

College Students, Technology, and Time

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CUNY IT Conference, December 2, 2016

Good morning, we're Maura Smale and Mariana Regalado, Chief Librarian at City Tech and Head of Reference and Instruction at Brooklyn College, and today we're going to talk about our research on how undergraduates use digital technology for their academic work.

As in any research project, the work we're talking about today wouldn't be possible without the help of many people:

- the hundreds of CUNY students and faculty who shared their experiences with technology with us
- our research assistants, CUNY Graduate Center students Christopher Baum, Jay Blair, Rachel Daniell, and Brenna McCaffrey
- our CUNY library faculty colleagues who helped during our data collection, especially Jean Amaral at BMCC

We wanted to start by sharing a typical City Tech student's day with you. Chandni was an 18-year-old sophomore who participated in our study in Fall 2015. Majoring in liberal arts, Chandni lives in Queens and attends college full-time, commuting to her classes at City Tech in Brooklyn four days a week. Her commute begins at about 8:30am when she gets on a crowded subway for the trip to school, which takes a little less than an hour. In the mornings she tries to spend her commute reading course materials or studying notes on her smartphone, though on the rare occasion that she gets a seat she sometimes takes a quick nap to catch up on sleep. Sometimes she buys her course textbooks, and sometimes she borrows a reserve textbook from the library, but she never brings them to school, preferring to use her phone's camera to take and store pictures of the pages she needs to read. To use her phone for studying without internet access she told us, "since I don't have wifi underground, I screenshot certain things that I need to study."

On the day we spoke with her, Chandni headed first to the City Tech library's computer lab to work on a paper for her child psychology course, which she finished and printed in the time between her other classes. She usually studies in the library or in one of the campus computer labs. While she does have a computer at home, she told us that she couldn't use it because "it's totally messed up because of some virus issue, so I have to get pretty much everything done at school." Her sister also has a computer but won't let Chandni use it; while Chandni has a tablet computer she only uses it occasionally to type up short assignments since she doesn't have a word processing application. Chandni always prints on campus as there is no printer for her to use at home.

At 7:00pm, after finishing with her day on campus going to classes, studying, and hanging out with friends, Chandni heads back to Queens for her part-time job as a tutor for high school students in her neighborhood. By the time she gets home around 11:00pm that night her parents and two siblings are winding down their days. She eats some dinner before settling into

a session of math homework—both with her textbook and with internet videos to help her work through challenging concepts—interspersed with talking with friends on her phone. Chandni shares a one-bedroom apartment with her family and finds it easier to do her academic work at school, since space at home is limited. She also told us that when she studies on her bed it's easy to fall asleep. In fact, studying at home is so challenging that Chandni sometimes makes the 90-minute round trip commute into City Tech to use computers, study, and do homework even on a day when she doesn't have any classes.

As we know, and as the story of Chandni's day illustrates, digital technology is integral to higher education. Both the academic and mainstream news media report on technology trends, beginning with K-12 education and continuing through higher ed, and technology is a focus of many college and university strategic plans.

Technology planning on campus often relies on the trope of the digital native: the belief that today's college students are fundamentally different than in the past, and that their skill and competency with digital technology can be assumed since they've grown up in "the digital age." However, research has shown (and probably your own experiences too) that students' experience of and preparation for using technology in their academic work is uneven. A recent study of K-12 students by the nonprofit Joan Ganz Cooney Center revealed that digital skills are weakest for students from low-income backgrounds whose parents lack experience with technology, which puts them at a disadvantage in college compared to students from economically-privileged backgrounds.

The trope of the digital native can be problematic in higher ed, as this quote from Donna Lanclos, who does similar research at the University of North Carolina Charlotte, suggests.

We are also concerned, as are others, about the relentlessly positive ways that the academic and news media portray digital technology in higher education, as this quote from a 2015 article on educational technology trends illustrates.

For example, as Audrey Watters has discussed, the excitement about MOOCs -- massive open online courses -- a few years ago centered on their potential for individualized and self-directed learning in which students could complete a college degree outside of the traditional structure of college. However, this excitement has given way to the reality of low course completion rates, and currently MOOCs are most often used for job skills training.

We also wonder to to what degree these unqualified positive views of digital technology are shifting the responsibility for ownership of, access to, and competencies in digital technology onto our students, who may or may not be able to take them on.

Over the past 7 years we have used qualitative research methods to learn more about CUNY students' lived experiences using technology for their coursework. Despite the media focus on elite residential colleges and universities, more institutions look like CUNY than not: 85% of US

undergraduates are commuter students, the majority are nontraditional students, and many attend community colleges.

We've completed two cycles of research at CUNY, including:

- 2009-2011: Brooklyn, City, Hunter, City Tech, BCC, BMCC
 - photo surveys
 - mapping diaries
 - research process interviews
 - faculty research assignment interviews

- 2015-2016: Brooklyn, City Tech, BMCC
 - sms mapping logs
 - brief tech interviews
 - hybrid/online course student questionnaire
 - hybrid/online course faculty questionnaire

Our full research protocols are available on our website: <http://ushep.commons.gc.cuny.edu>

We use taskscape as a framing concept in considering how students do their academic work, a term proposed by archaeologist and anthropologist Tim Ingold who suggested that “every task takes its meaning from its position within an ensemble of tasks, performed in series or in parallel.” The academic taskscape encompasses the totality of the student experience, including students’ perceptions of their schoolwork, the locations where their academic work takes place, the tools or support that are available to them, and the people they interact with along the way. This illuminates each student’s experience of navigating places and using digital technology to create meaningful academic spaces for herself.

What digital technologies do students use?

In our research with students and faculty we found that students are using both fixed and mobile digital technology in support of their coursework. We also learned about how technology can sometimes prevent students from doing their academic work, barriers that may take many forms.

Internet access is critical for using digital technology for academic work, and here’s some detail about CUNY students’ internet access from the biannual Student Experience Survey. As you can see, in 2010 and 2014 the Student Experience Survey reported on different kinds of internet access for CUNY students off campus: dial-up (which is predictably low), broadband, cellular, and none at all. By the most recent Student Experience Survey in 2016 the questions had shifted and students were only asked whether they had access to the internet off campus.

While overall the number of CUNY students without access to the internet off campus is low -- 5% in 2010, 3% in 2014, 4% in 2016, we do have some concerns. When we consider that

CUNY's undergraduate enrollment in Fall 2015 was 245,000, even this low proportion of students without internet access is still over 7,300 students.

We are also concerned with the increase in the number of students who rely on cellular access to the internet off-campus and the decrease in broadband. This shift is also seen in studies by the Pew Research Center -- last year they reported that home broadband access in the US was slightly down, and the number of households with access to the internet only via smartphones had increased. As we'll see, it can be challenging for students to complete their academic work without broadband access to the internet.

Let's talk about the technologies that our students use for their academic work.

Personal computers can include desktops (fixed) and laptops (mobile), more about those distinctions in a minute. Students appreciated many aspects of personal computers that we term full-featured computing. They told us that a full keyboard is easier to type on, especially for long-form writing and in depth research. They also appreciate that many websites display better on and are easier to use with the larger screen of a personal computer, especially those that require interaction like entering data or spawn pop-up windows (e.g. Blackboard, CUNYfirst, etc.).

However, personal computers do represent an expense, an expense that includes the cost of internet access at home, which is all but required for computers to be maximally useful. We also heard from students about their challenges with computer maintenance, everything from hardware problems to system updates to viruses. Sometimes these problems were intractable, as we heard from Chandni, making their computers unusable.

We also heard a lot about printers and printing from students; we are not living in a paperless age, and students still need printers for their academic work. Most students prefer to read for their courses on paper, as our Queens College colleague Nancy Foasberg has also found, so they print their reading when needed. They also print their assignments -- papers, lab reports, homework, etc. -- when faculty require it.

More of the students that we spoke to in 2015-2016 had printers at home than in 2009-2011, but many still print on campus even if they have printers at home. Cost is one reason: printers use consumable supplies like ink and paper, and all of the colleges have at least some free printing allocation for students. Like computers, printers also require maintenance, and a few students told us that their home printer was broken.

We found in both cycles of research that printers feature heavily in the taskscape of our students, especially in regard to time, which we'll discuss more in a few minutes.

Students who had them raved about laptops as a technology they most appreciated for doing their academic work. They noted full-featured computing as we just mentioned, and the ability to work in locations that were convenient for them.

However, many students were not able to take full advantage of their laptops as mobile technology. They told us that their laptops, in particular older models, were too heavy to bring to campus, especially given their long commutes of an average of 45-60 minutes each way. Laptops also require internet access and access to charging to be most useful, which is not always guaranteed throughout students' days, even on our campuses. In this way laptops' mobility can be limited, and they can thus function more like desktop technology. And of course there are similar concerns as with desktop computers with the need for maintenance, updates, avoiding viruses, etc.

Smartphones are the all-but-universal technology for students: while we did meet students in 2009-2011 who didn't have a smartphone (and a few without a phone at all), every student we interviewed in 2015-2016 had a smartphone. Students appreciate their smartphones and take full advantage of their features, using the camera to take photos of readings or notes on the whiteboard in class, emailing instructors, checking various digital platforms required for their academic work.

While many students do use their phones for their assignments, they also noted concerns with relying solely on their smartphones for coursework. Not all websites are easy to access on the small smartphone screen, especially if students need to input data, and some may not work properly on mobile devices.

We did hear from students who had tablet computers, but they were far less prevalent than other forms of technology students use, which aligns with recent research on tablet use by US adults as a whole (by the Pew Research Center). A few students in both rounds of our research used ereaders, though they seem to be falling out of use in favor of tablets.

Where do students use digital technology?

With the emphasis on mobile technology in consumer culture, and given how busy we know our students are, we might anticipate that students' mobile devices are best suited for their academic work and that older technology models like the campus computer lab are less relevant. However, what we learned from talking to our students is more nuanced. And in fact, *where* they use technology is key.

For some students home is ideal, and affords them quiet access to the technology they need for their academic work, including a personal computer, printer, etc.

But we found that barriers were common. Broadband internet access at home represents an additional expense for our students and their families; students also complained of poor wifi at home. Not all students have broadband access; as the Student Experience Survey data showed, broadband access at home appears to be decreasing. Cellular internet access is not as conducive to academic work as is broadband. It's more complex to get a personal computers

online via cellular internet, and many cellular data plans have limits. Adding laptops and printers on top of cellular access might not always be feasible.

Software access at home is also a concern, and sometimes students don't have specialized or even standard office software. Free versions are available via the university or cloud-based applications like Google Docs, but again these require broadband internet to be maximally useful.

The shared spaces that our students live in have an impact on their use of technology for their academic work. Many don't have private, quiet space at home, though mobile technology can help (laptop, smartphones). And we did hear from students that they value the support they get from family members, which is an advantage of shared space. But shared technology can mean lots of negotiating at home for some students, juggling their academic needs with the needs of others in their households. And some students just don't have much technology at home (or even any, beyond a smartphone).

Our campuses offer fixed computers and printing, availability and access to full-featured computing with broadband internet connections and the applications and printers that students need for their coursework. Computer labs are heavily used by our students, even by those who have access to computers elsewhere, and our students appreciate them.

At busy times lines at the computer labs can be long and socializing can be an interference, and students spoke of the challenges of shared spaces in which not everyone is using the technology for academic work. Students told us that computing was not always adequate on their campuses; it's important to note that the Student Experience Survey responses show students as largely satisfied with their campus computer labs.

Laptops on loan from libraries or students' own laptops allow for flexible workspaces, so do smartphones if there's work that can be done on them. But mobile technology is only useful if wifi on campus is robust and charging is available.

Of particular note is that our questionnaire for students in hybrid and online classes as well as our own experiences from the reference desk revealed that many students taking hybrid and online courses are doing the work for those courses on campus in computer labs or on borrowed laptops. We cannot assume that students in hybrid and online courses are all working off campus.

CUNY students commute an average of 45-60 minutes each way, many come to class multiple days per week, or as we heard with Chandni they might even come to campus when they don't have class if they need a place to study. Access to mobile technology, particularly smartphones, allows students the opportunity to do readings and sometimes writing on the commute. This is often not a comfortable space for students to work, but some describe it as a way to "escape" the not-always-pleasant conditions of the subway. Students' work with technology on the commute must accommodate the lack of internet access on most subways, though cellular

access is possible on the bus. And of course none of the benefits of fixed technology (the advantages of personal computer, fast and stable internet, comfort) are available to students on the commute.

We also learned about students' use of technology for their academic work in other places, including at their jobs, at public libraries, and in other public locations. Some have access to computers/printers at their jobs, though this is not private and unrestricted, and of course they must negotiate this use with the work of their jobs. Some students use public libraries near their homes for computer and printing needs; many of our students are familiar with the public libraries from their high school days. In addition to also being public and potentially crowded, printing at the public library carries a fee. While publicly available wifi is increasing in New York City it's still not everywhere. Again, internet access is increasingly required for much of students' coursework.

How does digital technology impact students' use of time?

Time is important to all students, but especially for commuter and nontraditional students as we have at CUNY because so much of their time is taken up with commuting. In addition, most of our students have serious responsibilities beyond those as students (as caregivers, as workers). For many students much of their time is not their own.

As a result, students are on the go, and they often don't have time dedicated to one task -- they experience overlapping taskscapes. They may use technology to take advantage of the time they have available for academic work, since as Judy Wajcman has noted "digital devices teleport work into spaces and times once reserved for personal life" (*Pressed for time: the acceleration of life in digital capitalism*, 2015).

Time is entangled interactions with other people - others' activities must be accounted for. Students reflected on these pressures when we interviewed them. Many told us that managing their time was a major focus, or was problematic and they wished they could do it better.

We found it useful to think of the ways that technology helps students to create time. They are making time by multitasking, which we saw as layering of taskscapes. For example, they layer their online activities by working in an academic platform using digital technology while also socializing, or while they are at work. In particular we found lots of unacknowledged use of smartphones for incidental academic work throughout students' days. Students who told us they never used their phones for academic work also told us that they checked in on their course website, read class readings on their phone, or used their phone to email a professor.

As we noted above, many students take advantage of the commute time for school work. Reading and reviewing notes were the most common activities students told us about, though some students also do their academic writing on the commute. It's important to note that preparing to use technology on the commute adds time: readings need to be located and scanned or photographed and uploaded onto their digital device for reading later. Time gained

on the commute -- and money saved by reading in a digital format -- is “paid for” by frontloading the work.

And not unexpectedly some students were unable to (or chose not to) do their academic work on the commute. For some this was a frustrating waste of time, for others a moment to relax.

One of our favorite student quotes from our 2015-2016 research cycle is: “Technology is great, but it’s really time consuming.” And as this BMCC student alludes to, we found that there are many ways that technology wastes our students’ time.

Some of this is infrastructural. Students (and faculty) have multiple digital interfaces to learn with the platforms they use for school work, and multiple login credentials. These systems take time to learn, and depending on students’ prior experience with technology, some may struggle with these systems. The requirement to print assignments that are created electronically can sometimes lead to the time created with one digital technology evaporating due to the barriers of another, as students must spend time going to computer labs on campus and waiting in line to use a computer or print.

Technology failures also waste students’ time. Among these are unstable platforms (websites that crash while students’ are doing their work), inopportune maintenance schedules (during midterms, finals), and the slow speeds of systems or of campus wifi. Slow, outdated, or broken hardware also waste students’ time, as we saw in Chandni’s story.

Students also articulated a lot of frustration about perceived lack of support, which we found wasted their time. In particular they mentioned just in time support. The latency inherent to email especially frustrated students when they had a question or were struggling with technology. They also mentioned the lack of support at certain times for technology they are required to use -- for example, the 11:59pm deadlines to submit work in many online systems.

The challenges of connecting to the internet also constrained students -- wifi in particular -- even if they own a device. They noted that campus wifi was often too slow or difficult to access (and sometimes home wifi, too). They also complained that other students were “wasting bandwidth” -- using campus wifi to watch movies, play games, or other non-academic work, which is especially concerning for those who lack broadband at home.

Finally, the lack of private, unrestricted access to the technology necessary for their academic work also wastes students’ time. The need to rely on computing in shared spaces (campus labs, home, other locations) requires accommodating, and impinging upon, the activities of other people simultaneously using those spaces and technologies. Most campus spaces have restricted hours of access, and students have to work around busy and closed times. And home access also may be restricted by time to accommodate others’ needs. Distractions at home may drive students to campus or other places, which also requires time to commute.

How can we best support students with digital technology?

It's important that we understand student realities and constraints. We can't assume that our students are "digital natives" or otherwise particularly experienced with technology. Remember that the bulk of their experience may be with smartphones rather than personal computers. It's so useful to ask our students about their study habits, strategies, successes, and challenges -- we saw when we interviewed students that self reflection can be a step towards identifying challenges and improving their experiences with technology.

On campus, it's important to invest in robust wifi for students. The most common desire we heard from the students we interviewed is for wifi and computing that is "always fast and never crashes" and where "everything instantly connects and is always there." As we know, they are bringing multiple devices to campus and heavily relying on wifi. This infrastructure can help them take advantage of their own devices for their academic work. Of course this infrastructure carries a cost, so campuses will have to make choices about how to invest in that infrastructure.

We also need to understand students' needs for campus computing and adjust accordingly. Do students need access to computers, printers, specialized software in our campus labs? Can we work with libraries to loan laptops or other technologies to students rather than carving out space for additional labs? Are there enough outlets or charging stations on campus for students to successfully use their own technology? Can we increase cloud-based access to the software students need? We know that Microsoft 365 is coming at CUNY, but mobile-friendly access to the learning management systems and other platforms students use would be beneficial (though of course internet access is required for their use).

Students would also benefit from rapid, timely support in their use of technology. Can we learn from the platforms and systems we use? For example, many students submit assignments at 11:59pm when there is no technology support available. IT staff could share that information with faculty or even reset default times for assignment submissions. Training is also beneficial to students, even more valuable as we increasingly move to online learning. We know that our campuses offer training for students, but how can we make sure that they have access to it, or even require them to take it? We cannot assume that students' competencies with applications for their personal use translates into instant understanding of academic platforms.

Faculty can also explore how to take better advantage of technology for teaching and learning. Accepting assignments electronically and grading/commenting on student work inline can reduce students' need to print (and also reduce paper use and waste). To accommodate students' use of smartphones for writing, perhaps faculty can encourage a greater number of shorter writing assignments, or blogging and other online writing strategies.

Technology may also be helpful in bolstering students' time management. We heard students say they would be interested in receiving automatic reminders of upcoming assignment deadlines, either emailed or texted to them. And we can ensure that students' smartphones -- the technology that is always with them -- are configured to receive college and course emails and notification.

We encourage CUNY and other institutions to explore our local conditions to keep the focus on students. They have access to technology both on and off campus, and especially at a commuter like CUNY it's important to understand what technologies students have, how they're using it, and where their own technology and knowledge falls short, so we can support them and plan for student success.

Thank you.