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# Shedding Light on Students' Technology Preferences: Implications for Academic Development

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# Shedding Light on Students' Technology Preferences: Implications for Academic Development

**Abstract**
This study built on previous research in 2010 to determine changes to students' current use of and expectations for future integration of technologies in their learning experience. The findings reveal a continued trend of conservative technology use amongst students but with a growing demand for more integration of technologies for assessment and administrative purposes, podcasts or lecture recordings in flexible and blended course designs. While academic practice has been slow to change, this study reveals a continued need for academic development to focus on strategies that enhance technology adoption amongst academic staff. Students' preferences from this and the earlier study suggest that they would like more use of technologies, especially mobile technologies for efficient and convenient access to content, communication and assessment that can not only inform academic development and course design for fully online and blended learning courses, but also for the growing number of massive open and online courses (MOOCs) in the education landscape.

**Keywords**
blended learning, academic development, educational technology, higher education

**Cover Page Footnote**
We would like to acknowledge Dr. Margot McNeill for initiating this study and her support and guidance through its implementation.

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## 1. Introduction

Understanding students' IT experiences and preferences is critical in designing blended learning and massive open and online courses (MOOCs). The recent global rise of interest in MOOCs has pressured higher-education institutions to consider more-flexible learning opportunities to make the most of technologies. The integration of technology in the learning experience helps education to be less dependent on a particular time or place (Garrison & Kanuka 2004). Advances in web-based technologies, in particular, have led to an increase in student engagement and deep approaches to learning (Chen, Lambert, & Guidry 2010). While the blend of such online technologies with in-classroom instruction can facilitate innovative and learner-centred learning experiences (Torrisi-Steele & Drew 2013), it is important to consider students' preferences to ensure a positive perception and acceptance of the technologies used for offering flexible and blended learning initiatives. Although it has been argued that students entering universities represent a generational cohort (Millea, Limited, Green, & Putland 2005; Prensky 2001), the work of Jones and Binhui (2011) proves otherwise. Based on their extensive literature review, they have concluded that there is no evidence to prove that students entering university do not represent a universal cohort with common IT experiences and preferences. Hence, there is a need to explore students' diverse IT preferences to better understand which technologies they would like to use to enhance their learning, and how they would like to have access to more flexible learning opportunities. As argued by Oblinger (2003), the characteristics of students IT use (ownership, use, preference, and skills) shift their expectations about their learning environments; hence, higher-education institutions must be aware of this changing trend. Otherwise, students may be frustrated with their learning experience.

## 2. Purpose of the Study

With the recent wave of interest in blended learning and MOOCs across the higher-education sector and the hype surrounding the ways technologies can support and enhance flexible learning, it is critical to discover students' perspectives and preferences to make evidence-based decisions when implementing academic-development strategies. The research reported in this paper explored students' experiences and expectations for learning with technology, with the aim of informing academic-development strategies related to course design for blended learning, flipped classrooms and MOOC initiatives. This study explores students' IT preferences at one higher-education institution and compares the findings with earlier studies (Gosper, Malfroy & McKenzie 2013; Gosper, Malfroy, McKenzie & Rankine 2011) to observe any changes or emerging patterns. Ultimately, its findings can be applied to better inform strategic directions for flexible and blended learning and course-design decisions.

## 3. Literature Review

### *3.1 Student Generational Cohorts*

In recent years, students' IT ownership, use, preference and skills have been used to label generational cohorts believed to possess similar IT skills. For example, Howe and Strauss (1991) coined the word 'Millennial Generation' to describe the new breed of students who have strong

inclinations towards making an impact on society and maximising their use of information technology, and who are distinctly different from the preceding "Generation X", which has grown up with technology but does not necessarily value making a significant impact on society. Tapscott (1997) labels another group of students who has grown up surrounded by computers, the Internet and digital media as the "Net Generation". Prensky (2001) expands on this notion to refer to a more recent cohort of students as "Digital Natives" due to their high level of digital language literacy. More recently, Millea et al. (2005) acknowledge the emergence of "Digital Backpackers", who carry a variety of portable and mobile devices and tools. These terms are often used in educational and IT discourse to convey the changes amongst different generations of students based on their collective IT characteristics. Jones and Binhui (2011) explored the literature on the "Net Generation" and "Digital Natives", finding that these descriptions do not actually capture the changes occurring amongst generations of students. In other words, the new generation of students entering higher education cannot be labelled by a specific term.

### 3.2. Student IT Use and Preference

Jones and Binhui (2011) discovered that students' use of technology for learning purposes is moderate, and there is no evidence of extensive use of technologies such as blogs, wikis and 3D virtual words; their findings are consistent with earlier studies (Kaminski, Seel & Cullen 2003; Oliver & Goerke 2007; Salaway, Caruso & Nelson 2008; Thinyane 2010) that found a diverse pattern of technology use and access amongst students. In a more recent study at an Australian university, McNeill, Diao and Gosper (2011) and Gosper et al. (2013) observed a similar conservative trend towards students' use of technologies for social, work and learning purposes. For work and social purposes students tended to more often use the Internet for emailing and instant messaging and mobile phones for text messaging and voice calls compared to other technologies. They noticed the same conservative trend in students' use of technologies for learning purposes, with Internet search engines used most frequently, followed by online library resources, podcasts and videos, social networking sites and course-specific software. Despite the conservative and diverse pattern of students' use of and preference for technology, students tend to value what technology offers in various aspects of their learning. Through the emergence of technology, students have better access to information anytime and anywhere, allowing learning to become more convenient and flexible, enhancing communication and connection with their instructors and amongst their peers, giving better control over when to engage in course activities and offering improved learning overall (Kvavik & Caruso 2005; Smith, Salaway & Caruso 2009). Like student IT use, student IT preference shows a consistent moderate trend that is often attributed to their socio-economic profile, field of interest and year level (Kvavik & Caruso 2005; McCabe & Meuter 2011; Smith et al. 2009; Thinyane 2010). Students prefer courses that use technology only moderately. Kennedy, Judd, Dalgarno and Waycott (2010) recommend that the design of technology integration in curricula should be guided by students' technological experiences and educational expectations.

### 3.3. Student IT Experiences

One factor that influences students' preference for technology is their IT experiences. Smith et al. (2009) argue that students' attitudes towards the extent that technology is integrated in a course depend on the quality of their IT experiences. Their argument is based on Hoeffler and Ariely's (1999) findings that individuals' experience and effort with relation to a particular thing affects their preferences. This is consistent with the view that knowledge directly or indirectly influences

experiences. Thus, the higher the IT literacy of students and the better their IT experiences, the higher their preference for more technology integrated into the curriculum. Furthermore, students' use of technology depends primarily on their access to it and its efficiency and connectedness (McNeill et al. 2011), similar to their in-class interactions. They seek access to course content, immediate feedback, answers to questions, communication with academics and collaboration and interaction with classmates in educational technologies.

### *3.4. Student IT Use, Preference and Experiences and Course Design*

As demonstrated by the study of Snow, Jackson, Varner and McNamara (2013), students' prior expectations of technology affect the way they learn. Hence, it is necessary for universities to gain significant insight about students' IT expectations to ensure that their institution's IT services meet students' needs. At a system level, apart from understanding how students learn (Ellis & Goodyear 2010), their IT expectations can inform decisions regarding technology adoption for engaging and flexible learning experiences.

Academics who understand students' IT characteristics can avoid being trapped in the hype of new technologies. As they design their courses, they need to consider more effective ways of integrating and using technology (Johnson, Adams & Cummins 2012) within the context of student learning and student IT experiences, preferences and uses. For example, the growing trend of an expectation towards convenient access to work and learning at any time (Johnson, Smith, Willis, Levine & Haywood 2011) has very strong course-design and pedagogical implications. To address this expectation and enhance support students' learning experiences, courses need to be designed that facilitate exploratory and dialogical learning (Dabbagh 2007).

## 4. Method

### *4.1. Design and Instrument*

This study built on previous research undertaken by Macquarie University, the University of Western Sydney and the University of Technology Sydney as part of the cross-institutional Student IT Experience project in 2010. Survey questions were adapted from the previous study (Gosper et al. 2013, 2011) pertaining to students' current use of technologies for everyday life (i.e. social, personal and work) and for educational purposes, and preferences for future use of the same technologies for learning. The survey instrument referred to various technologies relating to communication, social networking, research, multimedia editing, web development and presentation software, along with tools available from within learning-management systems (LMSes). Because the current work uses questions from the previous study, its findings can be compared with the 2010 survey to determine if students' use of and preferences for technologies for social, work and learning purposes have changed over the past several years, or if the trends remain constant. A subset of the findings is reported in this paper, focusing specifically on the quantitative data related to flexible and blended learning course design.

### 4.2 Sample

The study was conducted at one Australian higher-education institution and was open to all students who enrolled in at least one course in Semester 2 of the 2013 academic year. Upon receiving institutional ethics approval, the survey was advertised through the institution's LMSes (Blackboard and Moodle), and no remuneration was given to participants. The survey was administered through Qualtrics, a locally hosted online survey tool, and available 19-28 August 2013.

Of the 334 students who consented to participate in the study, 171 completed the entire questionnaire. The greatest proportion of the respondents were from the business discipline (37.93%), followed by engineering (19.16%), while the rest of the participants were from a variety of academic disciplines. Table 1 shows the distribution of participants by study level.

Table 1. Distribution of Participants by Study Level

| Level of study | Proportion of participants |
|---|---|
| First-year undergraduate | 32.06% |
| Second/third-year undergraduate | 28.63% |
| Final-year undergraduate | 15.27% |
| Postgraduate | 24.05% |

## 5. Results and Discussion

### 5.1 Location of Technology Use for University Learning

Before delving into the specifics of which technologies they prefer to use, the survey aimed to determine where participants access technologies for learning purposes, asking students to identify in which of the following locations they frequently accessed technologies specifically for educational purposes: on campus, at home, at work and anywhere using mobile devices. A five-point scale was used throughout the survey instrument: *never or rarely; a few times a semester; a few times a month; a few times a week;* and *one or more times a day*.

Figure 1 shows the portion of the participants in the present study who indicated that they accessed technologies for educational purposes at various locations along with the comparative figures from the 2010 cross-institutional study (Gosper et al. 2013).

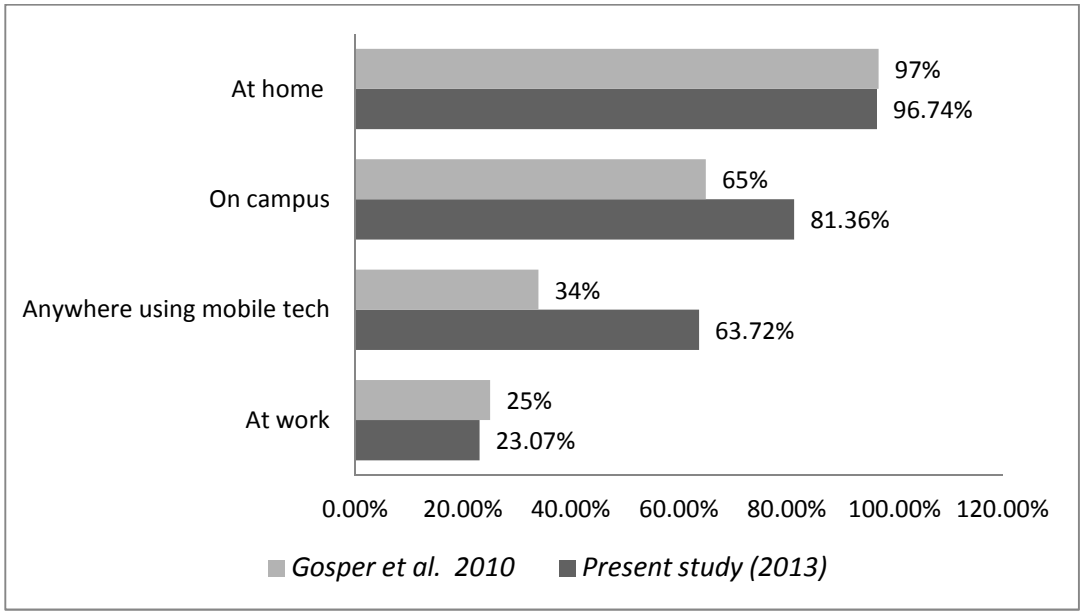


Figure 1. Percentage of Student Use of IT for Learning in Various Locations

The findings in the present study reveal that students access technology for learning purposes in various locations. Most students (96.74%) continue to use technologies at home, consistent with previous results (Gosper et al. 2013). The use of technology at work specifically for learning also appears to have remained fairly stable over the past few years, with a slight decline of use from 25% to 23.07%. However, the findings show that there is a sharp rise in students' use of mobile devices for learning purposes. These results imply that students may prefer more flexible and blended learning opportunities, as most of them tend to use educational technologies when they are not on campus.

### *5.2. Technologies for Everyday Use and Learning Purposes*

Participants were asked to identify which technologies they currently use for everyday purposes (i.e. personal, social and work) and to aid their learning. Using the same five-point scale, they indicated how much they perceived they used the technologies: *never or rarely; a few times a semester; a few times a month; a few times a week;* and *one or more times a day*. They were also asked to indicate whether to they would like to use more of the technologies particularly for learning purposes. Table 2 shows the portion of participants who identified that they used the technologies regularly (i.e. a few times a week or more) for everyday and learning purposes, along with the percentage who would like more use of the technology specifically to aid their learning.

Table 2. Student Use of Technologies for Everyday Use and for Learning Purposes on a Regular Basis (N=171)

| **Technology** | **Everyday purposes** | **Learning purposes** | **Would like more use** |
|---|---|---|---|
| Internet search engines (e.g. Google, Yahoo) | 98.1 | 96.15 | 73.6 |
| Library search engines (e.g. e-journals/electronic databases) | 34.93 | 46.19 | 71.58 |
| Mobile phone for voice call | 79.13 | 41.55 | 50.30 |
| Podcasts or webcasts (e.g. YouTube) | 69.53 | 38.75 | 80.75 |
| Social-networking sites (e.g. Facebook, Twitter) | 87.38 | 31.88 | 56.80 |
| Text (SMS) and instant messaging (e.g. WhatsApp, Vibe etc.) | 97.15 | 31.07 | 64.07 |
| Web conference or video chat (e.g. Skype, Collaborate, Yahoo Messenger) | 41.83 | 16.09 | 50.30 |
| Photo sharing websites (e.g. Flickr, Picasa, Instagram) | 32.54 | 14.14 | 45.29 |
| Blogs | 22.12 | 13.59 | 35.67 |
| Social bookmarking/tagging (e.g. del.icio.us, Diigo) | 5.72 | 9.71 | 33.33 |
| RSS feeds using a variety of web sources | 14.01 | 9.09 | 43.36 |
| Virtual worlds (e.g. Second life, Project Wonderland, Active Worlds) | 7.18 | 2.9 | 34.12 |
| Software used to create audio/video materials (e.g. Audacity, Garage Band, Director, iMovie) | 7.25 | 1.96 | 26.90 |

Table 2 shows that the technology most used on a regular basis for both everyday and learning purposes is Internet search engines; this is consistent with the 2010 survey. As in the earlier study, survey respondents would like to use Internet search engines less frequently for educational purposes, likely due to over-reliance on them over the years. Further, while text or instant messaging and accessing social-networking sites are the second and third most highly used technologies for everyday purposes, library search engines and mobile phones for voice calls are the second and third most highly used technologies specifically for learning purposes. The findings related to the use of library search engines remain consistent with the 2010 survey. The use of mobile phones for voice calls was not explored in the previous study.

The findings further reveal that although nearly 90% of the participants reported a high use of social-networking sites for everyday purposes, only a third used such sites to aid their learning. However, more than half of the respondents indicated that they would prefer to use these sites more to enhance their learning experience, an increase from 2010. Furthermore, although nearly 70% of participants accessed podcasts or webcasts for everyday purposes, only 37% of them accessed these technologies to aid their learning. However, despite this low number, over 80% of participants noted that they would like to see an increased use of podcasts and webcasts in their courses. Although the use of video recordings and podcasts has increased marginally since the 2010 survey, the findings have generally remained consistent. Several years ago the use of videos or podcasts for non-educational purposes was double their use for learning purposes; the present study showed the same trend. Similarly, approximately twice the number of students using podcasts and videos for educational purposes requested more use of them in both the earlier and current studies. These results support the increased use of videos and lecture recordings in course design, since it is apparent that while they have been increasingly used over the past several years, they continue to be under-used. With flexible and blended learning initiatives, particularly “flipped classroom” approaches, video lecture recordings allow opportunities for class time to be spent on socio-

constructivist activities while students access lecture content on their own time (Houston & Lin 2012). Generally, the results of the survey show that despite the conservative use of technologies, most students would like to use a wide range of technologies for learning purposes.

### *5.3 Technologies for Assessment and Class Administration*

The use of technology in assessment is an emerging trend in higher education. As greater emphasis is given to flexible and blended learning initiatives, the role of technology to facilitate assessment is critical. In particular, the LMSes, such as Blackboard or Moodle, provide a single web-based platform with a suite of tools for academics to organise and coordinate learning and teaching activities that are accessible to students in one place (Kabata, Wiebe & Chao 2005). Table 3 shows the portion of participants who indicated that they used particular tools within an LMS on a regular basis (once a week or more) for assessment (i.e. quizzes or self-tests, engaging in discussions, sharing work with peers and using an e-portfolio) and administrative purposes (i.e. submitting assignments, receiving feedback and tracking progress), and whether they would like to use more of them.

Table 3. Student IT Use for Assessment/Administration Purposes and LMS in General (in %, N=171)

| **Activity** | **Currently use** | **Would like to use more** | **Access through LMS** |
|---|---|---|---|
| Accessing the LMS in general | 95.72 | 74.61 | |
| Discussing assignments and projects online with other students | 30.43 | 72.57 | 42.86 |
| Keeping track of progress and grades | 29.47 | 88.76 | 88.14 |
| Taking quizzes/self-tests online | 28.51 | 79.56 | 83.91 |
| Sharing work with others | 21.46 | 70.69 | 38.82 |
| Submitting assignments online | 15.46 | 76.84 | 90.45 |
| Receiving returned assignments online | 14.21 | 81.36 | 80.92 |
| Developing an e-portfolio to record or reflect on learning | 6.37 | 51.18 | 33.54 |

While almost all respondents accessed the LMS on a regular basis, a third or fewer used either assessment or administrative tools, consistent with the findings of the 2010 survey (Gosper et al. 2013). Further, the present study shows that some tools, such as submitting online assignments and engaging in online discussions, were used by a slightly lower portion of participants than previously. The current low usage of technologies for assessment purposes amongst the participants suggests two things: 1) online assessment may not have been encouraged in the course; and 2) assessment may not have been embedded in the teaching and learning process. The former is based on the reasoning that if academics provide online assessments as a component of flexible and blended course design, students will have more opportunities to use technologies for assessment purposes. The latter implication is grounded in the principles of effective classroom practice, where assessment is an integral component of learning and is aligned with the intended learning outcomes. In this view, academics develop a curriculum where assessment tasks are used as part of the learning process and where students are regularly engage in both formative and summative assessment.

However, despite the low use of the LMS tools, and unlike the 2010 study, which found that only about half of the respondents preferred to use more technologies for assessment and administrative purposes, more than half of the participants in this study would like to use more of the technologies reported in Table 3 to engage in assessment and administrative activities. These findings have strong implications for course design and professional development. Academics need to be aware of students' desire to use more technologies to engage in assessment and administration, and make changes to their course design considering these expectations. Academic development may be required to build capacity and ensure academics have the skills and confidence to design courses that use technologies to provide effective formative and summative feedback to enhance students' overall experiences with assessment tasks.

## 6. Implications for Academic Development

The results of this study have critical implications for academic development. As discussed in the previous section, students continue to request more technology-enabled learning experiences that allow for efficient and convenient access to content, communication and assessment tasks. Furthermore, there has been a noticeable, yet not surprising, increase in preference for the use of mobile technologies for educational purposes in recent years. With the improvement of cellular and internet networks across Australia, enhancements to smart phones and the introduction of tablets, many students can access to the Internet anytime and anywhere (Bowen & Pistilli 2012). The use of mobile technologies allows students to take advantage of the time spent in transit while travelling from home to work or school to access course materials or their grades, read and respond to a discussion posting or complete a self-test or quiz (Taylor 2010). Hence, it is critical for academics to be aware of where and how students access their course materials and engage in learning activities, to design courses that can be accessed through the devices that students use, such as mobile technologies. In addition, while many mainstream learning technologies, such as LMSes and video lecture-recording tools, are designed to be accessed on either mobile technologies or standard computers, it is how they are used or integrated into the course that leads to their successful adoption. For example, while video lecture recordings can be accessed on mobile technologies, if academics are aware that students will likely be viewing the videos while on transit or when not in a permanent location for long periods of time, they might design the lectures to be offered in short meaningful segments that can be paused when needed. Quizzes or self-tests could be short in duration so that students can complete them on the fly when they have several minutes to engage with the course.

In addition to the marked increase in the use of mobile devices for accessing course material, the findings show that students are requesting more use of video lecture recordings or podcasts and online library resources, consistent with Gosper et al.'s (2013) earlier study. Although the responses in this current study reveal that there has been a marginal increase in the use of these technologies, they are still in quite high demand and not integrated as much as students would like in their courses, despite being readily available in most higher-education institutions. Furthermore, unlike the results reported by Gosper et al. (2013), the participants in the current study indicated a high demand for more use of the administrative functionality available from within the LMS, particularly for submitting assignments, receiving feedback and keeping track of their grades. In addition, there was a trend towards more use of collaborative tools in the LMS for discussion and sharing with fellow students, as well as more use of online quizzes and self-tests. The portion of respondents requesting more use of these tools available from within the LMS for administrative, collaborative,

or assessment purposes, has significantly increased since the previous study was conducted despite the actual use remaining fairly consistent (Gosper et al., 2013).

Taken together, the overall findings of the present study indicate that although LMSes, online library resources and video lecture recordings are not novel technologies and have been available to academics to integrate in their course design, their actual use has not increased very much, if at all, overall the past few years. Such discouraging results, coupled with recent blended learning and MOOC initiatives, indicate that academic-development strategies need to build academics' capacity and confidence in using technology to not only meet students' demands but also achieve their institutions' blended and flexible learning initiatives.

Higher-education institutions have been faced with the challenge of implementing and diffusing technology across their campuses to encourage its adoption by individual academics (Abrahams 2010). However, obstacles include not only the adoption and acceptance of technology, but also its appropriate integration into course design to facilitate effective student-centred learning experiences (Torrisi-Stelle & Drew 2013). Numerous studies have reported on the role that collaboration, communication or mentorship amongst academic staff can have on effective technology adoption (Davis 2005; Kopcha 2010; Mirriahi 2013; Mwaura 2003; Oncu, Delialioglu & Brown 2008). Academics tend to form professional social networks within their discipline-based departments or schools, where they hold informal and formal conversations with colleagues regarding the use of new technologies in teaching practice (Mirriahi, Dawson & Hoven 2012). Such conversations can lead to the exchange of ideas, sharing of best practice and eventual adoption of new teaching strategies, including the use of technologies. While some of these conversations can occur in department or school meetings or formally between a course conveyor and academics teaching the same course, colleagues who know and trust one another often informally share ideas or solve pedagogical problems together (Roxå & Mårtensson 2009; Roxå, Mårtensson & Alveteg 2011). As Niesz (2007) writes, honest and meaningful conversation between colleagues without any judgement requires a degree of trust. Therefore, it is critical for academics not only to have an opportunity to meet their colleagues but also to have avenues for establishing trusting collegial relationships. Academic-development units can organise events where academics who may be more advanced in integrating technology into the curriculum can share their strategies with others. Such events can provide a stimulus for conversation as academics from a range of experience in both teaching and using technology come together to inspire one another and establish connections that they pursue later as they build their professional social network. In addition, formal mentorship arrangements could be established, particularly between academics who have been using educational technology and those who have not yet or do not use it to the same degree. Opportunities for academics to collaboratively develop new courses or examine their current curriculum will help develop trust and collegiality that will translate into sharing ideas about pedagogical practice, including the use of technology. Such strategies would help institutions address the challenge of diffusing the effective institution-wide use of technology in curriculum design and implement blended learning and MOOC initiatives, which are building momentum across the higher-education sector.

Figure 2 summarises the critical implications of this study's findings for how academic-development units can play a role in developing academics' technology-enabled course design practices – and, ultimately, addressing students' learning preferences – though both formal and informal programs.

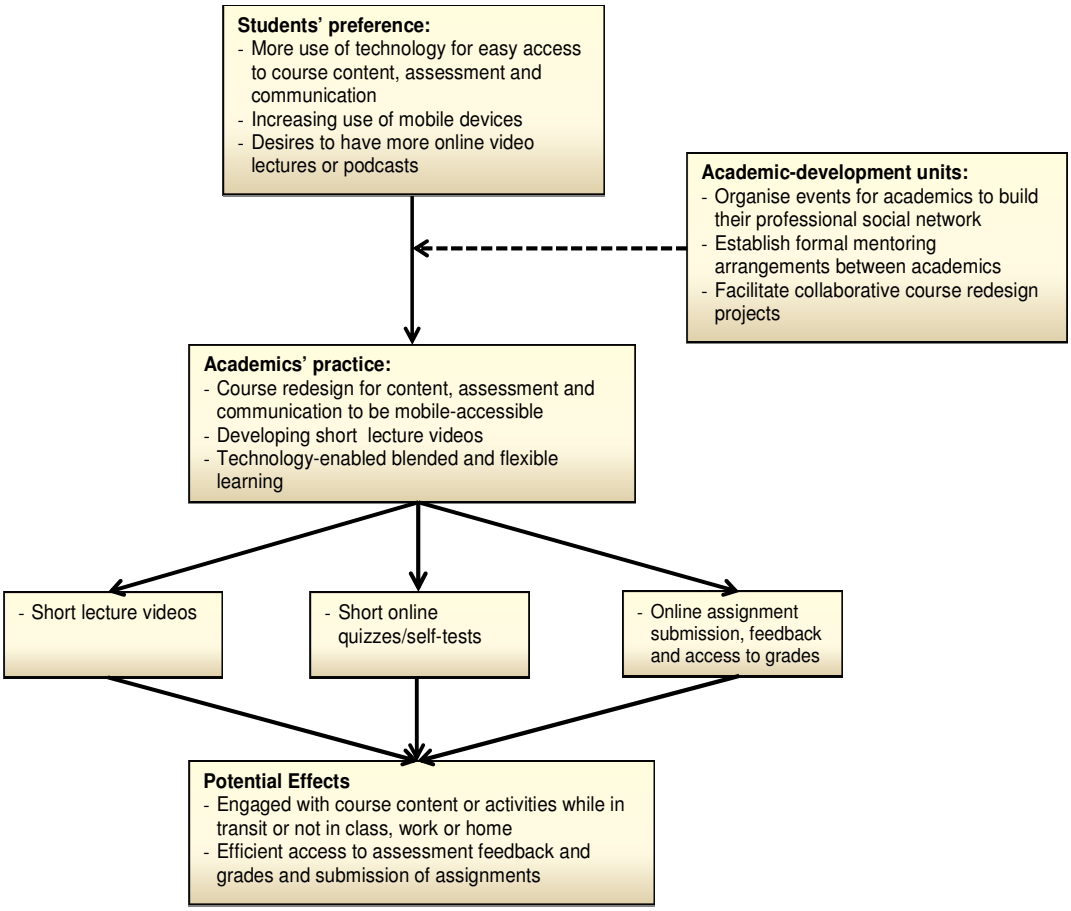


Figure 2. Implications of Students' IT Preferences for Academic Course-Design Practice

## 7. Implications for Future Research

This study has two limitations that future research should address to either support or refute the present findings. First, though most of the results of the present study are consistent with the findings of previous studies (Gosper et al. 2008; McNeill et al. 2011), future research can expand the scope of the study by conducting it in multiple institutions, either nationally or internationally, to gain a broader understanding of students' technology preferences and changes. A second limitation refers to the quality of the self-reported data through the survey instrument. Future studies should triangulate the data from students' responses with objective data captured from their actual use of online technologies. While some of the data relating to where students are when they access course material or which technologies they use for non-educational purposes is limited to the information students provide through survey instruments, much of the technologies used for learning purposes capture students' activity. Future studies can make use of the rapidly advancing learning-analytics research techniques, whereby objective online trace data of students' interactions

with technologies is analysed to discover patterns in learning behaviours and outcomes, which in turn inform academic practice. By triangulating this objective data of students' and academics' actual use of the technologies, coupled with students' responses from survey instruments, future studies can yield more useful information for academic development and course-design strategies.

## 8. Conclusion

With flexible and blended learning initiatives and the recent global interest in course design for MOOCs, higher-education institutions need to be aware of their current students' technology use and rapidly growing expectations of greater integration of technologies in their learning experiences. While there is no collective term that defines students' technology use and preferences, this study has shown that generally students' use of technology for everyday and learning purposes has largely remained consistent over the last few years, except for a sharp rise in using mobile devices to access online course content or activities. Although students continue to use educational technologies conservatively, possibly due to academics' traditional method of primarily using LMSes to disseminate course material, this study reveals a noticeable increase in the demand for more online technologies for assessment, collaboration with peers, administrative purposes and access to resources such as podcasts, lecture recordings and online library resources. These findings have very strong implications for flexible and blended learning course design and academic development, since students tend not only to access online course content and learning activities most frequently when not on campus but also to expect more use of the basic tools readily available from within LMSes. Rather than higher-education institutions putting effort into implementing new and innovative technologies or repurposing the tools that students use frequently for everyday purposes, the focus should be on implementing effective academic-development strategies, such as networking opportunities for academics, to adopt technologies that students request or prefer. In addition, academics should receive support to use holistic and inclusive course design, which builds from students' diverse IT backgrounds and experiences. Higher-education institutions should prioritise the development of academic-development strategies that would help academics build capacity and feel confident about effectively integrating technology into their course design. This can be achieved by providing avenues for academic staff to meet one another, establish trusting relationships, share best practices and help each other overcome teaching challenges, leading to a more engaging and effective learning experience for students while also meeting their educational-technology preferences and requests.

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