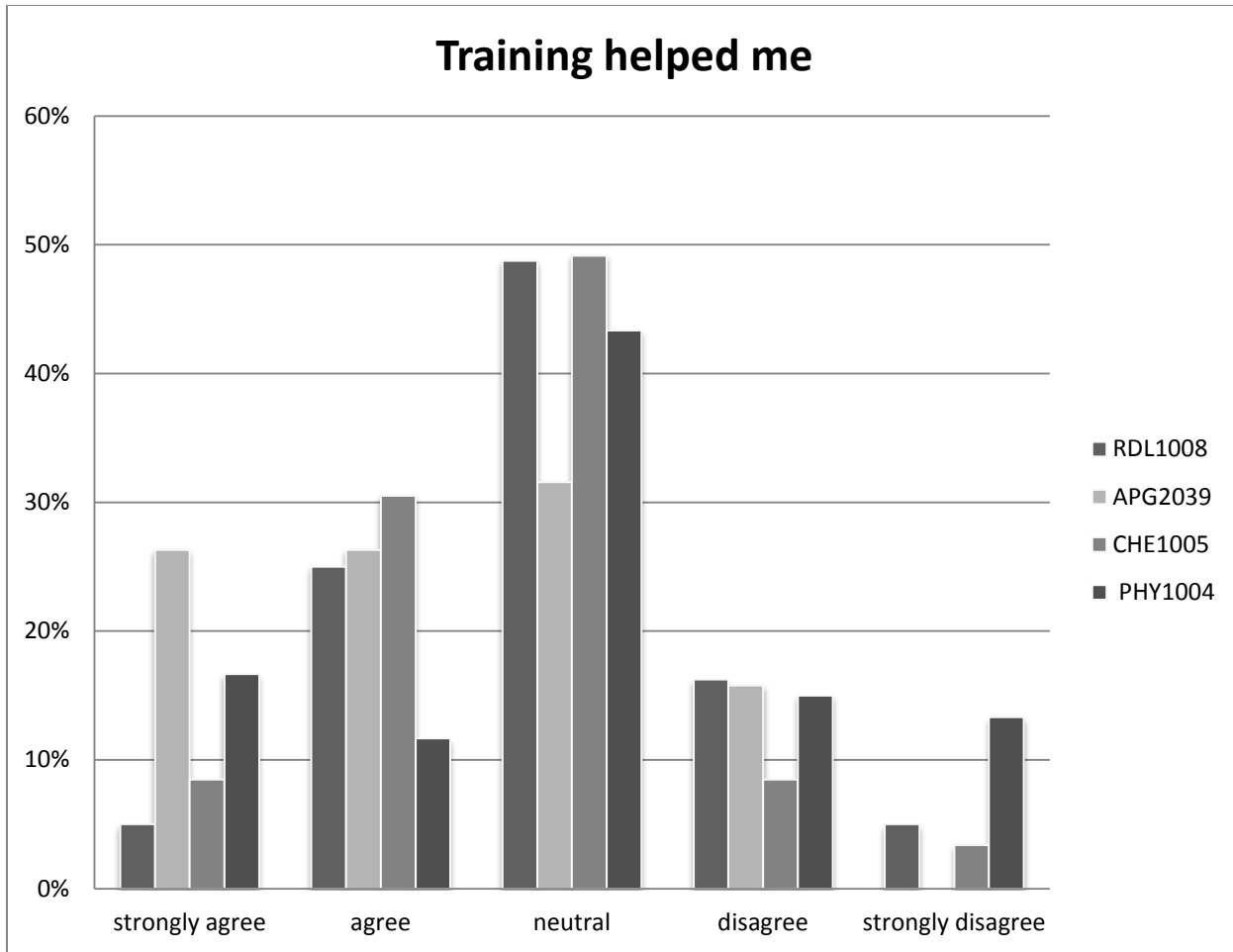
Universities seem to have shifted from talking about computer skills (functional IT use) to digital literacies and associated graduate attributes. Digital literacy includes the ability to find and use information that goes beyond this to encompass communication, collaboration and teamwork, social awareness in the digital environment, understanding of e-safety and creation of new information⁴. Digital literacy refers to the skills, competences and dispositions of students using digital technologies to achieve personal, study and work-related goals (Open University Digital and Information Literacy Framework, 2012).

Students had mixed responses around training, likely due to a mismatch between the training they had experienced in their individual courses (from ICTs, tutors, etc) and the kind of training they actually need, which is more contextual. While the majority of students agree that training on how to use a computer (i.e. computer literacy) is essential before embarking on a course requiring laptop use, the majority of students were neutral in response to whether or not the training they received during orientation helped them.



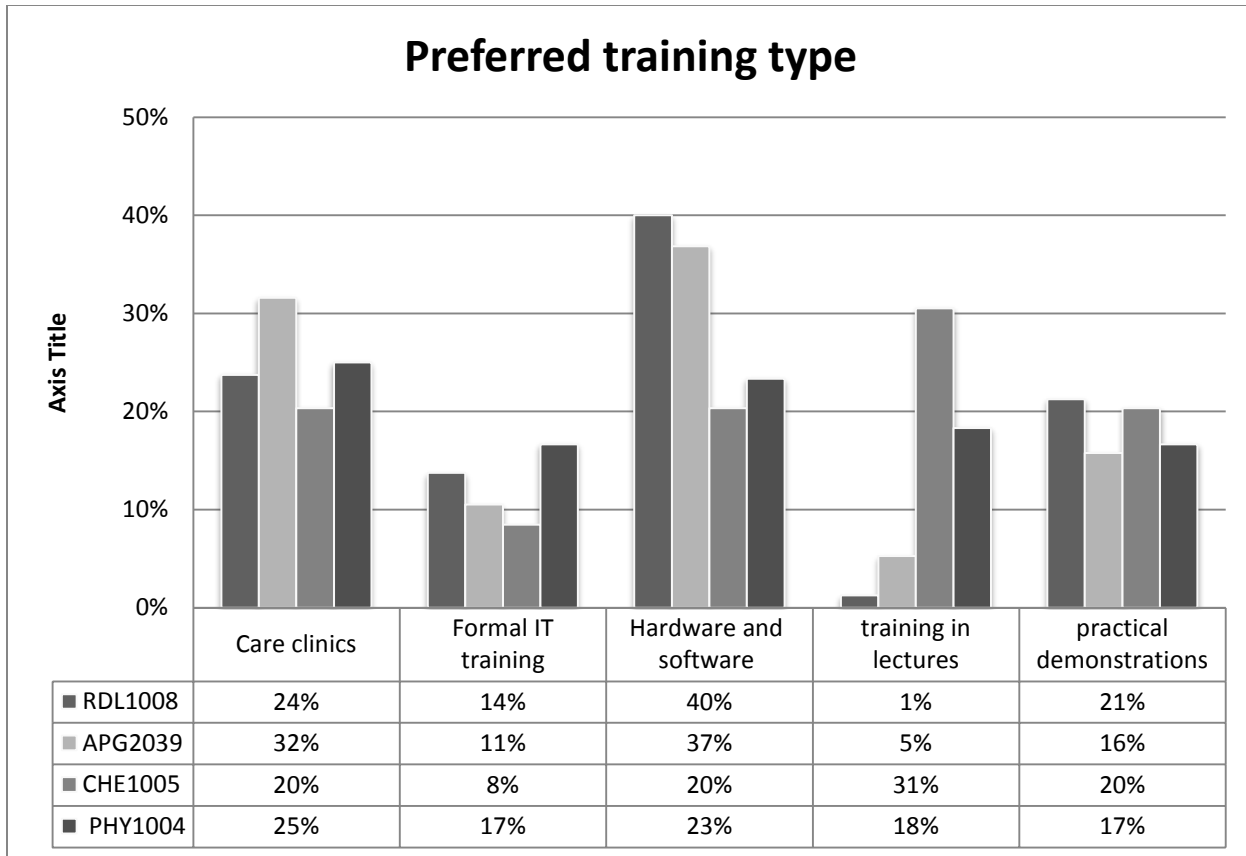
Training on how to use a computer is essential before embarking on a course requiring laptop use

⁴ <http://www.open.ac.uk/libraryservices/subsites/dilframework/>



I found that the training before the course started helped me

When asked about the preferred training methods that ICTS could use to help students, students also had mixed responses. This may be related to the pilot courses. For example, a Chemical Engineering student may perceive 'IT training lectures' as valuable because they had received that to some extent already where 'training' elements are integrated into the course as part of their professional development. Architecture students would be familiar with 'care clinics' (2-3 hour blocked training sessions) as it is a format they are familiar with for Adobe Photoshop training and so forth.



Which training method would you prefer ICTS provide you with to help you use your laptop and the installed software more efficiently?

KEY

Care clinics: Short training sessions (2 - 3 hours) on specific software applications

Formal IT training : instructor-led training focussing on practical hands-on sessions in training lab (number of half day training sessions)

Hardware and software assistance

IT training lectures as part of my course

Seminars: practical demonstrations (1 - 1.5 hours) such as Learn @ Lunch on specific topics/software features

A lot of the training and support cannot be done upfront by ICTS and some lecturers believe this needs to happen in class or via other support networks such as tutors or peers.

6. Staff development and support

The project team was privileged to include some innovative lecturers who were willing and able to experiment with new technologies such as lecture recording, podcasting, using student response systems in lectures, etc. Some lecturers took a more personal approach to their professional development, buying imported software such as Camtasia and hardware (microphone) from their personal or research funds. Others worked more collaboratively with the Centre for Educational Technology's staff development coordinator.

Regular meetings included sharing lessons learnt and this assisted staff development of the team as a whole. This included the trialling of a student response system (Learning Catalytics) which some of the lecturers report as involving quite an initial learning curve. Roger Brown from the CET Learning Technologies Team also assisted with class testing for Vula online tests. Lecturers had to be confident to try out these technologies and prepare a back-up plan if things did not go as planned in the class setting. For example, if a student's laptop crashed during an online class test they could use a back-up laptop, etc.

7. Campus infrastructure

Brown & Pallitt (2013) report a range of examples from the pilot where teaching and learning dynamics in traditional learning spaces such as lecture theatres changed as a result of the laptops entering these spaces. Often this meant that activities that took place in computer labs (such as online tests or live assessments) were able to take place in lecture theatres and thus lecturers were less reliant on booking computer labs. The presence of wireless connectivity had an enabling effect for some teaching and learning activities that were not possible in these spaces before.

However, when the Chemical Engineering students had 3 hour workshops in lecture venues on Fridays and their laptops ran out of battery power, some of them sat outside in the passage of the Menzies building to access a plug-point enabling them to continue working on a group project. Students therefore reported that access to power in lecture venues and campus generally (to charge laptops) was an issue.

Internet connectivity was an issue for students not in residence:

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)

Additionally, many students rely on internet access via smartphones when off campus. Students also report using smartphones in what they describe as an 'academic' way:

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)

Discussion

While the integration of laptops in Higher Education is not new, access cannot be assumed in resource constrained universities. 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). In our context, many students rely on mobile phones as their primary means of internet access off campus (Czerniewicz, Williams & Brown, 2009). The introduction of laptops as a requirement for four courses is thus a unique opportunity in our highly divided context where individual access to laptops and internet connectivity are still relatively novel resources.

Our findings indicate that the reported experiences of UCT students and lecturers resonates with literature on laptop use in Higher Education in other contexts. McMahon and Pospisil (2005) studied a university wide initiative involving the use of wireless laptops among undergraduate students across four campuses at Edith Cowan University (Western Australia's second largest university). They report strong evidence of students' independent use of technology, but found their value as a tool for learning was heavily influenced by the technical support provided for the laptops and the way in which tutors integrated the technology into their teaching. They argue that the two fundamental issues that impacted on this related to the quality of teaching and learning and the quality of the university infrastructure. However, they argue that overall their project survey indicated a strong positive response to the value of the laptops helping students with their learning. Similarly, we also find evidence of students using laptops independently for their learning. We agree that university infrastructure and support aspects of such projects are key factors important to the success of ubiquitous mobile computing. Brown and Pallitt's (2013) work which argues for the diversity of learning spaces, including non-traditional 'in between' spaces is also supported:

“Appropriate physical learning spaces with stable wireless network access, access to power and projection facilities are essential to the success of in class use of laptops. Out of class learning spaces with access to power and wireless networking were important to students. Adequate and immediate support when needed was another key requirement of this group. The challenge to educators and administrators therefore is to meet the expectations of the millennial students by supporting experiences that are immediate in terms of their access and reliability, are flexible enough to cross the boundaries of study, work, and social lives, and provide them with a connected and information rich environment in which to learn.” (McMahon and Pospisil, 2005:430)

All the lecturers achieved the objectives they initially envisioned (outlined on page 4). However, it is difficult to answer research questions framed around impact in the space of a one-year pilot. Burbules (2012) argues that laptops are more successful when integrated into curricula. However, it is important to remember that not all lecturers had the same objectives or integrated laptops in their courses in the same way due to the nature of their courses. Additionally, unequal numbers of students participated in the survey and focus groups which further complicates any comparison. Thus, for the purpose of this report we have chosen to identify a range of broad themes that have a bearing on teaching and learning.

Project outcomes

The laptop pilot project had a range of outcomes that contributed to University activities more broadly. Outcomes for various interest groups can be summarized as follows:

- The project has strengthened relationships and collaboration between ICTS, CET and

academics in Chemical Engineering, Physics, Law and Architecture

- While ICTS will continue to provide initial IT literacy training during orientation and student support, CET and FYE (First Year Experience) are in the process of providing streamlined (i.e. faculty-specific) / integrated digital literacies
- Greater consideration of power (plug points) issues in new lecture theatres which has a bearing on decisions made by Properties and Services. Teaching and learning needs are better informing these requirements.
- ICTS inclusion in FYE. Student mentors or 'tech buddies' are going to be hired to assist with faculty specific training. The pilot showed that there is a need for this.
- Wireless densification in lecture theatres has improved.
- The project has clarified avenues for future staff development.
- With the current pilot cohort moving to second year, Chemical Engineering plans to extend the laptop requirement to 3rd year and find ways to support financial aid students themselves .
- Lecturers have become more conscious of how educational technology impacts on teaching and learning.
- Lecturers are able to utilise learning spaces more mindfully.
- Lecturers have gained confidence in their abilities to use educational technologies in the classroom and some have become mentors and sources or inspiration for others in their departments.

Recommendations and implications

The Council for Higher Education (CHE) is currently proposing an undergraduate curriculum reform⁵. They have set up a task team (chaired by Njabulo S Ndebele, former UCT Vice-Chancellor) to investigate the possible implications of introducing an extended and 'flexible' curriculum structure for undergraduate education in South Africa to address systemic obstacles to access and success. UCT's Flexible Learning Project is no doubt related to this at an institutional level. The laptop project needs to pay close attention to the framing of flexibility and access and how the role of technology is conceptualised as part of a 'flexible' curriculum and theorised in relation to access and equity. Integrating digital literacies into curricula forms part of the CHE proposal for curriculum reform. The laptop pilot provides insights into how this may be achieved.

Computer literacy or functional access and digital literacies are inter-linked at a practical level which has implications for curriculum and training. JISC's digital literacies framework and the Open University's digital and information literacy framework (more general) can be used to consider the integration of digital literacies in curricula and training sessions. Having access to laptops require functional access but one cannot assume that students are also engaging in digital literacies by virtue of their access. Orientation is a very saturating time of year where new undergraduates receive near to information overload and thus might not be the best time for such training. We suggest that students receive Faculty specific training which is streamed rather than the 'one size fits all' training

⁵ See 'A proposal for undergraduate curriculum reform in South Africa: The case for a flexible curriculum structure' at http://www.che.ac.za/media_and_publications/research/proposal-undergraduate-curriculum-reform-south-africa-case-flexible Full report available at http://www.che.ac.za/sites/default/files/publications/Full_Report.pdf

students receive during orientation. We suggest that ICTS/CET work with Faculties to develop student digital literacies together. Thus, students can develop digital literacies in the context of their respective disciplines.

During orientation, students completed a self-assessment survey on their IT competencies (i.e. computer literacy). Future surveys could include questions related to digital literacies and whether students believe there to be a difference between computer literacy or IT fluency and digital literacies. Retrospectively, the 'seminars: practical demonstrations' may be a good place for fostering digital literacies. For example, Nicola Pallitt taught a Learn@Lunch session and created a resource 'Using Social Media for your Studies'. Other sessions included Microsoft Excel tips and tricks, using Google Drive, etc. The Learn@Lunch programme also shifted, as the first two semesters informed the kind of training that took place in the second half of the year, the words used to address students changed as well as the marketing. Rather than assuming that all students need 'basics', we used their way of speaking about technology in the focus group (being 'tech savvy') and addressed them as already having this skill with the programme helping them to improve on it. How training sessions are marketed to students is very important.

The four pilot courses embedded digital literacies into their curricula in different ways, some more explicitly than others or not at all. However, this is not the lecturers' responsibility alone, as students need to be supported to 'learn how to learn'. A learner-centred approach involves developing students' capacity to integrate their knowledge and skills, and supporting them to become more confident and self-directed actors in their learning (LLiDA).

Continued high quality support for academic staff is essential for the next phase of the project. Lecturers need to collaborate with CET or seek advice from academics who are adept at using various technologies in their courses when it comes to integrating appropriate educational technologies into their curricula and teaching practices. The project has also benefited from having very engaged academics who have become role models for other academics. Even though the pilot is not being scaled up, there are academics that have become 'followers' of these experts and are passionate to experiment on their own. Thus, the laptop pilot seems to be scaling up in some ways irrespective of expanded institutional financial backing.

Future research

The laptop pilot has been approved for continuation, but not upscaling, in 2014. Currently there is a mismatch between budget objectives which focuses on providing Financial Aid students with laptops and academic authorities seeking findings related to the impact of laptops on teaching and learning. Further research on financial aid students (who are also statistically most at risk) in particular is needed, as this focus raises questions related to UCT's academic development and transformation. We propose case studies to unpack student narratives at a granular level to investigate how they experience using laptops as novel resources as part of their first year experience at UCT. In 2014, we will be following first year students into second year as well as studying the laptop use of the new cohort of first year students in the initial four courses with a particular focus on the benefit for Financial Aid students.

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2013 Survey Data

DEMOGRAPHICS

Gender

53% male
47% female

Where do you live during term time?

46% I live in a UCT residence
21% I live in a flat
29% I live with my parents
4% Other

ACCESS AND USE

When did you first own your own laptop?

33% This year
24% When I left high school
13% During my final year of schooling
28% During high school, before my final school year
3% During primary school

Did you use computers at school before coming to university?

88% Yes
12% No

How often do you bring your laptop to campus?

41% Every day
3% Twice a week
18% Most days in the week
22% Depends on course activities for that week
9% Only when my lecturer tells us to bring it
6% Never

When I don't bring my laptop to campus, it is for the following reasons:

- 17% It rains and I do not want my laptop to get wet
- 1% I use public transport
- 42% I do not want to carry a bulky laptop around
- 7% I am afraid I may be mugged
- 4% I am afraid of having my laptop stolen on campus
- 28% Other:

Does your laptop battery have sufficient power to last throughout the day?

- 45% Yes, I only use my laptop when necessary
- 20% No, my battery dies during half the day
- 29% No, but I charge my battery on campus
- 6% Other: please specify

How often do you use your laptop for course-related work?

- 26% A couple of times a day
- 61% Daily
- 12% A few days in the week

How would you divide the time you spend on your laptop between academic and leisure activities?

- 17% 90% academic work, 10% leisure
- 32% 75% academic work, 25% leisure
- 32% 50% academic work, 50% leisure
- 16% 25% academic work, 75% leisure
- 4% I only use my laptop for academic purposes

Laptops are essential for completing coursework

- 56% Strongly agree
- 26% Agree
- 11% Neutral
- 5% Disagree
- 1% Strongly disagree

Laptops are essential for learning in this course

- 44% Strongly agree
- 28% Agree
- 17% Neutral
- 9% Disagree
- 3% Strongly disagree

Lecturers in this course are adept at using computers

- 36% Strongly agree
- 44% Agree
- 17% Neutral
- 2% Disagree
- 2% Strongly disagree

Assignments in this course require us to use laptops in ways that allow us to learn new things

- 38% Strongly agree
- 34% Agree
- 21% Neutral
- 4% Disagree
- 3% Strongly disagree

Laptops help to create a sense of community in the class

- 10% Strongly agree
- 16% Agree
- 37% Neutral
- 23% Disagree
- 15% Strongly disagree

TRAINING AND SKILLS

How would you rate your computer skills with regard to the tasks that you are currently needing to do on your laptop?

- 47% I am 100% confident in my competency
- 43% I am 75% confident - there are a few things I don't know how to do
- 8% I am 50% confident - I manage, but know I still have a lot to learn
- 2% I am 25% confident - I struggle with most things computer-related

Training on how to use a computer is essential before embarking on a course requiring laptop use

- 29% Strongly agree
- 42% Agree
- 21% Neutral
- 6% Disagree
- 2% Strongly disagree

I found that the training before the course started helped me

- 11% Strongly agree
- 23% Agree
- 46% Neutral
- 14% Disagree
- 6% Strongly disagree

Which training method would you prefer ICTS provide you with to help you use your laptop and the installed software more efficiently?

- 24% Care clinics: Short training sessions (2 - 3 hours) on specific software applications
- 14% IT training lectures as part of my course
- 19% Seminars: practical demonstrations (1 - 1.5 hours) such as Learn @ Lunch on specific topics
- 13% Formal IT training: instructor-led training focussing on practical hands-on sessions in lab
- 30% Hardware and software assistance

Have you started using Lynda.com as an online learning resource?

- 66% Have not created my Lynda.com profile yet
- 3% Completed one or more courses
- 20% Watched a few video clips but have not completed a course
- 12% Other: please specify

PERCEPTIONS ABOUT LAPTOPS IN THIS COURSE

How do you feel about the use of laptops in lectures/workshops at UCT? Which statement do you most identify with?

- 38% I love it - it saves time, helps us to organise our work and learn new things
- 58% I like it - I find it helpful, but I'm not overly excited about it
- 4% I loathe it - I find it challenging and ask my classmates for help a lot of the time

I own digital versions (ebooks) of textbooks required for this course:

- 35% Yes
- 65% No

ALTERNATIVE DEVICES AND MEDIA

I could manage in this course without owning my own laptop

- 9% Strongly agree
- 15% Agree
- 21% Neutral
- 28% Disagree
- 27% Strongly disagree

I could manage in this course using an alternative device such as a smartphone or tablet

- 11% Strongly agree
- 28% Agree
- 25% Neutral
- 21% Disagree
- 14% Strongly disagree

Please tick if you use and do the following using your laptop:

- 89% I watch series and movies
- 84% Facebook
- 84% I listen to music
- 78% I watch videos on YouTube
- 39% I play games installed on my laptop
- 30% Twitter
- 28% I download media using torrents
- 19% I play games online
- 17% Other
- 8% Pinterest
- 6% I have my own blog
- 6% I upload videos to YouTube
- 2% I have my own website

Laptop Pilot Project: Enabling flexible learning through ICTs

2014/5 Research Report

Cheryl Brown & Ian Barbour
Centre for Innovation in Learning and Teaching

The research objectives

This report builds on the research conducted in 2013 where the focus was on how laptops created an enabling environment for innovative uses of ICTs in teaching and learning. In the first research report, questions were framed in relation to

- what was the impact of laptops on teaching and learning in and out of the classroom?
- What was the impact on general IT literacy?
- Were the academic objectives envisaged by Chemical Engineering, Law, Architecture and Physics achieved?
- Did students perceive that the laptops added value?

In 2014, as the pilot settled into a degree of fluency and logistical issues and concerns were largely ironed out, the focus shifted to answering specific questions:

- How did students use laptops compared to other devices they owned or had access to on campus (e.g. computers in labs, phones, tablets)?
- What did students perceive as the academic value of laptops for their learning (both in and out the classroom)?
- What was the value of the laptop for Financial Aid students particularly?
- How had laptops influenced student learning in second year?

Methodology

A survey examining particularly aspects of using laptops for learning was administered to 356 students (70% response rate), 32 financial aid students were interviewed and a focus group was held with three students who had received laptops in 2013.

In addition, in order to better understand the value of tablets for learning, a tablet pilot was run for eight weeks with ten students who were loaned a Samsung Galaxy Tab4 tablet. Interviews were conducted with nine of these students.

2014

- Two focus groups with four of the students who received a laptop in 2013.
- Class survey in all four laptop classes. 511 students with a response rate of 356 (70%).
- Four focus groups with 32 financial aid students.
- Tablet pilot with 10 students for an eight week period.

2015

- Interviews with nine of the students who received a tablet in 2014.

Research Findings

Benefits of connectivity and portability

Laptops provided students with the ability and opportunity to easily and seamlessly engage in university work wherever and whenever they needed to.

With media reporting a prevalence of smartphone ownership amongst university students ¹, we assume students are always “connected” in some way. However a spot poll at the start of 2015 amongst the 130 PHY100W students indicated only 66% had smartphones. It’s not that students are unable to make a plan if they don’t own their own device, but that ease of access enables students to have their study materials available when they need them and manage their learning around their other commitments.

“I do the majority of my work on a Sunday and late at night as I work during week nights and on weekends and then the computer labs are closed” [Student CG, Focus group 2014].

The flexibility in both teaching and learning that having a portable mobile device enabled was such an interesting finding that the research team concluded that “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” (Brown and Pallitt 2014²)

The ability and opportunity for students to easily and seamlessly engage in university work wherever and whenever they wanted to was a dominant theme in the qualitative data.

The ease of access means they can save time by having their study materials available when they need them

“when I go home I'm able to like read the readings easily because normally I'd have to save it on a flash and go and find an internet cafe or borrow a computer and then go and read it on there”.
[Student ED; Interview 2014].

Students talk about being able to undertake learning activities “in my own time at home or on campus” [Focus group 2014].

¹ <http://www.studentmarketing.co.za/what-students-cant-live-without/>

² Brown, C. and Pallitt, N. (2014). Laptops and Learning Spaces: Online, Offline and In Between. 9th International Conference on Connected Learning. Edinburgh, Scotland. April 2014. Available <http://www.networkedlearningconference.org.uk/abstracts/brown.htm>

“One major benefit is convenience. I find myself waking up early and a laptop enables me to do work straight away. And I can do it faster. I have internet at home but it is capped. Others have to spend the night at campus if they don’t have Internet at home. You can’t eat in the library but at home you can eat and drink.” [Focus group 2014]

Study spaces are important to students, and whilst one may be cynical about those who like to “*go back to my bed and I continue what I was doing*” [Student EG, Interview 2014], the reality for many is working in your own space is more convenient.

“because sometimes you need to work in your room without people around you, and using only the computer labs may be a disadvantage” [Focus Group 2014]

Travelling is also a concern for students who live off campus. “*It would make my life a lot more complicated because I would only be able to work in cad labs as we use a lot of designing programs*” [Student CO, Focus group 2014]. And whilst there is provision of labs on campus for some student access to these is difficult.

There are labs but at times they are full especially during exam times and they close early which makes things difficult when you don't have a laptop. [Student CK Focus group 2014]

However, once students have a device connectivity becomes increasingly important and they show preparedness to go to some unusual length to get this:

“When I wanted to download like videos or tutorial solutions like two o'clock in the morning, I'd just leave my room, go to the res, because it's a shuttle stop, so I'd go in there, they'd open the gate for me, I'd sit with the shuttle staff and download things”. [Student EG, Interview 2014]

When students were asked in 2014 whether they felt the Wi-Fi connection available in lecture rooms was unreliable the majority (47%) disagreed with the statement.

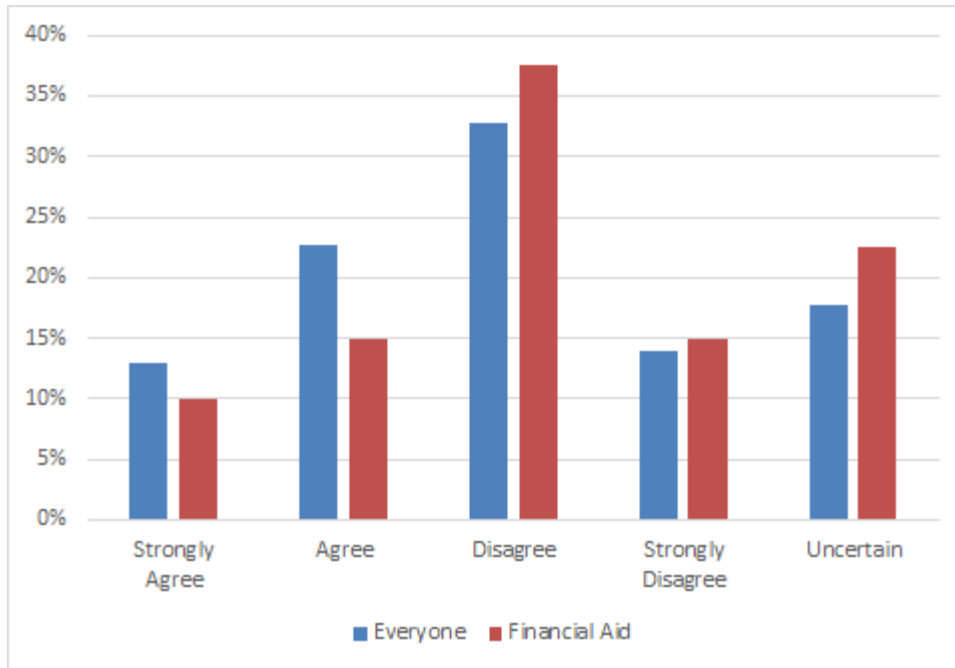


Figure 1: I feel that the Wi-Fi connection available in lecture rooms is unreliable [Source 2014 Survey n = 356]

On campus wifi enabled additional engagement in lectures

“Yes, now I can go to the internet during a lecture to get better understanding.” [Student CQ, Focus group 2014].

Off campus students went to extraordinary lengths to get access to WiFi

“ Because I also put my laptop right in that corner and sometimes if it's windy it picks up the Wi-Fi but if it's not windy I don't pick anything up.” [Student EG, Interview 2014].

The need for continuous access has become something students have indicated as desirable as part of the project

“ if possible, so that everybody can have access to the internet wherever they are, so that their academic life can be easy. [Student CQ, Interview 2014].

The laptop as a mobile device facilitates interactions, opens up traditional learning spaces and enables a wide range of educational practice. In our context the laptop has empowered students by offering them greater choice about when, where and how to learn, and facilitating connections with community and resources as and when needed.

Influence on learning

Students didn't always know upfront how having a device would enhance their learning until they had experienced using it as a learning tool:

“now that we have a laptop we're going to use every single day in class ... you discover more about the internet and you're starting to have a passion for it and now everything is, like, oh”
[Student AA, Interview 2014]

However once they had access it became a central learning resources for some.

“like, we rely on our laptops every day, so if anything goes wrong, you don't really know where you stand, so it's kind of, like, a bit bad because, like, this is what holds everything for us.” [Student AE, Focus group 2014]

In the 2013 survey, students overwhelmingly agreed that laptops were essential for completing their course (82%) and essential for their learning (72%). In 2014 we asked students specifically whether using a laptop in lectures enhanced their learning generally and the majority (67%) agreed.

Learning activities included

- access to internet generally and Vula specifically (which was used to download slides, watch lecture recordings, do readings and keep up with announcements)
- reading
- note taking and writing assignments
- disciplinary specific activities (including CAD, case books, python, excel)
- engagement with study groups, interacting with tutors and communicating with lecturers

Unsurprisingly devices played different (and sometimes contradictory) roles for students in their learning.

Laptops in Lectures

In the 2014 survey we tried to gauge more specifically how laptops helped students in lectures specifically

The 2014 survey was based on a study³ from the US that examined the reasons why students choose to take laptop computers into college classes. The US study concluded that lecturers' behavior wasn't the primary driver in the student's decision to bring a laptop to class and that they were intrinsically motivated by their own drive to achieve effective learning. The same appeared to be true of our UCT cohort.

³ Houle, P. A., Reed, D., Vaughan, A. G., & Clayton, S. R. (2013). Using Laptop Computers in Class: A Student Motivation Perspective. *Journal of Learning in Higher Education*, 9(2), 83–92.

The learning activities which dominated the “classroom” or formal learning space in the UCT courses were using the internet to locate and use relevant materials and capturing information.

	Agree	Disagree	Uncertain
Allows me to more easily locate relevant materials	83%	6%	11%
Allows me to more easily use relevant materials	80%	7%	13%
Allows me to better capture all of the information presented	60%	15%	25%
Allows me to better process the information presented	52%	21%	27%
Allows me to better summarise the important information presented	49%	24%	27%
Allows me to better communicate with the lecturer	36%	32%	33%
Enhances my learning of the subject matter of the class	58%	14%	27%
Enhances my learning in general	62%	13%	25%

Table 1: [Source 2014 Survey n =356]

n terms of other aspects of learning, 59% of students noted that having a device allowed them to use their time better in order to get work done and 70% said that it helped them to better organise and process information.

	Agree	Disagree	Uncertain
Improves my problem solving skills	35%	29%	36%
Improves my critical thinking skills	26%	31%	44%
Improves my analysis skills	38%	25%	37%
Allows me to better organise and process information	70%	12%	18%
Gives me an opportunity to better participate in class	41%	28%	31%
Allows me to use my time better in order to get work done	59%	20%	21%

Table 2: [Source 2014 Survey n =356]

In the 2014 survey, the majority of students (87%) indicated they used their devices and internet in lectures to access more information.

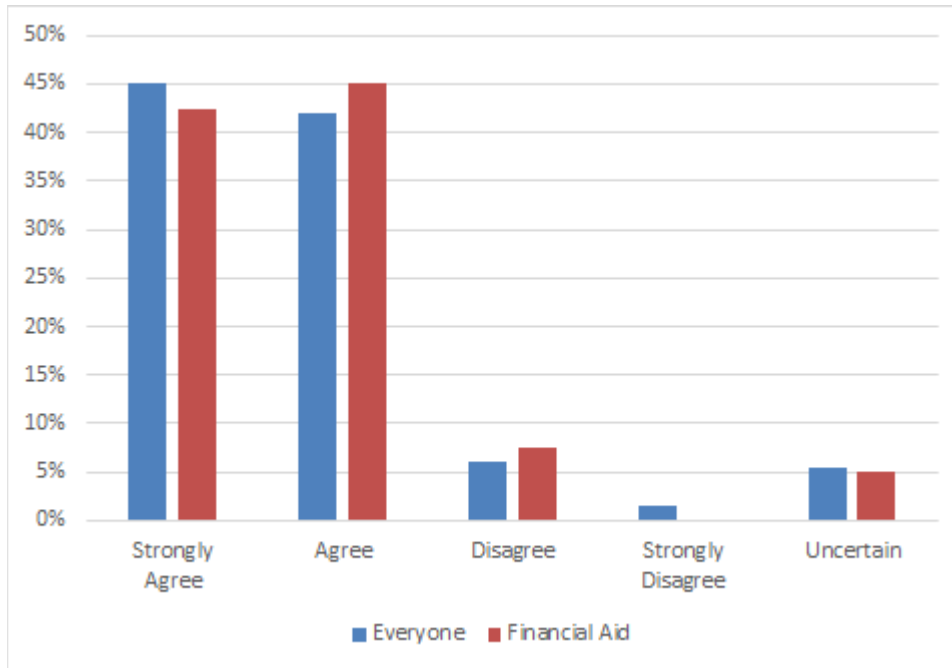


Figure2: Using a laptop during lectures gives me access to more information [Source 2014 Survey n = 356]

Students also indicated it gave them easier access to information (87%) and enabled them to search for information more quickly (97%).

This activity was dominant in the qualitative data as well (comprised 29% of comments about learning activities) and occurred both in- and outside of class. Students described the value of having a connected device in lectures as a

“nice thing ... when you're in lectures when the lecturer saying something you can quickly look it up. Because ... you have like Wi-Fi right there and it's like a book so you can look up anything instantly” [Student EF, Interview 2014].

They also described the value of being connected so they could follow up on ideas and research as they needed.

“most of the times I could just research about anything I wanted to research about, like sometimes the readings, you could go to research journal on the same authors, and see what they are about and get more information about a certain topic you are learning” [student EB, Interview 2014]

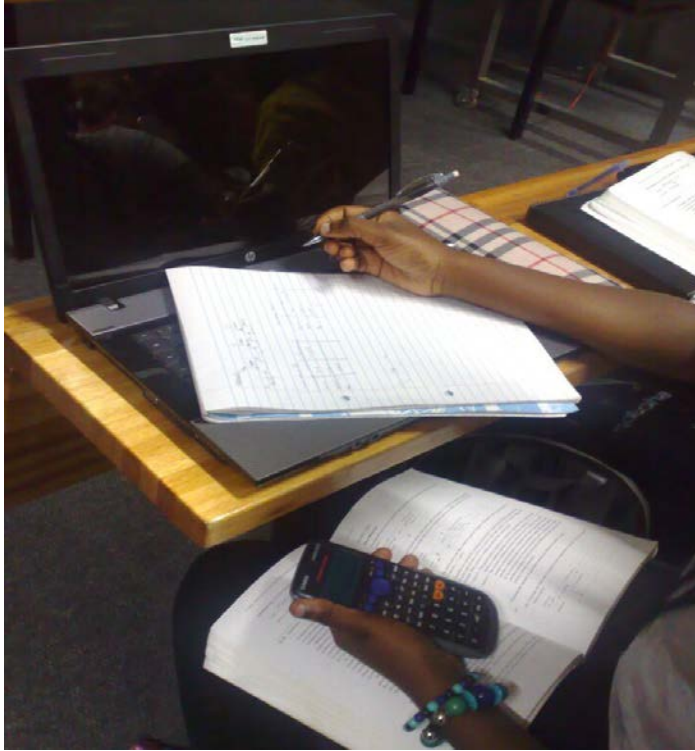


Figure 3: ChemEng student with laptop, notepad, calculator, textbook

Using the device for writing and note-taking was also a main theme (24% of comments about learning activities). Photos taken in classrooms showed that in an average lecture theatre accommodating textbooks and devices, note-taking was often a challenge. Student responses to this challenge varied.

For some the process of taking notes by hand was preferable: *“I prefer to write ... I wasn't comfortable enough so I preferred my old way of doing things.”* [Student EE, Interview 2014]. Others found it added value to be able to annotate lecture slides on their device *“Like my notes were already there, the slides, I've downloaded the slides, then just actually it gives you an option to actually tab in the slides and you add more notes to the slides”* [Student EH, Interview 2014].

The survey results (Table 1) show that 60% of students used their devices in lectures to capture the information presented. This doesn't negate the value and role of pen and paper but certainly shows many students use the laptop as an active learning tool in lectures.

However writing practices also included assignments *“I write and typing the essay in Google Drive”* [Student EE, Interview 2014], *“actual assignments. I just prefer to do those on my laptop because I know my way around it”* [Student EF, Interview 2014].

In the 2013 survey students were unanimous that laptops were essential for completing their course (82%) and essential for their learning (72%).

Access to Vula was referred to in 14% of the qualitative data about learning activities and described as central. Vula was used to download slides, watch lecture recordings, do readings and keep up with announcements.

“everything around here is mostly centred around Vula,” [ID420 Focus 2013 -2 DC] and a daily requirement: “I believe as a student you have to check myuct and vula like everyday” [Student DC, Focus group 2014].

Students used their devices for reading *“I have one book that is actually printed, the rest is all eBook”* [Student AA, Focus group 2014] as well as a range of disciplinary specific activities including CAD, case

books, python, excel and one student who was part of the Science decant continued with these activities.

“because in the first term of the year while I was doing PHY1004W we were doing vpython, so even now I am still practicing python so that next year I will excel” [Student DE, Focus group 2014]

Devices were also used to engage with study groups and interaction with tutors both through formal channels and social ones

“I would like interact with my tutors on a very - I don't know how to say, we could interact like she or he could see what I was writing whilst I was writing and get feedback instantly. You don't have to wait for the tutor to come around and first look at your stuff, she or he could give you feedback right now, whilst you are writing your essay.” [Student EB, Interview 2014]

Although it wasn't a primary source of communicating with lecturers (36% agreed their device enabled better communication with lecturer – See Table 1)

“if I want to ask a question maybe with students I will just go to Facebook straight away or just go to WhatsApp” [Student 68 tablet 2014-1 EA].

Addressing equity

Over the course of the three-year pilot, there were 1582 students registered across the four pilot courses. Of these, 274 students (16.6%) were identified as being on Financial Aid and 243 students (88%) were given a laptop through the project.

Those who didn't receive a laptop were either repeating the course and had already been given a laptop in the previous year, or they already owned a laptop before coming to UCT and therefore declined the offer.

“A lot of the students didn't have access to laptops before so it's not just this new course and new content and the whole experience of coming to university but it is this device and this device that is yours that you never owned and it is making sense of how to use this new tool. I don't do computer science but I have felt the need to learn different things about the laptop even though it isn't part of my course. The laptop opened my eyes to a different side of life.” [Student N, Focus Group 2014]

The project was clearly set up with an equity focus. The reason students on Financial Aid were given laptops was to ensure equity of access within the student cohorts participating in the pilots so that all students were on an equal footing. Students on Financial Aid were very positive about the opportunity and in interviews indicated their appreciation:

“I am very pleased and happy that I received a laptop and very grateful” “I live off campus and without a laptop it would’ve been tough” [Student CC Focus Group 2014]

However students on Financial Aid were also acutely aware of the disparity of access amongst their friends and peers. They are under pressure to explain why they have this opportunity

“they said it's not fair, what did you do to get this opportunity? I said I don't know, I was chosen, I don't know why.” [Student EB, Interview 2014]

“at first I lied to them, I said I bought it for me” [Student EB, interview 2014].

An important dimension of the project is that through the pilot students on Financial Aid become integrated into the mainstream student cohort rendering them less distinct. In a focus group with second year ChemEng students, they wondered whether all the students on Financial Aid from the previous year had moved course or dropped out. In fact, this was not the case but rather students on Financial Aid had become less visible as a distinct group in the second-year cohort.

“I think it does give me an edge over my peers because I have a friend who doesn't have a laptop and she really has a hard time with getting stuff done and she doesn't live on campus. She has to organise and plan her time.... and I've seen the difference between my work and hers. There is a major difference there.”

Students are very aware of the edge having a personal device gives one.

“think it does give me an edge over my peers because i have a friend who doesn't have a laptop and she really has a hard time with getting stuff done and she doesn't live on campus. She has to organise and plan her time. Sometimes i have to give her my laptop. Sometimes she submits assignments hand-written and it takes up a lot of her time because with a laptop you can just delete some things and start again and you can copy and paste but with handwriting if you mess it up once you have to start over again and that's not cool especially if you don't have time on your hands” [Student B Focus Group 2014].

But even amongst those who had devices they were conscious of status

“Ja, but there's also a certain social status that comes with different types of laptops. Like, ja, if you just see like a crisp white, snow white laptop that's got the Apple sign on it, you can already stereotype someone”. [Student AE, Focus Group 2014]

Impact in subsequent years of laptop ownership

It can take time for the benefits of an intervention to be realised or acknowledged. In focus groups with students in the second year of the project, it became clear that it took a while for them to develop optimal learning strategies with their devices and to integrate them effectively into their learning

“Well this year I started having problems with my laptop. So for one I feel like that's when I really started realising that it's so important to have a laptop on campus and there's so much that you don't realise - I had the laptop but I didn't put it to much use as i should have but this year i feel like the lecture recordings helped me take notes faster. It can compile things faster than when i do it by handwriting so I kind of like saw the need for it this year. I've just seen the transition because now I'm having problems with it and I see that okay I'm probably going to have to buy a new one again and that for me just shows that it is really important for me because I can't go without a laptop. And ComLabs close, most of them, well the ones I have access to, close at 10pm. So after hours I don't have access to any laptops and so I've kind of seen the difference between first year and second year now.” [Student A Focus Group 2014]

Students came to realise the edge that having a device has given them. They can see the difference it makes in terms of managing time and the quality of the work they do

“I think it does give me an edge over my peers because I have a friend who doesn't have a laptop and she really has a hard time with getting stuff done and she doesn't live on campus. She has to organise and plan her time. Sometimes I have to give her my laptop. Sometimes she submits assignments hand-written and it takes up a lot of her time because with a laptop you can just delete some things and start again and you can copy and paste but with handwriting if you mess it up once you have to start over again and that's not cool especially if you don't have time on your hands. For me it does because you know you have a laptop and you can work your functions and you can make things look appropriate and I've seen the difference between my work and hers. There is a major difference there.” [Student C, Focus Group 2014]

Distraction

This was an interesting point of contradiction between lecturers and students.

Student generally did not feel having a laptop in lectures was distracting for them. Interestingly this was one of the few questions where financial aid students differed from the rest of the class indicating they felt it was less of a distraction for them.

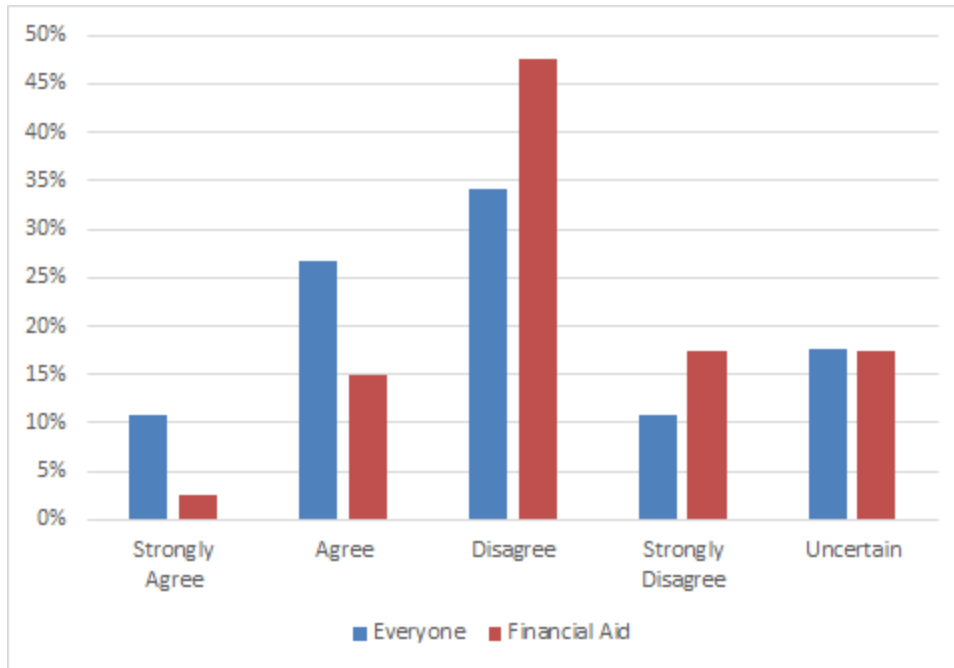


Figure 4: I feel that my using a laptop in lectures is a distraction for other students in the class. Source 2014 survey n =

However its an area that lecturer are concerned about with Chem Eng indicating they are “*grappling with potential for distraction during the lecture class ... for many the temptation to do off-task work appears to have grown*” [Prof Jenni Case, Appendix 1]. However students perceptions ar that this is something lecturer “don’t get”.

“But some of the lecturers think that when you are using a laptop that you are not paying attention. Some are old-school and you must write down and use your hand. But we are a new generation and they don’t seem to get that.” [Student E Focus Group 2014]

Influence on teaching

The evidence of the influence of these devices on teaching is presented in the form of reflections from the teaching staff involved in the four pilots (Appendix 1). After teaching in this way since 2013, none of them can imagine successfully convening their courses in an environment where devices were not part of their class landscape.

Whilst each course integrated laptops into their teaching and learning differently, some common themes emerged.

- It is an essential **graduate attribute** not just to be able to use technology but to engage with it in your **disciplinary context** to find relevant information, produce digital content, solve problems and undertake projects.
- Enabled a shift in **pedagogy** and in some cases sparked rethinking of the **curriculum**
- Increased opportunities for **interaction**, formative **assessment**, feedback and revision,
- Decreased the dependency on central resources such as labs and library, enabling computer related tasks to be undertaken **as and when needed**.
- Enabled improved organisational **clarity** of the course

“The laptops have made possible a radical shift in pedagogy where computers are now on hand for use at any point in the class, including in tutorial or project sessions.”
Chemical Engineering

Laptops vs other devices

The issue of whether a laptop is better or comparable to a tablet is an interesting one as our data shows opinion is divided and it all depends on purpose. Students’ use of tablets and laptops ranged widely and could be related to their preferences for devices and their digital literacy and interests.

Some of the discussion re pros and cons is situated around practical considerations and centred around the benefit of carrying something light and subtle.

“So yes, it's easier to just put it in my handbag and then I can move around, nobody knows it's in there anyway, and plus it looks like a diary, so I just put it in there and it looks like my diary and yes, I liked it.” [Student EF, Interview 2014].

Portability and convenience was definitely one of those aspects that made the tablet seem more desirable to students:

“So when you're done, I just close the case and I take it with me, I hold it and then I just [unclear] whatever I'm doing. With a laptop you can't really do that because you have to disconnect everything and then put it back. It's easier; to me it's easier, I prefer the tablet because I don't really have much use for my laptop – it just stays there. [Student EF, Interview 2014]”

However there is a sense that if one had one device only it should be a laptop as this was more versatile:

“a tablet is like I have this extra device that i can use just in case something goes wrong with my laptop. But the laptop is the main thing that everyone uses” [Student B Focus group 2014].

In teaching and learning terms laptops were seen by academics as critical for curriculum needs and indeed students realised this as well.

“Visio and Excel. Maths balance on Excel. You can’t do that on a tablet. You need a laptop. You need a laptop for chem eng in order to pass” .[Student A Focus group 2014]

“it has given me access to all the programs I need for my physics course, such as vpython and data logging software.” [Student DI, Focus group 2014].

“the engineering and science faculties do demand a lot of computer usage so their students do need laptops.” [Student DB Focus group 2014]

In reference to the tablet benefits included its suitability for reading and easy access to networks

“So it seems to be good for reading but not necessarily good for writing, like if you had a lot to write you'd probably then, if you didn't have a laptop you'd go to the labs” [Student EB, Interview 2014] to

“I downloaded my social networking obviously, I downloaded, let me see the things that I've got here, my news networks, CNN, BBC, Aljazeera and UN and the others. And I've got Adobe Reader and all the documents, Office and stuff. I've got my WhatsApp and Twitter, my emails.” {Student EH, Interview 2014]

However tablets had limitations for writing and student indicated a tablet wa great for taking notes but not for substantial writing.

“So it seems to be good for reading but not necessarily good for writing, like if you had a lot to write you'd probably then, if you didn't have a laptop you'd go to the labs.” [Student ZB, Interview 2014]

This preference was also clearly indicated in the annual International ECAR survey in which UCT participates. here students also indicate a laptop was more important for their studies than tablet.

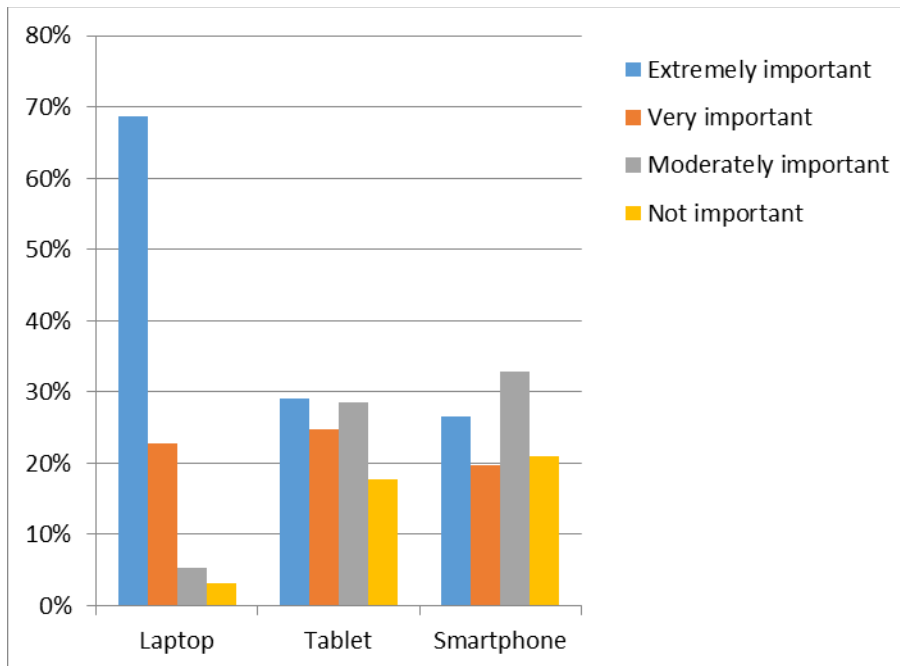


Figure 5: How important are these devices to your academic studies [Source ECAR survey n = 469]

Digital literacy

All students in the pilot courses got additional training through ICTS sessions at the start of the year. However ongoing support is important as for students this would be the first computer device they have owned.

I learnt at UCT, at first it was kind of difficult because you have to type and then you are slow and then people are just fast and then you have to start maybe early on your essay. When you are finished another one you just look which one was next and then before even the lecturer explains how to write it you have to start. And then you do some of the drafts that you did because you want to type fast, you know you are not fast at typing so you have to type before time so that at least you have more time to type because you are slow. [Student EA, Interview 2014]

But having a personal device was for many an advantage in terms of improving digital literacy. It exposed them to different ways of doing their work, gave them confidence and improved their efficiency.

“We have mastery and competency tests, even computer literacy tasks, that enhances our knowledge of computers and typing, most of all.” [Student CP, Focus group 2014].

Yes. It has helped with Applied Mathematics and Computer Sciences as well. I can now make graphs and programs at my own disposal at my own pace. [Student DB, Focus group 2014].

Peer support was critical for students as once off training helped initially but not continuously.

“So now is the biggest challenge so even when I did get my laptop it came without Office and that kind of thing so if you're not techno savvy then you have to ask other people to help you set up that kind of thing and configure everything. And with the Wi-Fi I also had a friend help me with that for this as well. But otherwise...” [Student EF, Interview 2014]

Operational issues

Throughout the project there was concern about whether logistical issues such as charging and safety was an issue for students. However students make conscious and strategic decisions about both these issues.



Figure 6: Charging in class

Students developed strategies for charging their devices.

Normally what I did I carried my electric plug, my two point plug, then I just plugged it wherever I found a plug. Then I would use it there, then and there. Public places, even the [unclear] inside the food court, things there, I used it there when I am having lunch. If I charge it overnight then I'll take it to my morning lectures up until, I think the battery by like three or four o'clock would be then out. [Student EH, Interview 2014]

“Oh yes, sometimes it's going to take too much time and then the battery like runs out just if you use it for four hours the battery is going to die. So you have to make a point that you're near the plug so you can charge it. [Student EC, Interview 2014]

Students were aware of crime, security and privacy of their devices. In the 2014 survey students were asked if they were worried if their laptop would get stolen if they brought it to a lecture or tutorial and about a third indicated they were concerned about this (37% expressed this concern).

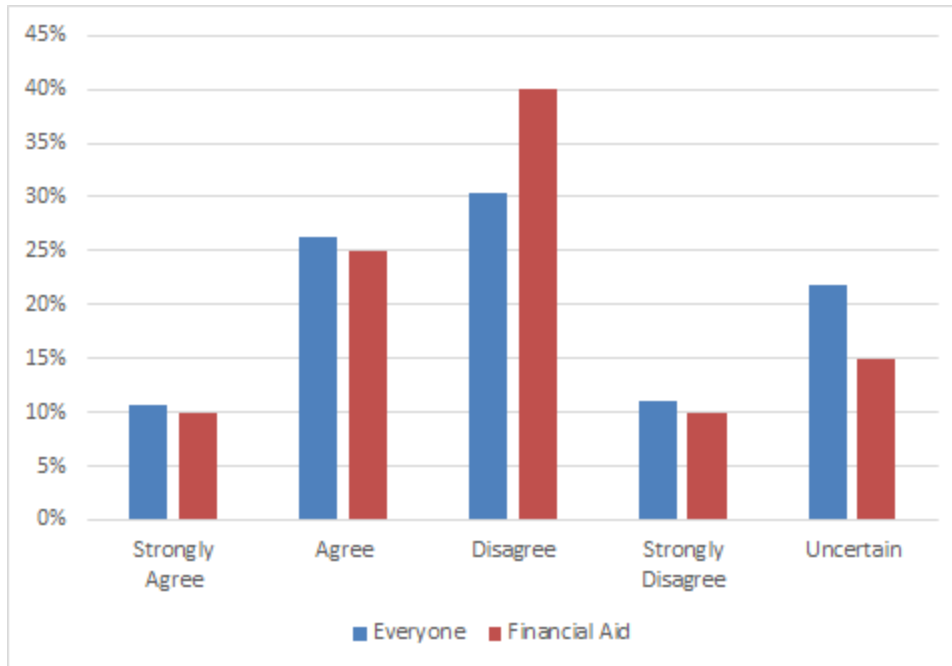


Figure 7: I am worried that my laptop will get stolen when I bring it to a lecture or tutorial. [Source 2014 survey n = xx]

However students adopted strategies that were sensible in public places

"I'm using a taxi which is a public transport with which there is a lot of robbery and stuff but now when I'm in the taxi I make a point of putting it in my bag.[Student AC, Interview 2014]

It's not a laptop bag, it's still a handbag, but it's big enough to fit my laptop. Because I don't like carrying those laptop bags, they're ugly and unfashionable! So yes, it's easier to just put it in my handbag and then I can move around, nobody knows it's in there anyway, and plus it looks like a diary, so I just put it in there and it looks like my diary and yes, I liked it. [Student EF, Interview 2014]

This shows that whilst challenges are real, students are sensible enough to figure out ways around them and minimise risk and problems.

Conclusion

Universities in South Africa have, for the past decade, recognised the role of educational technologies as tools to facilitate teaching and learning (Czerniewicz and Brown 2009⁴; Bozalek et al 2013⁵). While the integration of mobile learning in Higher Education is not new, in a resource constrained environment such as ours access to ICTs cannot be assumed. Technologically immersed and savvy youth are in the minority and represent an elite, rather than a majority (Brown & Czerniewicz, 2010⁶). This is equally an issue for staff at Universities.

Internationally access to mobile technology has been acknowledged as offering new opportunities for young people to enter the digital realm (Unicef 2013⁷) particularly for expanding teaching and learning. This potential has been recognised by the DHET which is actively encouraging Universities to expand online and blended learning (DHET 2013⁸). Given the imperative to both expand access and success in the university and post school sectors, the role of technology in curriculum initiatives lead to improved success and graduation needs to better understood

Given persistent socioeconomic and location-based digital divides in South Africa, government needs to continue to pursue and create initiatives to optimize ICT access (UNICEF 2013). The complex relationships between students' access to ICTs, home language and socio-economic background are also relevant in the Higher Education sector (Brown & Czerniewicz, 2010).

Universities across South Africa have recognised this problem. Through the purchasing consortium (PURCO) for South African higher education institutions they have negotiated a cost effective purchasing scheme for students to acquire laptops and tablets. Despite this, the outlay for poor students in particular represents a significant cost, and thus the educational value of prioritising funding needs to be clearly demonstrated before it can reasonably be expected that students (or government) can be expected to provide or acquire such devices.

This research has shown that the educational value for students is immense. The opportunity to be able to find information when you need it, engage with people right away when you need to and use specialised tools to undertake discipline based activities offers immediate benefits to students in their learning process. In addition the flexibility of a mobile device that allows students to manage their learning activities around the rest of their lives is increasingly important.

⁴ Czerniewicz, L, and Brown, C. (2009) A study of the relationship between institutional policy, organisational culture and e-learning use in four South African universities. *Computers and Education*. 53 (1) p121-131

⁵ Bozalek, V., Gachago, D., Alexander, L., Watters, K., Wood, D., Ivala, E. and Herrington, J. (2013), The use of emerging technologies for authentic learning: A South African study in higher education. *British Journal of Educational Technology*, 44: 629–638. doi: 10.1111/bjet.12046

⁶ Brown, C and Czerniewicz, L. (2010) "Debunking the "digital native": beyond digital apartheid, towards digital democracy" *Journal of Computer Assisted Learning* 26, 357–369

⁷ UNICEF 2012 – South African Mobile generation

http://www.unicef.org/southafrica/SAF_resources_mobilegeneration.pdf

⁸ DHET. (2013). White paper for post-school education and training. Department of Higher Education and Training: Pretoria



Laptop Pilot Project – Class Survey

Project Overview

The aim of this project is to understand how students at the University of Cape Town use laptops for learning in and out of lectures. The Laptop Pilot Project is part of a wider initiative undertaken by ICTS which aims to make laptops accessible to UCT students. Our intention is to gain an understanding of how you use technology (and laptops more specifically) through interviews, surveys and observing activities over the duration of your course. We aim to be able to make recommendations to ICTS regarding scaling up the laptop project to other courses at UCT.

Instructions

Thank you for taking the time to complete this survey. There are a total of 38 statements and for each one please select one response that best represents the extent to which you agree or disagree with that statement.

The survey should not take more than 10 minutes of your time.

This is an anonymous survey and you are not required to disclose your name or any other personal details. All the information that we collect during the course of the research will be kept strictly confidential and you will not be identified in any reports or research publications.

Please note that participation in this survey is voluntary.

By completing this survey you consent to the data being used for research purposes.

Before you start, please answer the following questions by ticking the applicable box:

Are you getting any financial assistance for your studies?

UCT Financial Aid	UCT Gap Funding	Corporate Sponsor	Other	None
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Does your funder provide a laptop for your studies?

Yes	No	Not Applicable
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How often do you bring your laptop to class?

Every day	Twice a week	Most days in the week	Depends on the course activities for the day	Only when the lecturer tells us to bring it	Never
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CHED

CENTRE FOR HIGHER EDUCATION DEVELOPMENT
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Centre for Higher Education Development,
University of Cape Town,
7th Floor, PD Hahn Building, Upper Campus,
Rondebosch, 7701
South Africa



For each listed statement below, please select one response that best represents the extent to which you agree or disagree with that statement:

ABILITY – 6 questions	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
I feel confident using a laptop during lectures	①	②	③	④	⑤
I feel confident choosing the appropriate software to use on a laptop during lectures	①	②	③	④	⑤
I feel confident using a laptop to connect to VULA during lectures	①	②	③	④	⑤
I feel confident using a laptop to access and download class materials from VULA during lectures	①	②	③	④	⑤
I feel confident using word processing software to capture notes during lectures	①	②	③	④	⑤
I feel confident using PowerPoint to follow a lecture presentation	①	②	③	④	⑤

EFFECTIVE LEARNING – 14 questions	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
Using a laptop during lectures allows me to more easily locate relevant materials	①	②	③	④	⑤
Using a laptop during lectures allows me to more easily use relevant materials	①	②	③	④	⑤
Using a laptop during lectures allows me to better capture all of the information presented	①	②	③	④	⑤
Using a laptop during lectures allows me to better process the information presented	①	②	③	④	⑤
Using a laptop during lectures allows me to better summarise the important information presented	①	②	③	④	⑤
Using a laptop during lectures allows me to better communicate with the lecturer	①	②	③	④	⑤
Using a laptop during lectures enhances my learning of the subject matter of the class	①	②	③	④	⑤
Using a laptop during lectures enhances my learning in general	①	②	③	④	⑤
Using a laptop during lectures improves my problem solving skills	①	②	③	④	⑤

For each listed statement below, please select one response that best represents the extent to which you agree or disagree with that statement:

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
Using a laptop during lectures improves my critical thinking skills	①	②	③	④	⑤
Using a laptop during lectures improves my analysis skills	①	②	③	④	⑤
Using a laptop during lectures allows me to better organise and process information	①	②	③	④	⑤
Using a laptop during lectures gives me an opportunity to better participate in class	①	②	③	④	⑤
Using a laptop during lectures allows me to use my time better in order to get work done	①	②	③	④	⑤

INTERNET ACTIVITY – 2 questions	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
When I use a laptop during lectures, I am more likely to send and receive email messages	①	②	③	④	⑤
When I use a laptop during lectures, I am more likely to visit one or more websites	①	②	③	④	⑤

NETWORK ISSUES – 2 questions	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
I feel that the Wi-Fi connection available in lecture rooms is risky to use	①	②	③	④	⑤
I feel that the Wi-Fi connection available in lecture rooms is unreliable	①	②	③	④	⑤

EMBARRASSMENT – 3 questions	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
Using a laptop during lectures would be embarrassing if something were to go wrong	①	②	③	④	⑤
Using a laptop during lectures would be embarrassing if another student were to see what was on my screen	①	②	③	④	⑤
Using a laptop during lectures is difficult because of other students watching me	①	②	③	④	⑤

For each listed statement below, please select one response that best represents the extent to which you agree or disagree with that statement:

ACCESS TO INFORMATION – 3 questions	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
Using a laptop during lectures gives me access to more information	①	②	③	④	⑤
Using a laptop during lectures gives me easier access to information	①	②	③	④	⑤
Using a laptop during lectures allows me to more quickly search for information	①	②	③	④	⑤

DISTRACTION – 3 questions	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
I feel that my using a laptop in lectures is a distraction for me personally	①	②	③	④	⑤
I feel that my using a laptop in lectures is a distraction for other students in the class	①	②	③	④	⑤
I feel that my using a laptop in lectures is a distraction for the lecturer	①	②	③	④	⑤

LAPTOP LOSS – 2 questions	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
I am worried that my laptop will get damaged or lost when I bring it to a lecture or tutorial	①	②	③	④	⑤
I am worried that my laptop will get stolen when I bring it to a lecture or tutorial	①	②	③	④	⑤

Thank you for your time. Please place your completed survey in one of the boxes provided.

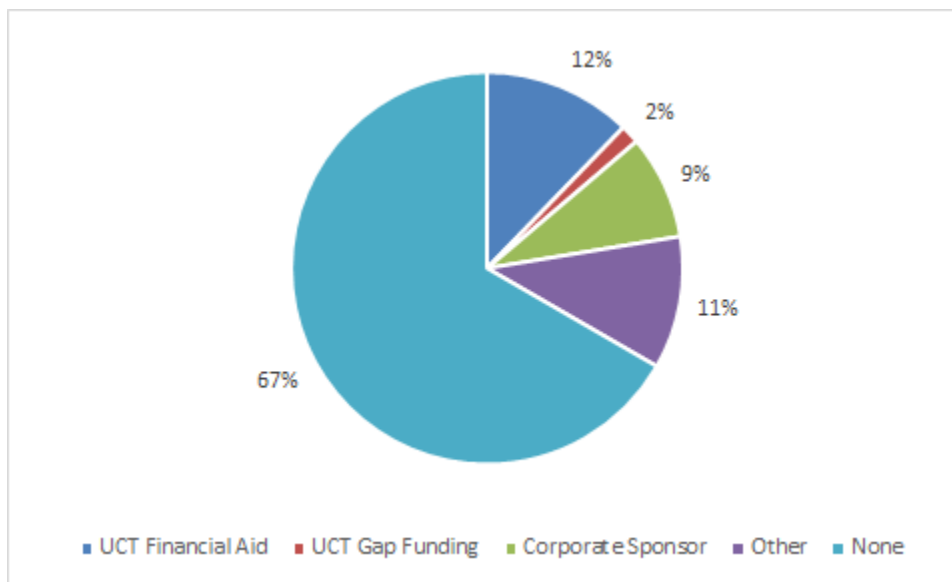
<p>Project Overview</p> <p>The Laptop Pilot Project takes place at the University of Cape Town across 4 courses where laptops have recently been made compulsory. The courses are: Physics (PHY1004W), Chemical Engineering (CHE1005W), Law (RDL1008/9H) and the 2nd year Architecture Design and Theory course (APG2038W).</p> <p>This is an anonymous study and we are not trying to assess computer literacy skills or report individual computer-related activities to the course convenors or lecturers. Participation in this research project is voluntary. All the information collected during the course of the project will be kept strictly confidential. No student will be identified in any reports or publications.</p> <p>The aim of the project is to be able to make recommendations to ICTS regarding scaling up the laptop project to other courses at UCT.</p> <p>This study is being carried out by Dr. Cheryl Brown and Ian Barbour at the University of Cape Town.</p> <p>Dr. Cheryl Brown ~ cheryl.brown@uct.ac.za Ian Barbour ~ ian.barbour@uct.ac.za</p>

2014 Survey Data

FINANCIAL ASSISTANCE

Are you getting any financial assistance for your studies?

- 12% UCT Financial Aid
- 2% UCT Gap Funding
- 9% Corporate Sponsor
- 11% Other
- 67% None



LAPTOP CLASS USAGE - 1 question

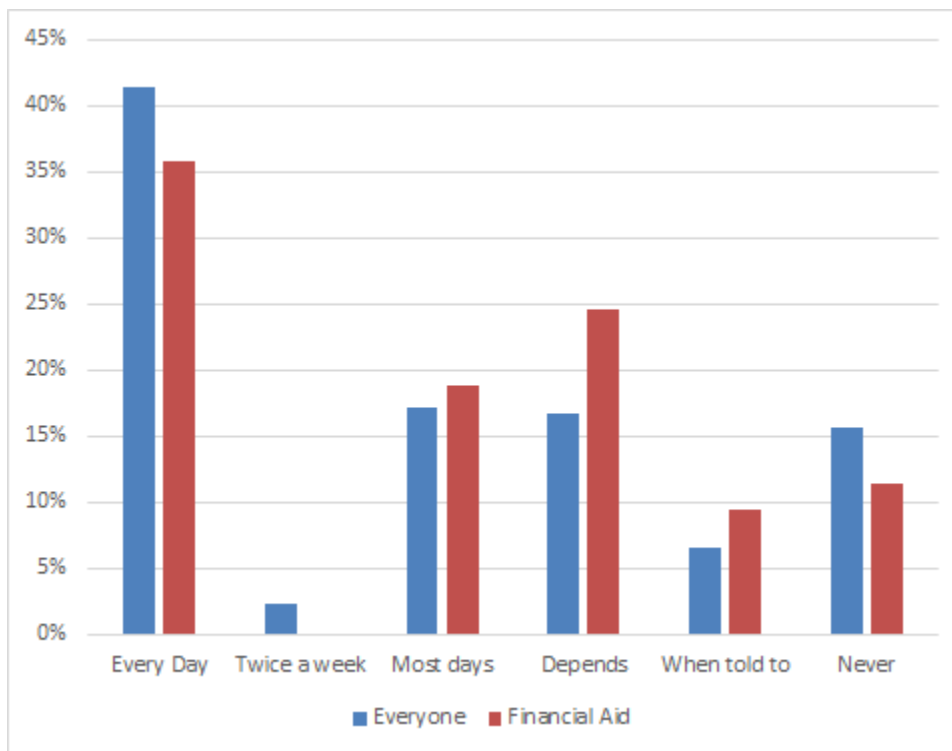
How often do you bring your laptop to class?

Everyone

- 41% Every day
- 2% Twice a week
- 17% Most days in the week
- 17% Depends on the course activities for the day
- 7% Only when the lecturer tells us to bring it
- 16% Never

Financial Aid Students

- 36% Every day
- 0% Twice a week
- 19% Most days in the week
- 25% Depends on the course activities for the day
- 9% Only when the lecturer tells us to bring it
- 11% Never



ABILITY - Question 1 of 6

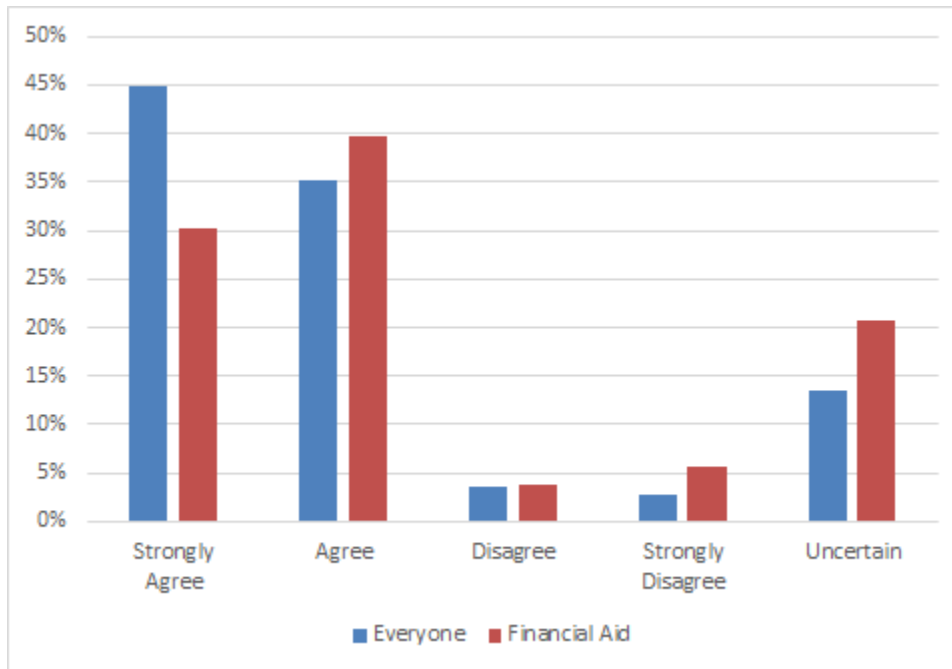
I feel confident using a laptop during lectures

Everyone

45% Strongly Agree
35% Agree
4% Disagree
3% Strongly Disagree
14% Uncertain

Financial Aid Students

30% Strongly Agree
40% Agree
4% Disagree
6% Strongly Disagree
21% Uncertain



ABILITY - Question 2 of 6

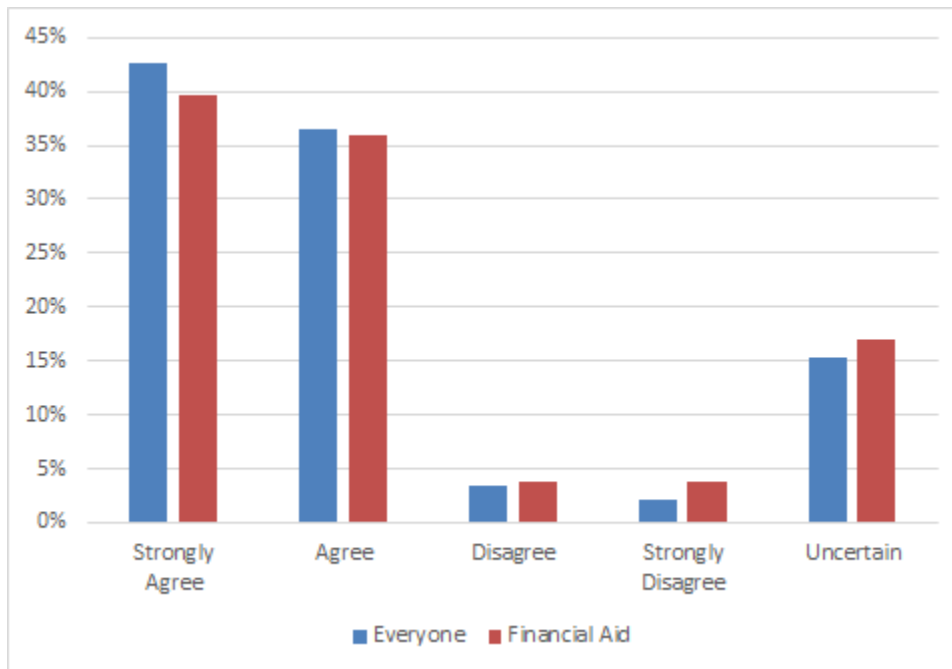
I feel confident choosing the appropriate software to use on a laptop during lectures

Everyone

43% Strongly Agree
36% Agree
3% Disagree
2% Strongly Disagree
15% Uncertain

Financial Aid Students

40% Strongly Agree
36% Agree
4% Disagree
4% Strongly Disagree
17% Uncertain



ABILITY - Question 3 of 6

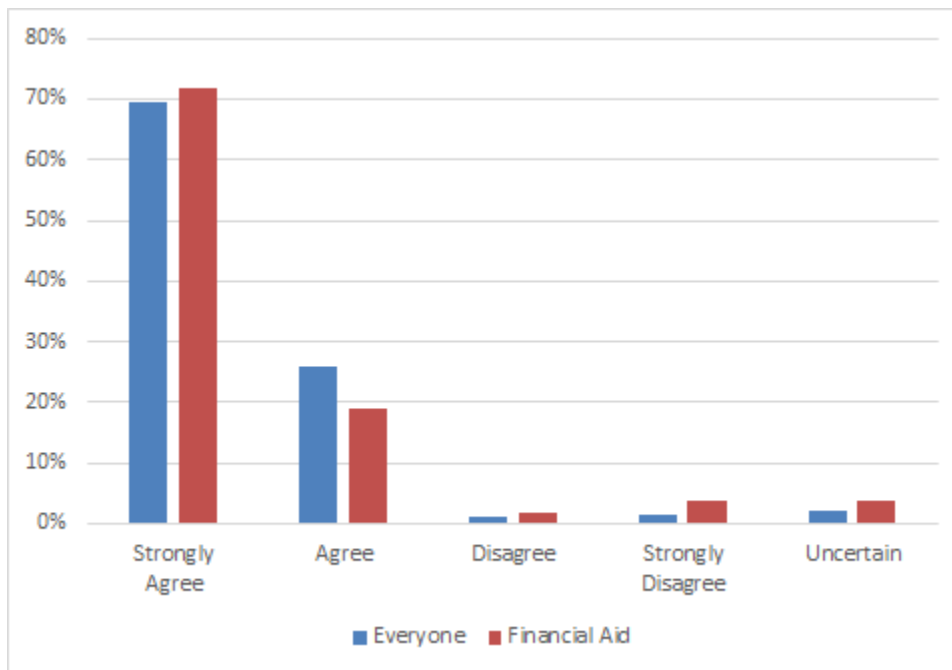
I feel confident using a laptop to connect to VULA during lectures

Everyone

70% Strongly Agree
26% Agree
1% Disagree
1% Strongly Disagree
2% Uncertain

Financial Aid Students

72% Strongly Agree
19% Agree
2% Disagree
4% Strongly Disagree
4% Uncertain



ABILITY - Question 4 of 6

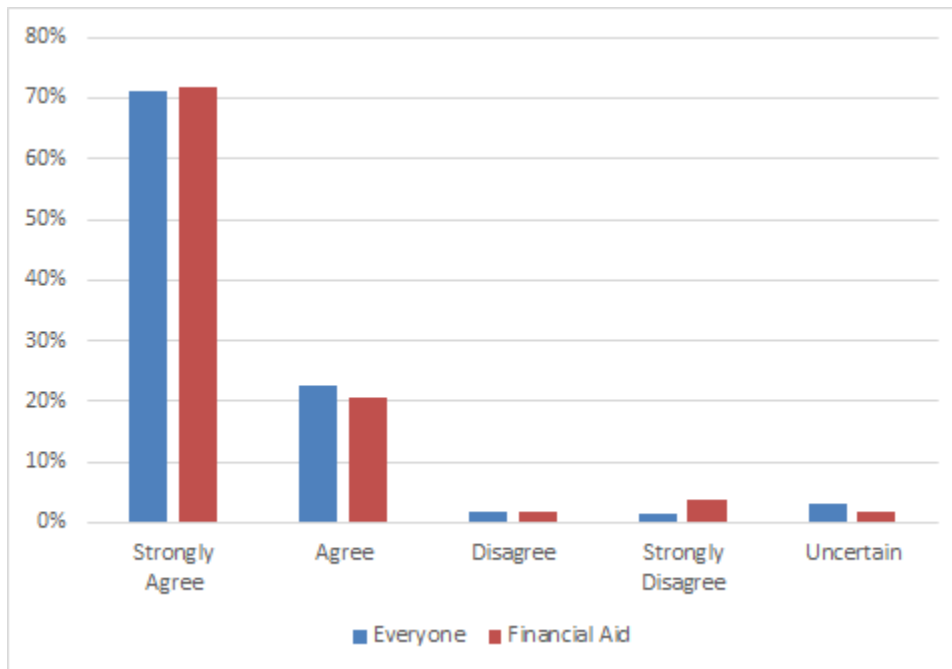
I feel confident using a laptop to access and download class materials from VULA during lectures

Everyone

71% Strongly Agree
23% Agree
2% Disagree
1% Strongly Disagree
3% Uncertain

Financial Aid Students

72% Strongly Agree
21% Agree
2% Disagree
4% Strongly Disagree
2% Uncertain



ABILITY - Question 5 of 6

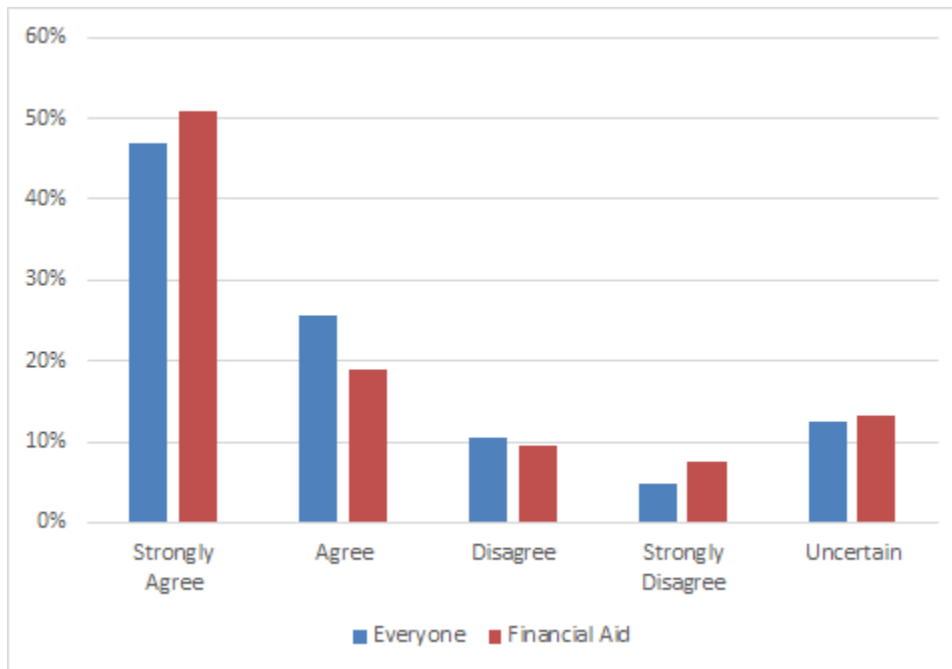
I feel confident using word processing software to capture notes during lectures

Everyone

47% Strongly Agree
26% Agree
10% Disagree
5% Strongly Disagree
13% Uncertain

Financial Aid Students

51% Strongly Agree
19% Agree
9% Disagree
8% Strongly Disagree
13% Uncertain



ABILITY - Question 6 of 6

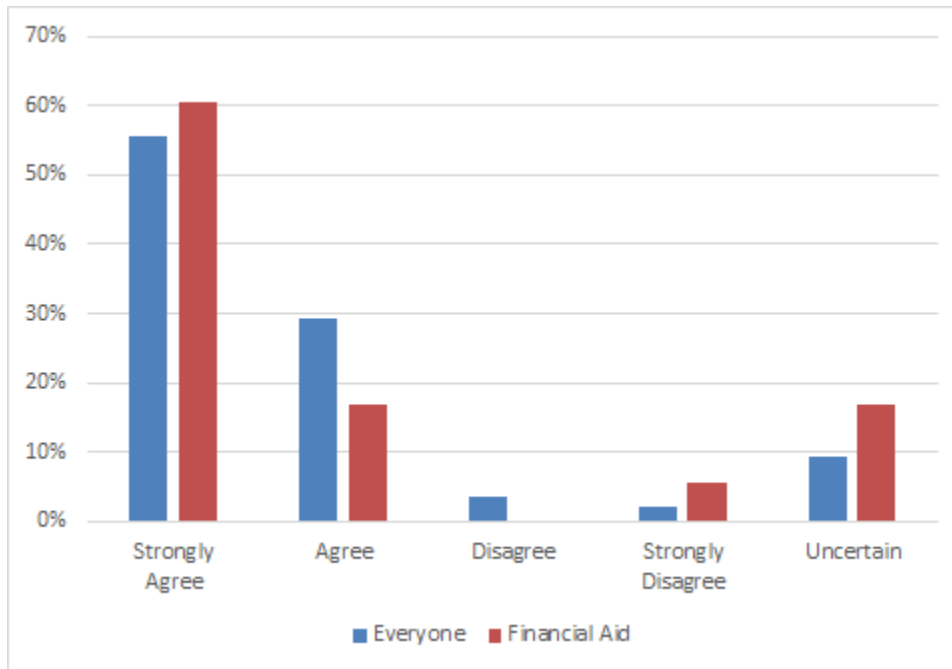
I feel confident using PowerPoint to follow a lecture presentation

Everyone

55% Strongly Agree
29% Agree
4% Disagree
2% Strongly Disagree
9% Uncertain

Financial Aid Students

60% Strongly Agree
17% Agree
0% Disagree
6% Strongly Disagree
17% Uncertain



EFFECTIVE LEARNING – Question 1 of 14

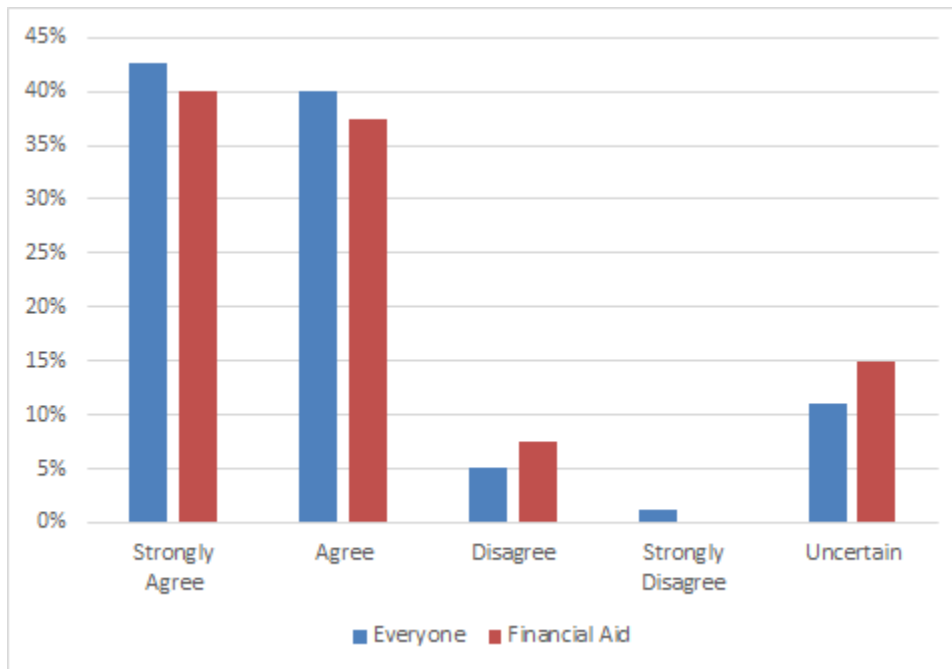
Using a laptop during lectures allows me to more easily locate relevant materials

Everyone

43% Strongly Agree
40% Agree
5% Disagree
1% Strongly Disagree
11% Uncertain

Financial Aid Students

40% Strongly Agree
38% Agree
8% Disagree
0% Strongly Disagree
15% Uncertain



EFFECTIVE LEARNING – Question 2 of 14

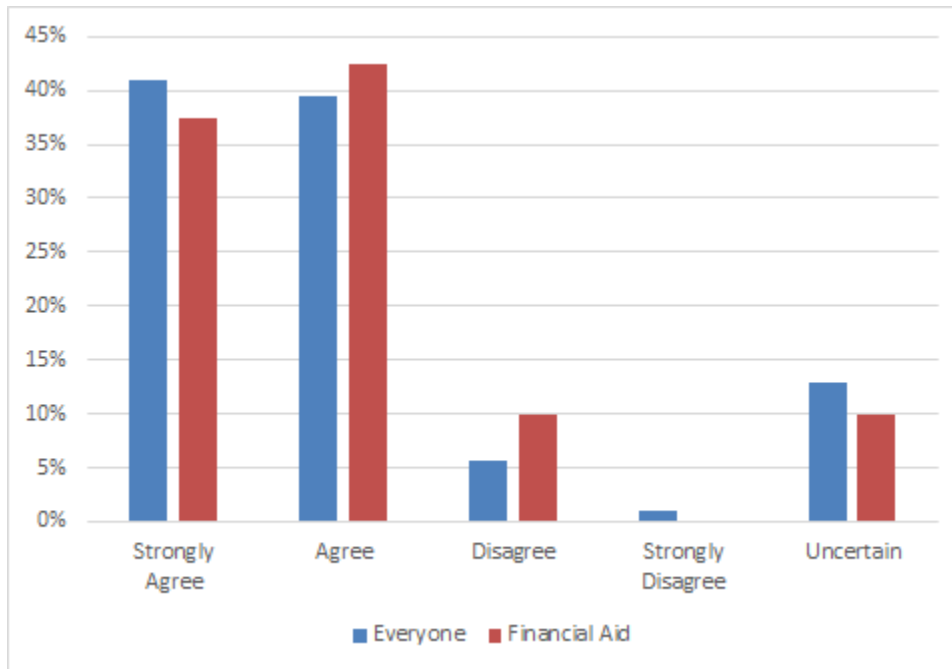
Using a laptop during lectures allows me to more easily use relevant materials

Everyone

41% Strongly Agree
39% Agree
6% Disagree
1% Strongly Disagree
13% Uncertain

Financial Aid Students

38% Strongly Agree
43% Agree
10% Disagree
0% Strongly Disagree
10% Uncertain



EFFECTIVE LEARNING – Question 3 of 14

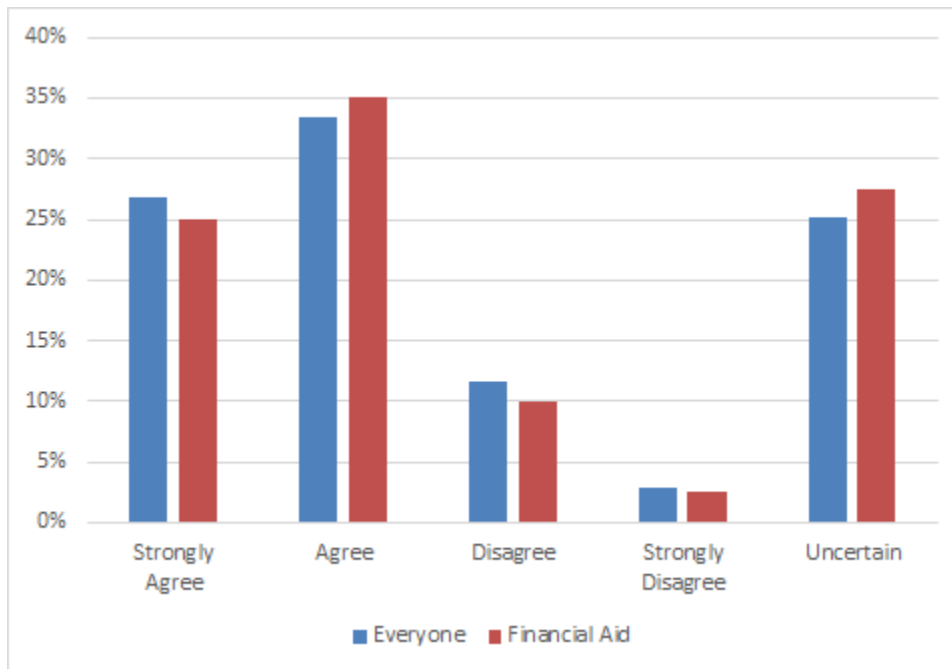
Using a laptop during lectures allows me to better capture all of the information presented

Everyone

27% Strongly Agree
33% Agree
12% Disagree
3% Strongly Disagree
25% Uncertain

Financial Aid Students

25% Strongly Agree
35% Agree
10% Disagree
3% Strongly Disagree
28% Uncertain



EFFECTIVE LEARNING – Question 4 of 14

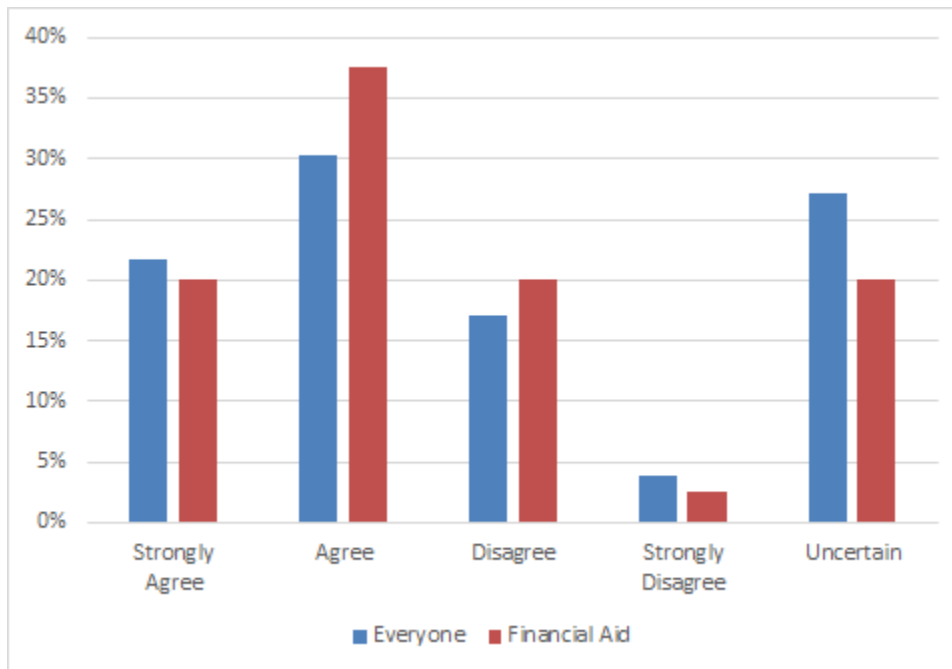
Using a laptop during lectures allows me to better process the information presented

Everyone

22% Strongly Agree
30% Agree
17% Disagree
4% Strongly Disagree
27% Uncertain

Financial Aid Students

20% Strongly Agree
38% Agree
20% Disagree
3% Strongly Disagree
20% Uncertain



EFFECTIVE LEARNING – Question 5 of 14

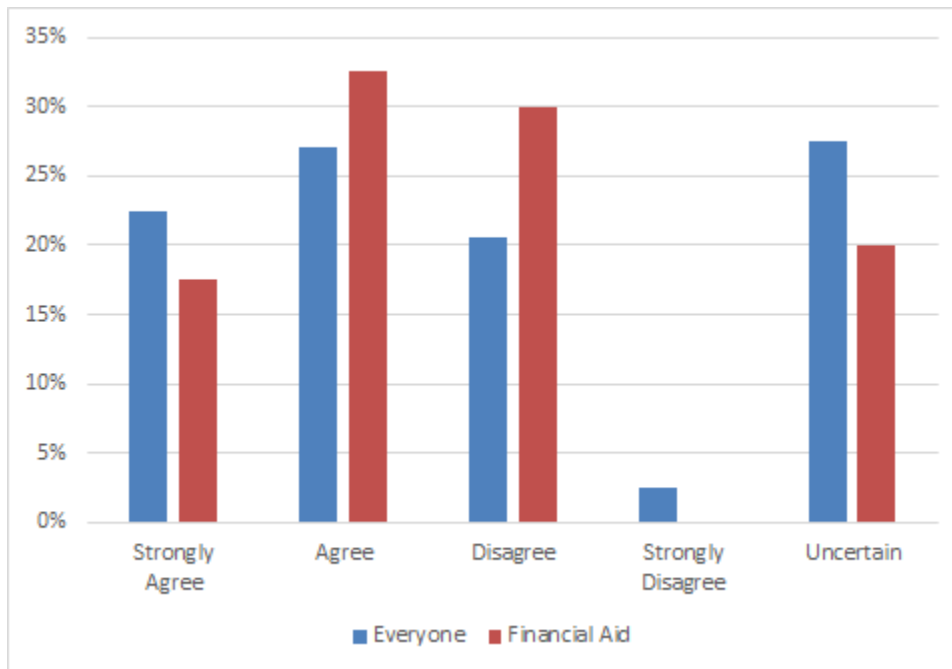
Using a laptop during lectures allows me to better summarise the important information presented

Everyone

22% Strongly Agree
27% Agree
21% Disagree
3% Strongly Disagree
27% Uncertain

Financial Aid Students

18% Strongly Agree
33% Agree
30% Disagree
0% Strongly Disagree
20% Uncertain



EFFECTIVE LEARNING – Question 6 of 14

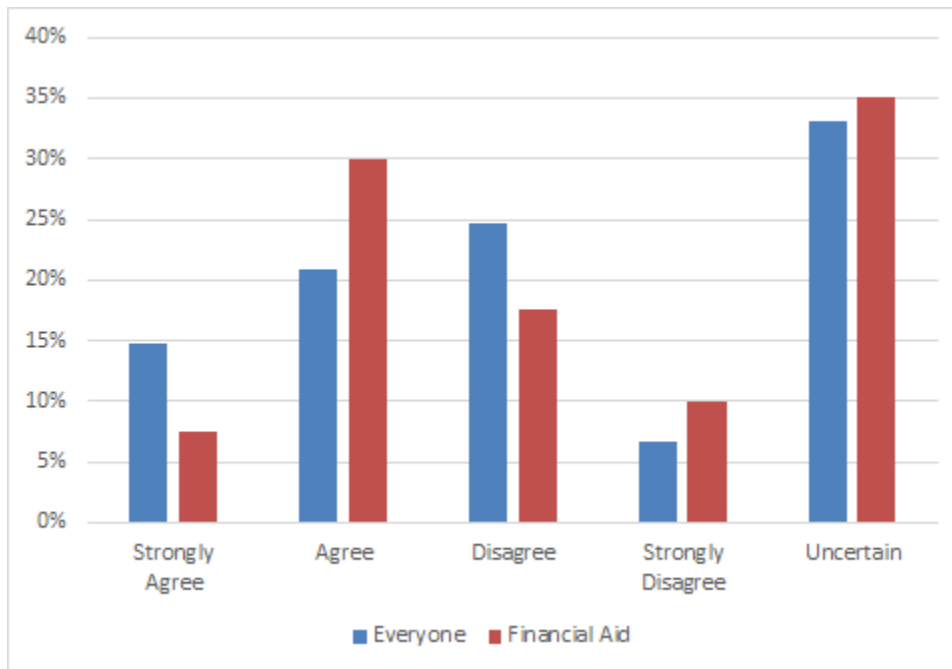
Using a laptop during lectures allows me to better communicate with the lecturer

Everyone

15% Strongly Agree
21% Agree
25% Disagree
7% Strongly Disagree
33% Uncertain

Financial Aid Students

8% Strongly Agree
30% Agree
18% Disagree
10% Strongly Disagree
35% Uncertain



EFFECTIVE LEARNING – Question 7 of 14

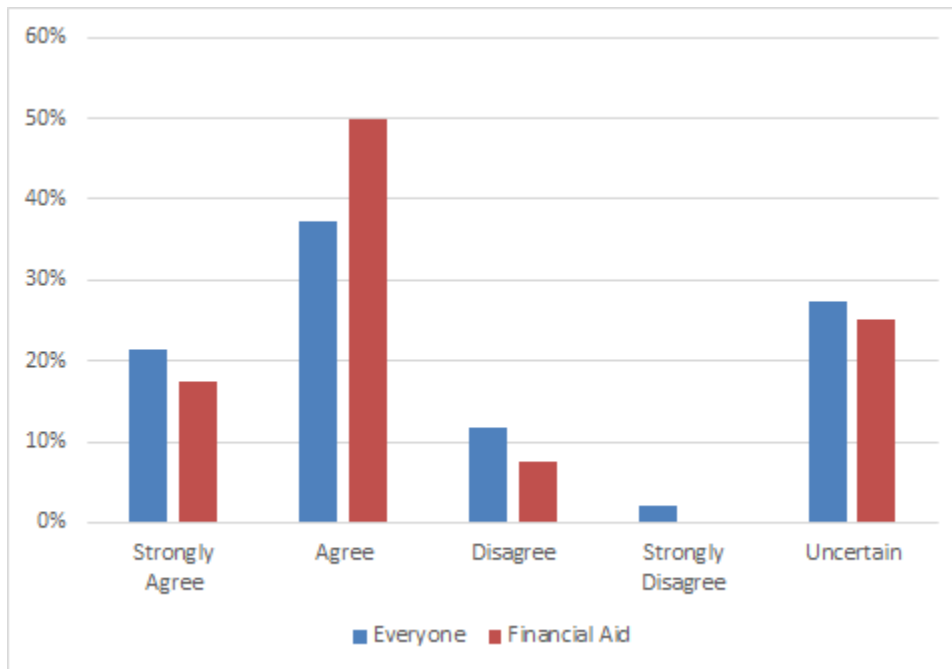
Using a laptop during lectures enhances my learning of the subject matter of the class

Everyone

21% Strongly Agree
37% Agree
12% Disagree
2% Strongly Disagree
27% Uncertain

Financial Aid Students

18% Strongly Agree
50% Agree
8% Disagree
0% Strongly Disagree
25% Uncertain



EFFECTIVE LEARNING – Question 8 of 14

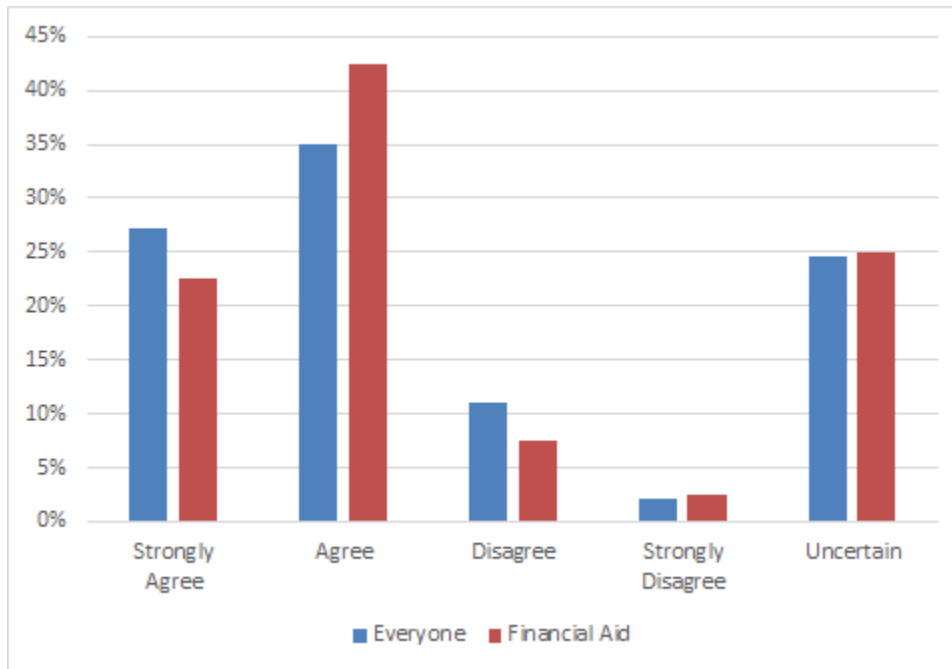
Using a laptop during lectures enhances my learning in general

Everyone

27% Strongly Agree
35% Agree
11% Disagree
2% Strongly Disagree
25% Uncertain

Financial Aid Students

23% Strongly Agree
43% Agree
8% Disagree
3% Strongly Disagree
25% Uncertain



EFFECTIVE LEARNING – Question 9 of 14

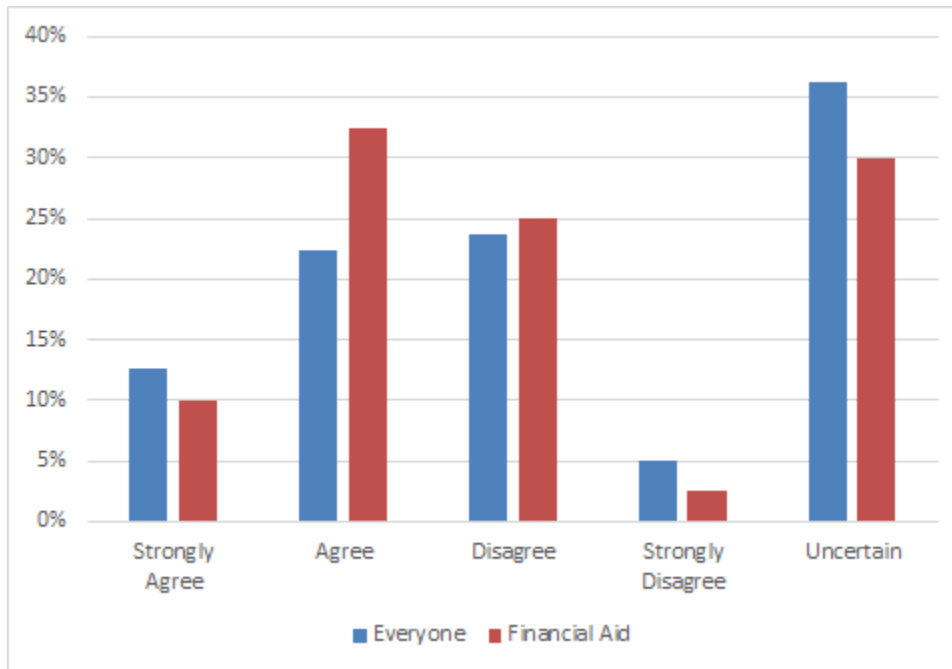
Using a laptop during lectures improves my problem solving skills

Everyone

13% Strongly Agree
22% Agree
24% Disagree
5% Strongly Disagree
36% Uncertain

Financial Aid Students

10% Strongly Agree
33% Agree
25% Disagree
3% Strongly Disagree
30% Uncertain



EFFECTIVE LEARNING – Question 10 of 14

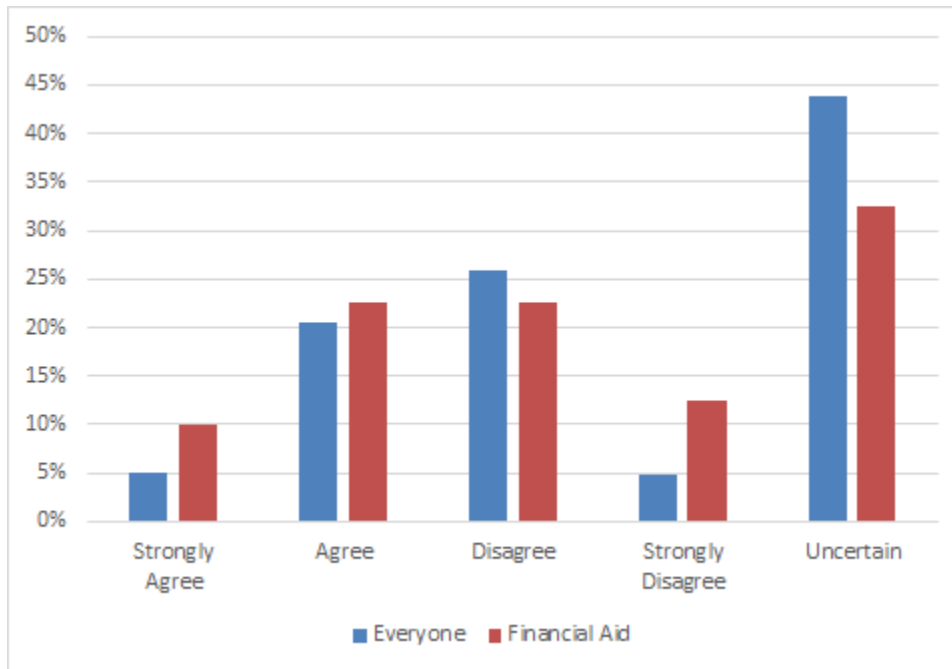
Using a laptop during lectures improves my critical thinking skills

Everyone

5% Strongly Agree
21% Agree
26% Disagree
5% Strongly Disagree
44% Uncertain

Financial Aid Students

10% Strongly Agree
23% Agree
23% Disagree
13% Strongly Disagree
33% Uncertain



EFFECTIVE LEARNING – Question 11 of 14

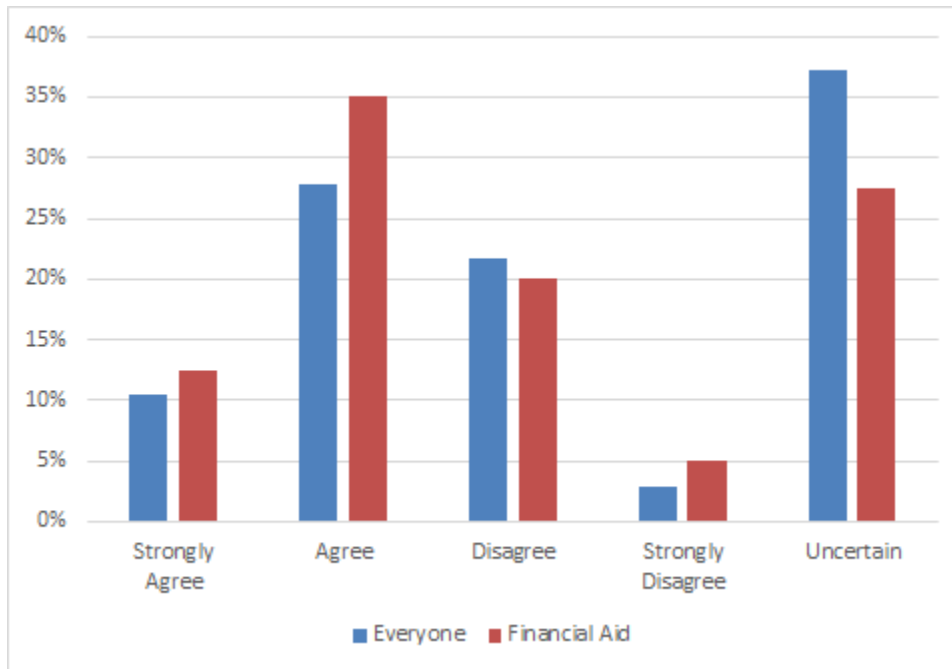
Using a laptop during lectures improves my analysis skills

Everyone

10% Strongly Agree
28% Agree
22% Disagree
3% Strongly Disagree
37% Uncertain

Financial Aid Students

13% Strongly Agree
35% Agree
20% Disagree
5% Strongly Disagree
28% Uncertain



EFFECTIVE LEARNING – Question 12 of 14

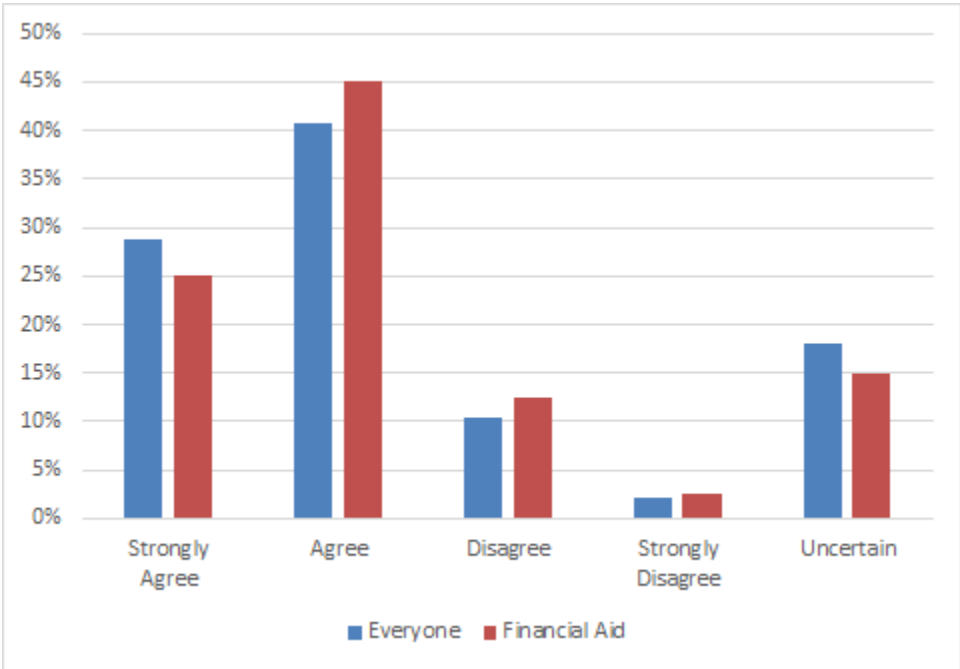
Using a laptop during lectures allows me to better organise and process information

Everyone

- 29% Strongly Agree
- 41% Agree
- 10% Disagree
- 2% Strongly Disagree
- 18% Uncertain

Financial Aid Students

- 25% Strongly Agree
- 45% Agree
- 13% Disagree
- 3% Strongly Disagree
- 15% Uncertain



EFFECTIVE LEARNING – Question 13 of 14

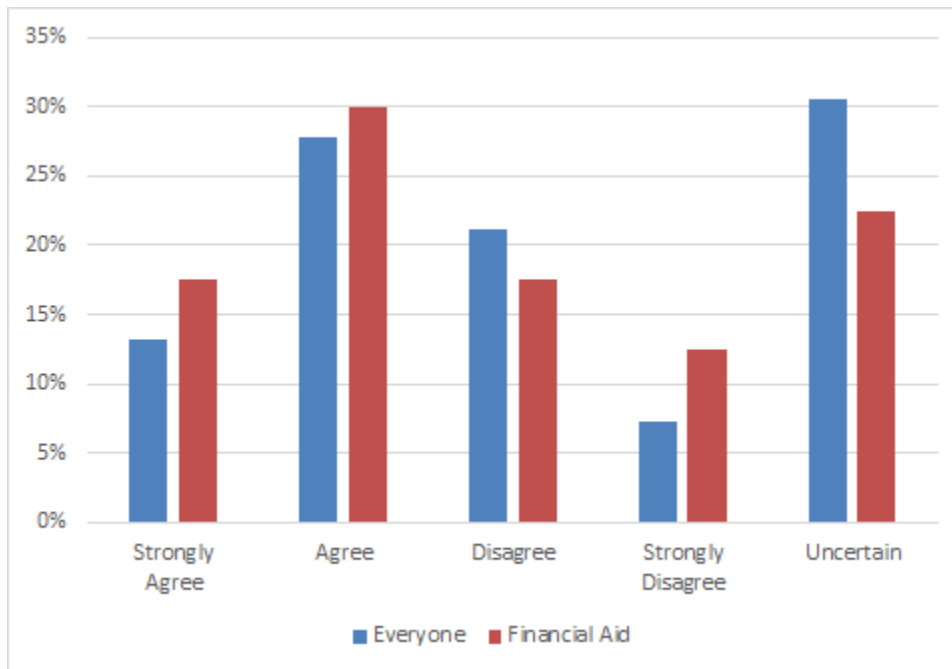
Using a laptop during lectures gives me an opportunity to better participate in class

Everyone

13% Strongly Agree
28% Agree
21% Disagree
7% Strongly Disagree
31% Uncertain

Financial Aid Students

18% Strongly Agree
30% Agree
18% Disagree
13% Strongly Disagree
23% Uncertain



EFFECTIVE LEARNING – Question 14 of 14

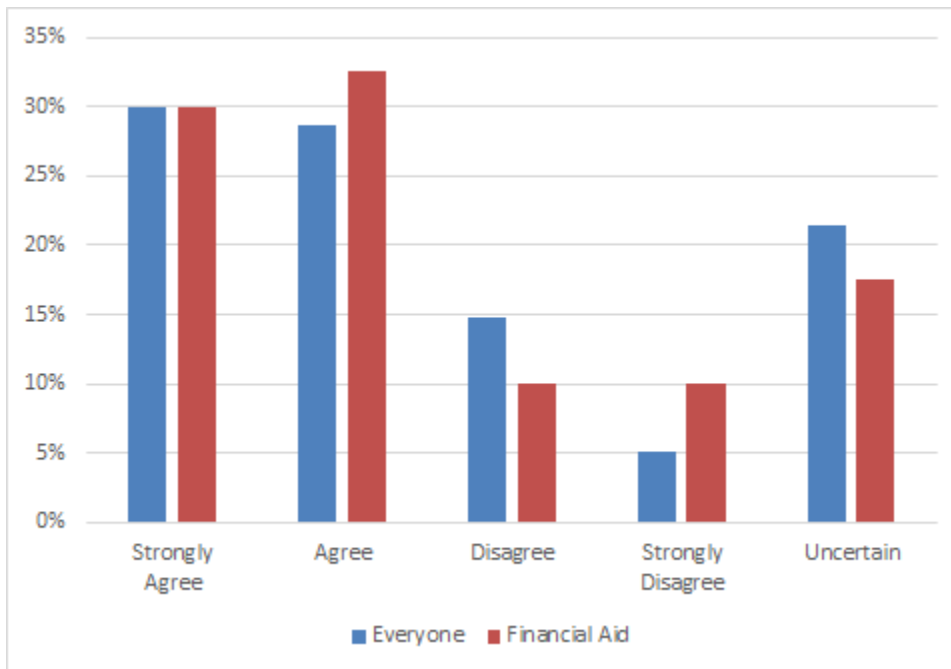
Using a laptop during lectures allows me to use my time better in order to get work done

Everyone

30% Strongly Agree
29% Agree
15% Disagree
5% Strongly Disagree
21% Uncertain

Financial Aid Students

30% Strongly Agree
33% Agree
10% Disagree
10% Strongly Disagree
18% Uncertain



INTERNET ACTIVITY – Question 1 of 2

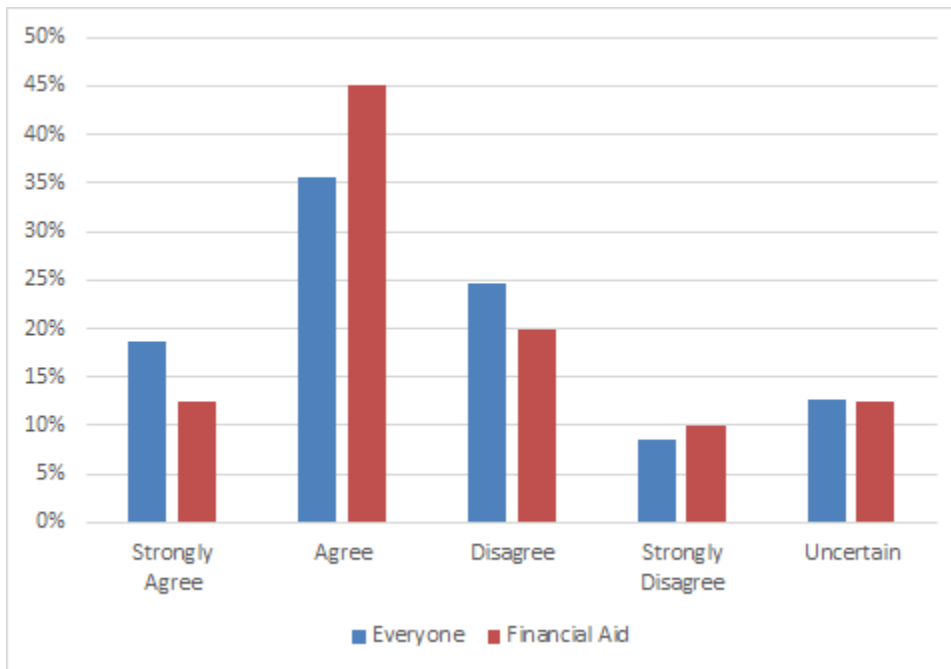
When I use a laptop during lectures I am more likely to send and receive email messages

Everyone

19% Strongly Agree
36% Agree
25% Disagree
9% Strongly Disagree
13% Uncertain

Financial Aid Students

13% Strongly Agree
45% Agree
20% Disagree
10% Strongly Disagree
13% Uncertain



INTERNET ACTIVITY – Question 2 of 2

When I use a laptop during lectures I am more likely to visit one or more websites

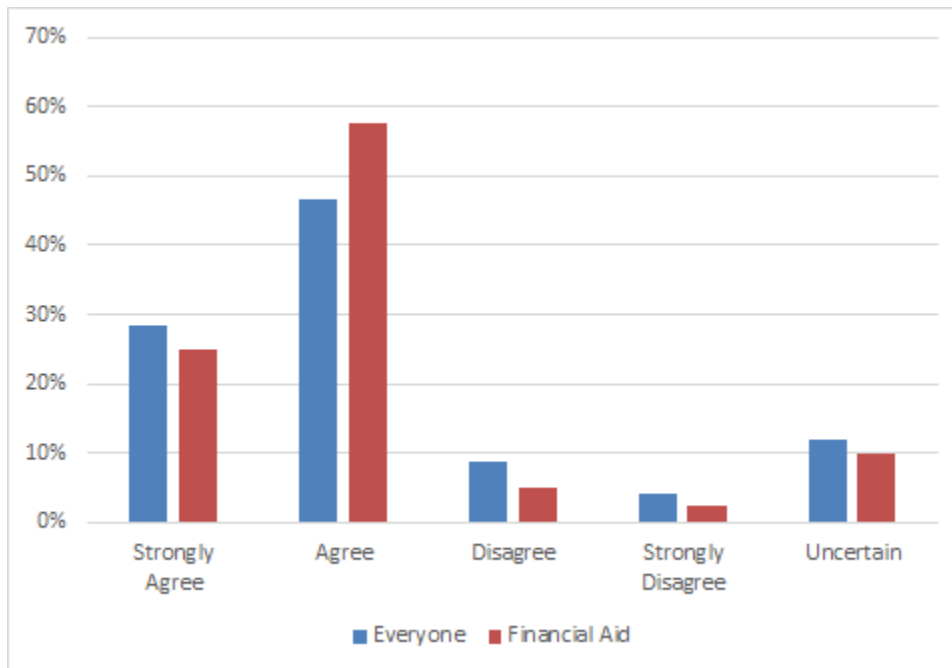
(Note: High percentage of agreement as the students saw Vula as a website)

Everyone

28% Strongly Agree
47% Agree
9% Disagree
4% Strongly Disagree
12% Uncertain

Financial Aid Students

25% Strongly Agree
58% Agree
5% Disagree
3% Strongly Disagree
10% Uncertain



NETWORK ISSUES – Question 1 of 2

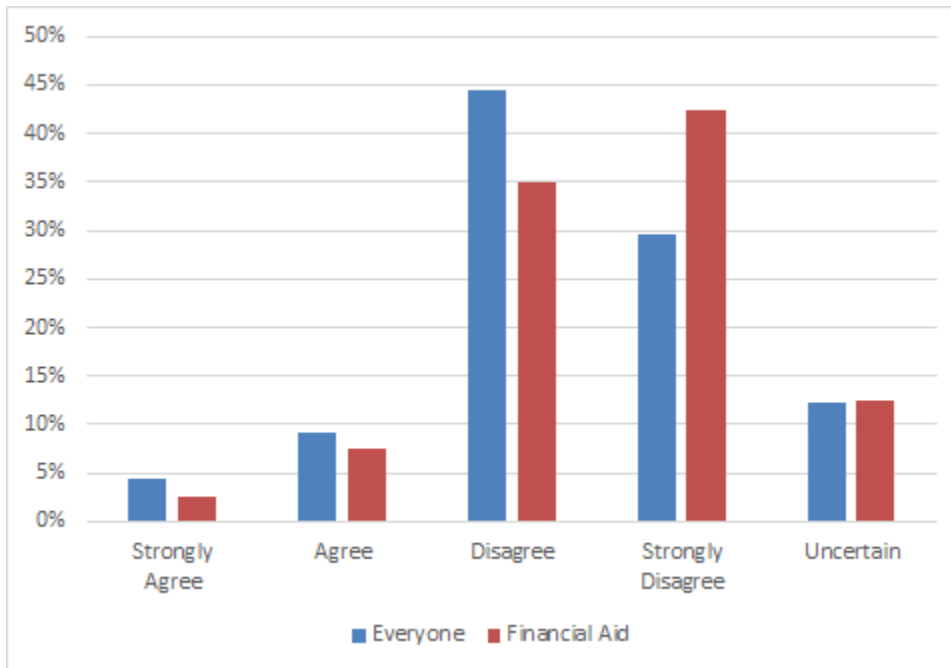
I feel that the Wi-Fi connection available in lecture rooms is risky to use

Everyone

4% Strongly Agree
9% Agree
44% Disagree
30% Strongly Disagree
12% Uncertain

Financial Aid Students

3% Strongly Agree
8% Agree
35% Disagree
43% Strongly Disagree
13% Uncertain



NETWORK ISSUES – Question 2 of 2

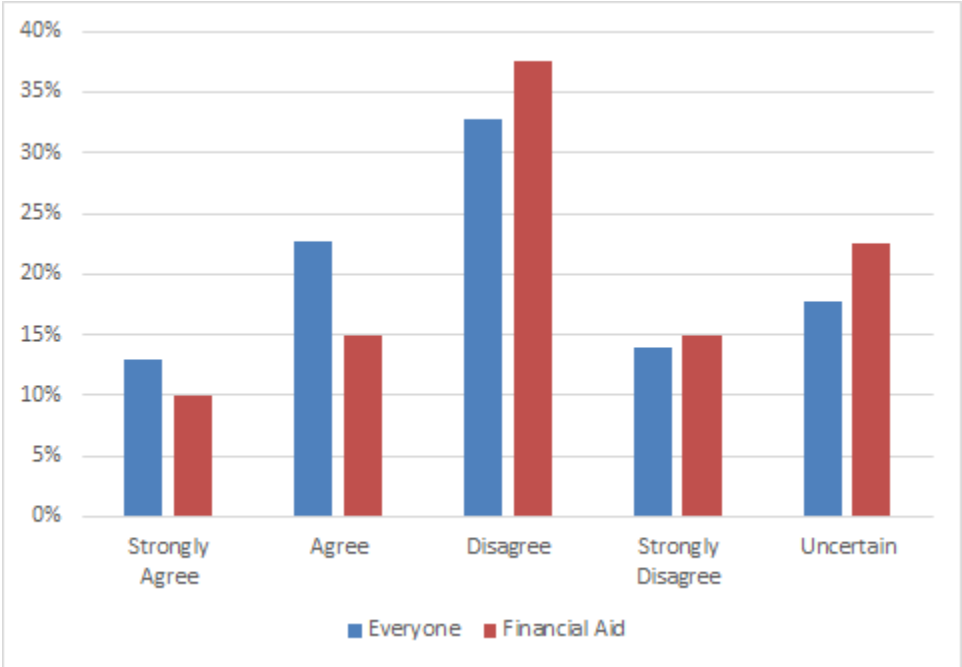
I feel that the Wi-Fi connection available in lecture rooms is unreliable

Everyone

- 13% Strongly Agree
- 23% Agree
- 33% Disagree
- 14% Strongly Disagree
- 18% Uncertain

Financial Aid Students

- 10% Strongly Agree
- 15% Agree
- 38% Disagree
- 15% Strongly Disagree
- 23% Uncertain



EMBARRASSMENT – Question 1 of 3

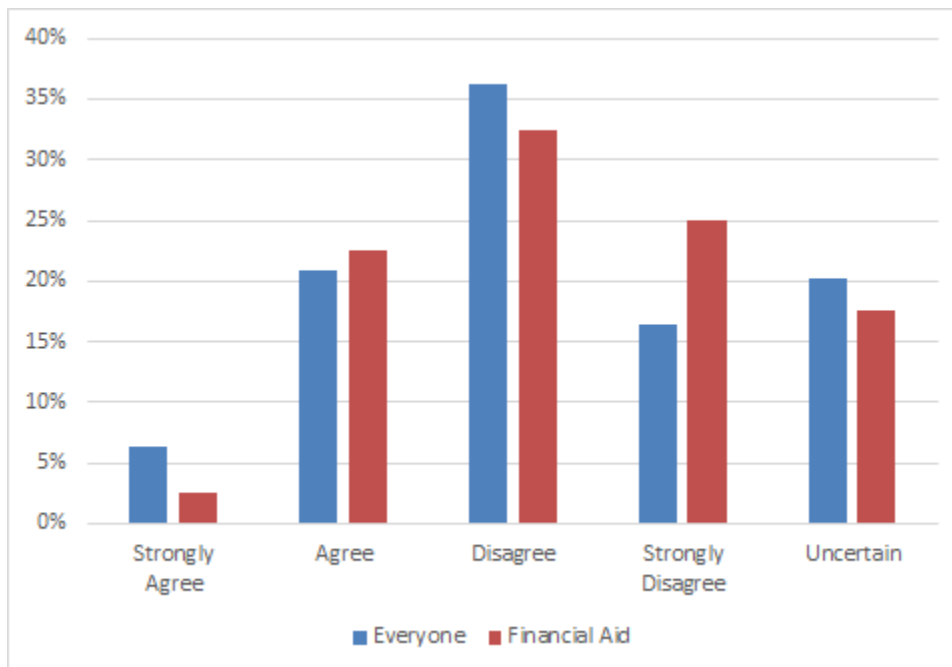
Using a laptop during lectures would be embarrassing if something were to go wrong

Everyone

6% Strongly Agree
21% Agree
36% Disagree
16% Strongly Disagree
20% Uncertain

Financial Aid Students

3% Strongly Agree
23% Agree
33% Disagree
25% Strongly Disagree
18% Uncertain



EMBARRASSMENT – Question 2 of 3

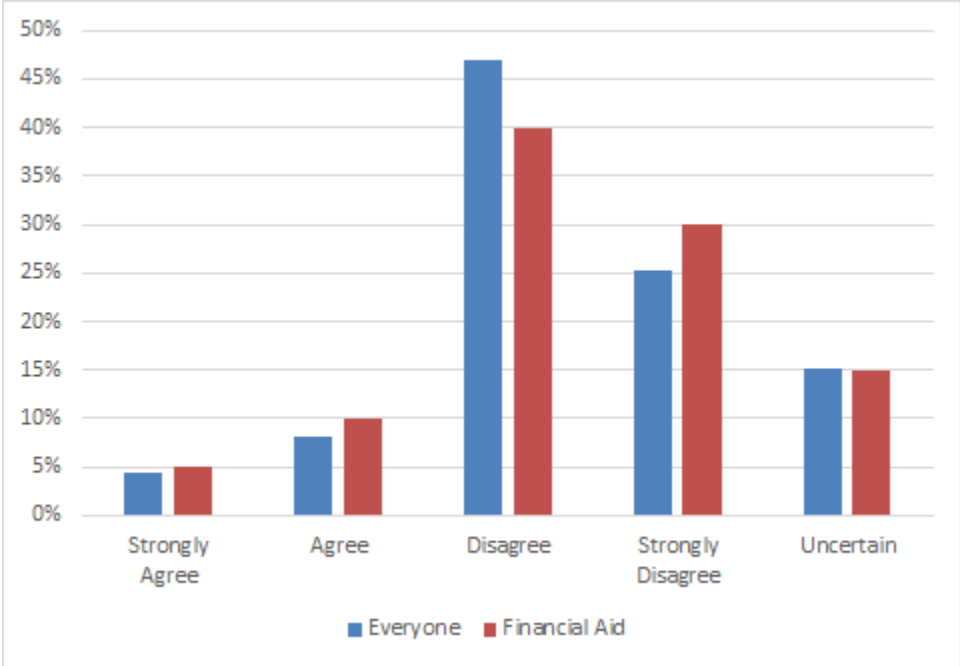
Using a laptop during lectures would be embarrassing if another student were to see what was on my screen

Everyone

- 4% Strongly Agree
- 8% Agree
- 47% Disagree
- 25% Strongly Disagree
- 15% Uncertain

Financial Aid Students

- 5% Strongly Agree
- 10% Agree
- 40% Disagree
- 30% Strongly Disagree
- 15% Uncertain



EMBARRASSMENT – Question 3 of 3

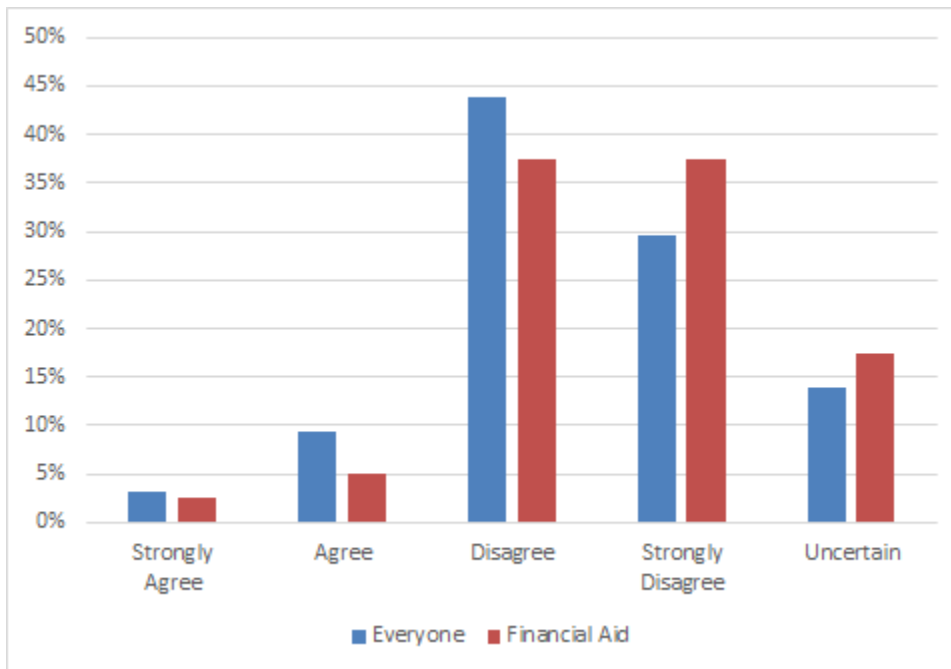
Using a laptop during lectures is difficult because of other students watching me

Everyone

3% Strongly Agree
9% Agree
44% Disagree
30% Strongly Disagree
14% Uncertain

Financial Aid Students

3% Strongly Agree
5% Agree
38% Disagree
38% Strongly Disagree
18% Uncertain



ACCESS TO INFORMATION – Question 1 of 3

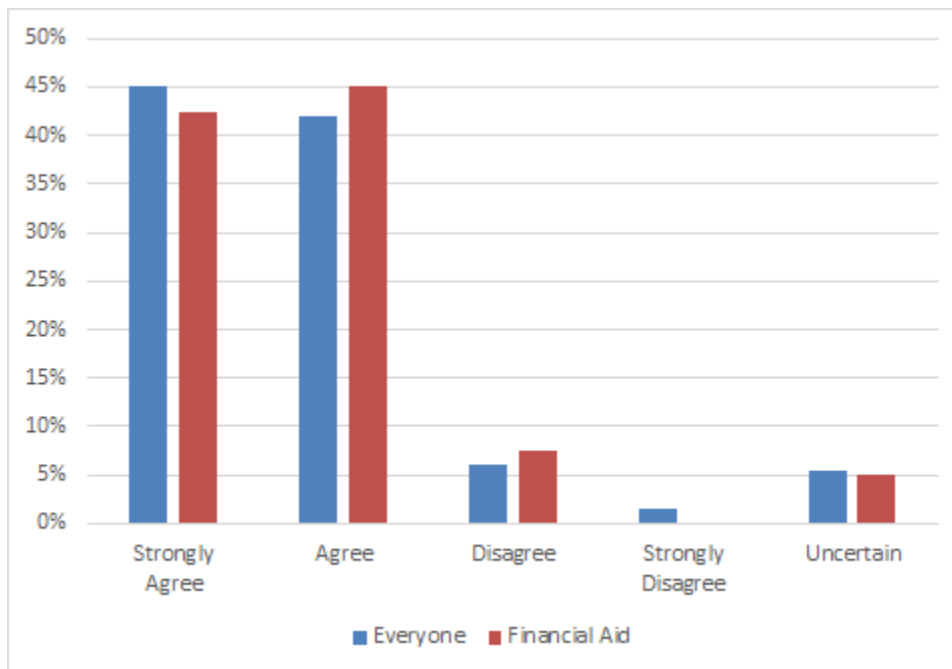
Using a laptop during lectures gives me access to more information

Everyone

45% Strongly Agree
42% Agree
6% Disagree
2% Strongly Disagree
5% Uncertain

Financial Aid Students

43% Strongly Agree
45% Agree
8% Disagree
0% Strongly Disagree
5% Uncertain



ACCESS TO INFORMATION – Question 2 of 3

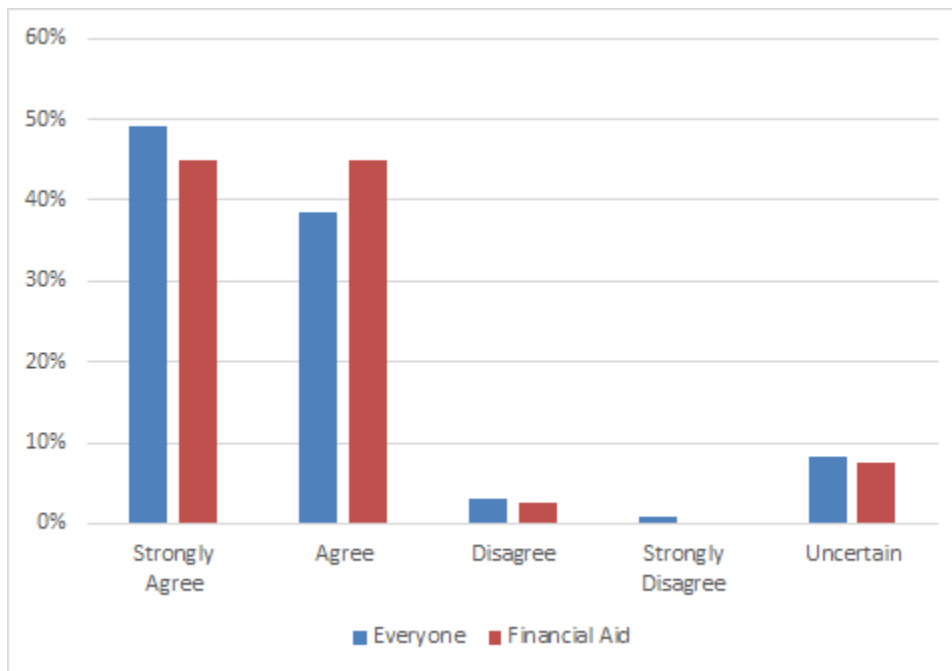
Using a laptop during lectures gives me easier access to information

Everyone

49% Strongly Agree
38% Agree
3% Disagree
1% Strongly Disagree
8% Uncertain

Financial Aid Students

45% Strongly Agree
45% Agree
3% Disagree
0% Strongly Disagree
8% Uncertain



ACCESS TO INFORMATION – Question 3 of 3

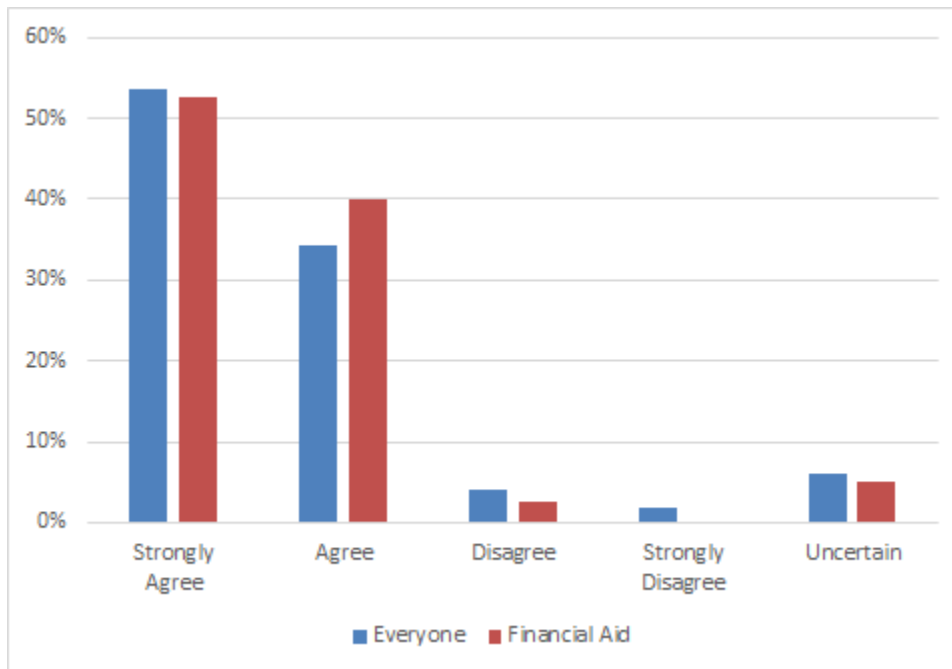
Using a laptop during lectures allows me to more quickly search for information

Everyone

54% Strongly Agree
34% Agree
4% Disagree
2% Strongly Disagree
6% Uncertain

Financial Aid Students

53% Strongly Agree
40% Agree
3% Disagree
0% Strongly Disagree
5% Uncertain



DISTRACTION – Question 1 of 3

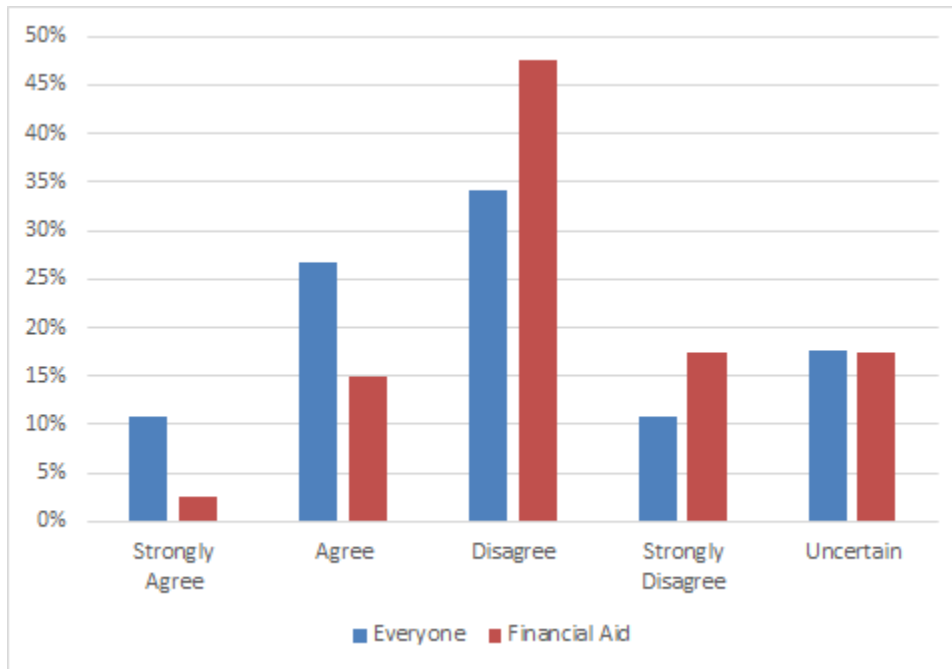
I feel that my using a laptop in lectures is a distraction for me personally

Everyone

11% Strongly Agree
27% Agree
34% Disagree
11% Strongly Disagree
18% Uncertain

Financial Aid Students

3% Strongly Agree
15% Agree
48% Disagree
18% Strongly Disagree
18% Uncertain



DISTRACTION – Question 2 of 3

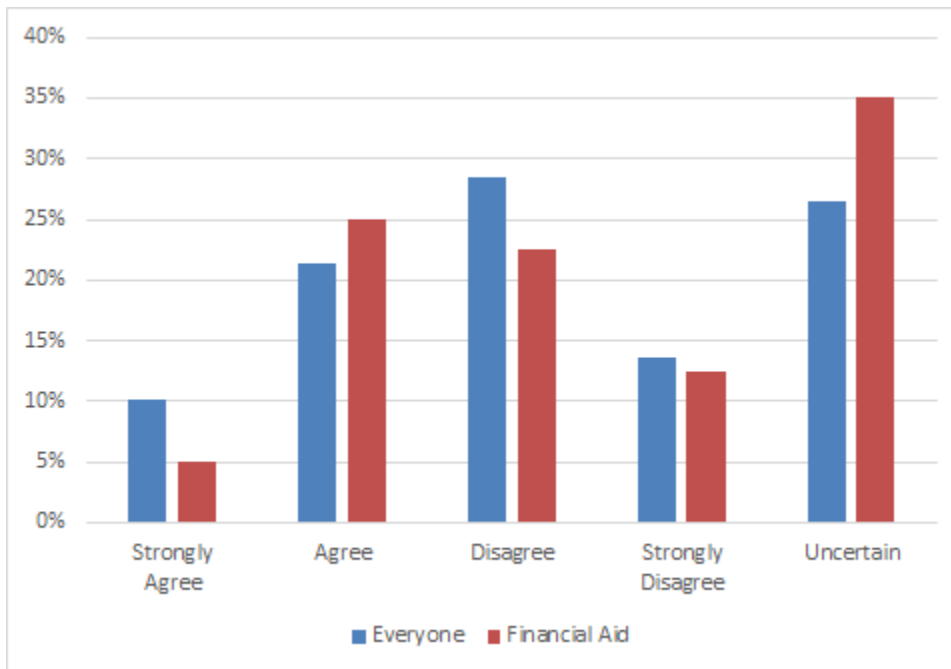
I feel that my using a laptop in lectures is a distraction for other students in the class

Everyone

10% Strongly Agree
21% Agree
28% Disagree
14% Strongly Disagree
26% Uncertain

Financial Aid Students

5% Strongly Agree
25% Agree
23% Disagree
13% Strongly Disagree
35% Uncertain



DISTRACTION – Question 3 of 3

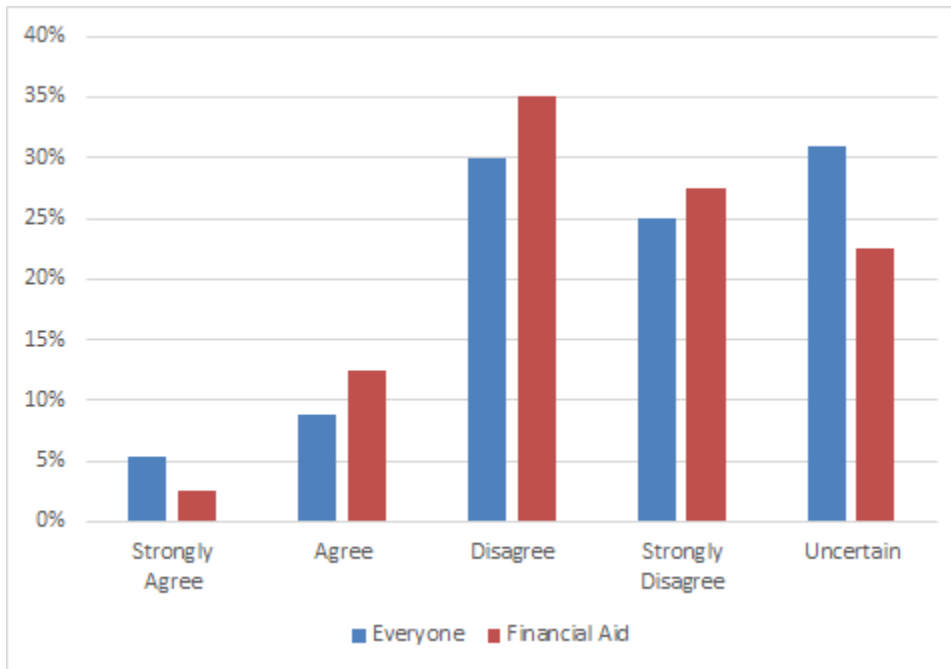
I feel that my using a laptop in lectures is a distraction for the lecturer

Everyone

5% Strongly Agree
9% Agree
30% Disagree
25% Strongly Disagree
31% Uncertain

Financial Aid Students

3% Strongly Agree
13% Agree
35% Disagree
28% Strongly Disagree
23% Uncertain



LAPTOP LOSS – Question 1 of 2

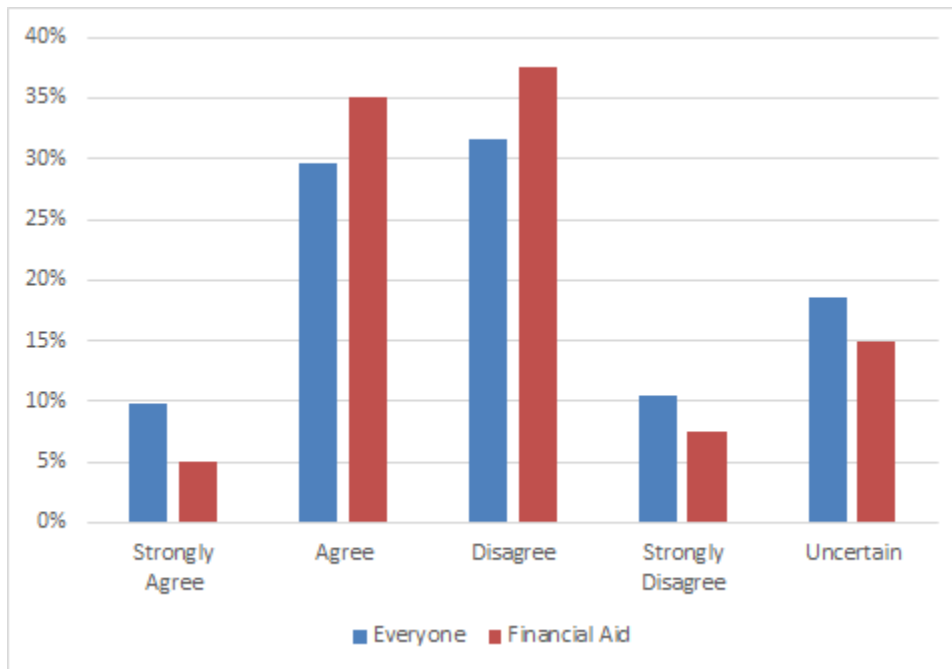
I am worried that my laptop will get damaged or lost when I bring it to a lecture or tutorial

Everyone

10% Strongly Agree
30% Agree
32% Disagree
10% Strongly Disagree
19% Uncertain

Financial Aid Students

5% Strongly Agree
35% Agree
38% Disagree
8% Strongly Disagree
15% Uncertain



LAPTOP LOSS – Question 2 of 2

I am worried that my laptop will get stolen when I bring it to a lecture or tutorial

Everyone

11% Strongly Agree
26% Agree
30% Disagree
11% Strongly Disagree
22% Uncertain

Financial Aid Students

10% Strongly Agree
25% Agree
40% Disagree
10% Strongly Disagree
15% Uncertain

