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Introduction: Fully Online University Programs and Students

Fully online university programs have rapidly increased in popularity (Kahu et al. 2013). Open Universities Australia, the 20-year-old pioneer of fully online learning, has experienced a doubling of enrolments during the past four years, with more than 55,000 students enrolled in 170 programs (Maslen 2012). More than 70% of USA universities currently offer fully online programs (Lederman 2013). With more than one-quarter of a million students in 23 countries, the UK Open University "has become a record breaker on the iTunes U service, which provides a digital library of materials for university students and staff" (John 2011). Compared to on-campus university programs, fully online programs are flexible and convenient, and thus attractive to non-traditional students (Kim, Kwon & Cho 2011; Prins et al. 2012), although the distinction between traditional and non-traditional university students is blurring (Bell 2012). Correspondingly, since on-campus students increasingly study online (Allen & Seaman 2013), the distinction between on-campus and fully online students may also be eroding. Furthermore, innovative instructional applications of emerging digital technologies coupled with changing population demographics may be influencing the characteristics of university students enrolled in on-campus and fully online programs (Ramayah 2010).

On-Campus and Fully Online University-Student Characteristics

On-campus and fully-online university students differ in terms of demographic or background characteristics such as age and gender (Quinn & Stein 2013). Students who study fully online are older than students who study on-campus (Ke 2010; Kummerow, Miller & Reed 2012), and more often female than male (Ke & Xie 2009; Quin 2011). While benefits of online learning have been reported for university students of ethnic and language minority status (Birch & Volkov 2007; Richardson 2011), description of such differences between on-campus and fully online students is not readily available. It may be that student cultural and linguistic characteristics influence selection of on-campus versus fully online university courses.

Stereotypically, the fully-online student is enrolled in university part-time and gainfully employed full-time (Colorado & Eberle 2010). Kahu and colleagues (2013) found that many students chose to study fully online to combine university learning with employment demands. Kim et al. (2011) reported that more than 90% of their sample of fully online students was enrolled part-time. In contrast, a sample of 355 fully online students in Pennsylvania consisted primarily of rural, white, low-income women, 38% of who received some form of financial assistance (Prins et al. 2012). Apparently, the demographic characteristics of fully online university students vary as a function of program specifications and research sampling techniques (Johnson 2008).

Age and gender confound descriptive comparison of on-campus and fully online university students (Ke 2010; Kummerow et al. 2012). For example, while it may appear obvious that fully online students would be heavy users of digital technology; in general, younger adults are heavier users of emerging technologies than are older adults (Zickuhr & Smith 2012). Since on-campus students are considerably younger than fully online students (Quinn & Stein 2013), technology use among students in the two study modes is difficult to compare. Dabaj (2009) reported that fully online students prefer traditional face-to-face education due to lack of skill in using the required technology, but are forced to enrol in online programs due to personal circumstances. In contrast, Andaleeb et al. (2010) reported that, without exception, the fully online students in their sample used mobile technology with extreme frequency. In a comprehensive survey of fully online university students in Canada, gender and age were related to use of social software for learning (Poellhuber et al. 2013). "Men claimed to be more experienced and to have more expertise than women did in regards to all social software, except social networking" (p. 76). Furthermore, "the 16-24-year-old group distinguishes itself

on almost every indicator. This supports the hypothesis about Generation Z being the so-called Net Generation" (p. 76). In the context of current demographics, student age and gender confound differences in digital-technology use between those who study on-campus and those who study fully online.

In addition to demographic characteristics and use of digital technology, on-campus and fully online university students reportedly differ in terms of approaches to learning (Kahu et al. 2013; Quinn & Stein 2013). Self-regulated learning is particularly important in fully online university courses because students determine personal learning goals, select and implement learning strategies and manage learning time (Lee & Tsai 2011). According to Bernacki, Aguilar and Byrnes (2011), students in digital learning environments are at increased risk of distraction from learning and lack of achievement motivation. Indeed, "self-regulation becomes a critical success factor for online learning" (Barnard-Brak, Lan & Paton 2011, p. 28). On-campus university students may be prodded along the learning journey by regular and direct lecturer contact; fully online students must be largely self-regulated (Ke 2010; Michinov Brunot et al. 2011; Xiao 2012). In this regard, fully online university students might reasonably be expected to demonstrate higher levels of metacognitive self-regulated learning than on-campus students.

Quinn and Stein (2013) observed that fully online students adopted deeper approaches to learning than on-campus students, who tended to employ more superficial approaches. Kahu and colleagues (2013) reported that older online students used deeper learning strategies than their younger counterparts. Yukselturk and Bulut (2007) found that student use of metacognitive strategies (i.e., planning, organising, self-instructing and self-evaluating) predicted academic achievement in online learning environments. According to Kirmizi (2013), academic success in online programs is directly proportional to student metacognitive awareness of learning outcomes, evaluation of learning strategies and intrinsic and extrinsic motivation to achieve. Fostering metacognitive learning characteristics in online university students has been the focus of considerable research effort (Edirippulige & Marasinghe 2011; Ellis & Folley 2011; Harris, Lindner & Piña 2011).

Research Hypotheses

Hypothesis 1: Compared to Australian university students who study on-campus, those who study fully online are more likely to be older, female, native English speakers, born in Australia, enrolled in specific programs, studying part-time, gainfully employed and financially secure, and to have higher expectations of academic achievement.

Hypothesis 2: Compared to Australian university students who study on-campus, those who study fully online use digital technology less frequently.

Hypothesis 3: Compared to Australian university students who study on-campus, those who study fully online demonstrate higher levels of metacognition in learning.

Methods

Participants: First-Year University Students

Students enrolled in the first-year course *Child Development for Educators*, in a university in Western Australia, were invited, via email, to complete an online questionnaire. The pool of potential respondents included approximately 175 students enrolled in an on-campus primary-education program; 75 students enrolled in an on-campus early childhood education program; 550 students enrolled in a fully online primary-education program; and 300 students enrolled in a fully online early childhood education program. Of the total pool of approximately 1,100

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first-year university students sent an email of invitation to complete the online questionnaire, 185, or 16.8%, responded with sufficient detail to be included in data analysis (e.g. some students did not indicate their mode of university study).

The Questionnaire: Determining Student Characteristics

Approximately mid-semester, students were sent an invitation via their university email accounts to complete a brief online questionnaire. To test the three research hypotheses, the questionnaire assessed three clusters of student variables: 1) demographic characteristics; 2) use of digital technology; and 3) metacognition learning characteristics.

University-Student Demographic Characteristics

Ten questionnaire items queried student demographic characteristics. With the exception of the item that queried age, demographic items provided students with a choice; for example: What is your gender (male or female); was English the first language you spoke (yes or no); were you born in Australia (yes or no); how many units are you taking this semester or study period (1, 2, 3, 4, 5 or 6); what is your current mode of university study (on-campus or fully online); in which course are you currently enrolled (early childhood education or primary education). To determine expectations of academic achievement, students rated the item *I expect my average final grades this semester or study period will be* by selecting one response-option from a list of six: 90% or above; 80 to 89%; 70 to 79%; 60 to 69%; 50 to 59%; below 50%. One demographic item queried average hours of paid employment with six response-options: 1) none, I am not employed; 2) 1 to 10 hours; 3) 10 to 20 hours; 4) 20 to 30 hours; 5) 30 to 40 hours; 6) more than 40 hours each week. To determine perception of financial need, students rated the item *I have as much money as I need to live comfortably* on a five-point scale ranging from strongly agree to strongly disagree.

University-Student Use of Digital Technology

Ten questionnaire items queried frequency of student use of digital technology Five items queried use of software on mobile phones and five queried the corresponding application on a computer or laptop; for example, *I send and received text messages on my phone* and *I use my computer or laptop to chat or tweet.* All 10 digital-technology usage questionnaire items included five response-options: 1) many times each day; 2) a few times each day; 3) a few times each week; 4) a few times each month; 5) never or hardly ever.

University-Student Metacognitive Learning Characteristics

The online questionnaire included 16 items adapted from the *Motivated Strategies for Learning Questionnaire* (MSLQ; Pintrich et al. 1991), which has been widely used to assess the metacognitive learning characteristics of on-campus (Bjork, Dunlosky & Kornell 2013; Credé & Phillips 2011; Pintrich 2004) and online (Artino & Stephens 2009; Cho & Summers 2012; Green, Moos & Azevedo 2011) university students. Presented in Table 1, the 16 items assessed eight aspects of metacognition: reading strategies, study management, learning-control beliefs, self-efficacy, intrinsic motivation, extrinsic motivation, peer learning support and seeking help for learning. Students rated each of the 16 questionnaire items on a five-point scale ranging from *not at all like me* to *just like me*. To maintain consistency with the MSLQ, two items were reverse scored to allow for summation of student ratings of the two items to yield a single score for each of the eight characteristics.

Table 1. Questionnaire Items Assessing University-Student Learning Characteristics

Eight Metacognitive Learning Characteristics Two questionnaire items assessed each metacognitive learning characteristic.
1. Reading Strategies
i. When I become confused about something I'm reading for a university class, I go back and try to figure it out.
ii. If course readings are difficult to understand, I change the way I read the material.
2. Study Management
i. I usually study in a place where I can concentrate on my course work.
ii. I often find that I don't spend very much time on my university course because of other activities. (reverse scored)
3. Learning-Control Beliefs
i. It is my own fault if I don't learn the material in each of my classes.
ii. If I try hard enough, then I will understand the course material.
4. Learning Self-Efficacy
i. I'm certain I can understand the most difficult material presented in the readings for my classes.
ii. I'm confident I can do an excellent job on the assignments in my university classes.
5. Intrinsic Motivation
i. I prefer course material that really challenges me so I can learn new things.
ii. I prefer course material that arouses my curiosity, even if it is difficult to learn.
6. Extrinsic Motivation
i. Getting a good grade in my classes is the most satisfying thing for me right now.
ii. I want to do well in my classes because it is important to show my ability to my family, friends, employer or others.
7. Peer Learning Support
i. I prefer to work with other students to complete class assignments.
ii. I like to discuss course material with other students from the class.
8. Seeking Help for Learning
i. Even if I have trouble learning the material in a class, I try to do the work on my own, without help from anyone. (reverse scored)
ii. I ask the lecturer or teacher to clarify concepts I don't understand well.

Data Analysis

Independent sample t-tests compared university students grouped according to self-reported mode of study (on-campus or fully online). Group means were compared on all measured variables, including nine demographic characteristics (one demographic item determined the groups to be compared), the frequency of 10 uses of digital technology and eight metacognitive learning characteristics. Significant differences in group means would confirm or refute the three hypotheses.

Results

Consistent with the enrollment patterns of the 1,100 students invited to complete the questionnaire, 15.6% of respondents (n = 29) indicated that they attended classes on-campus; 84.4% (n = 156) reported studying fully online. On-campus and online students did not differ in terms of gender; both on-campus and fully online modes of study were characterised by a small number of males. However, as presented in Table 2, on-campus and fully online students differed in age; on average, fully online students were more than 10 years older than

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on-campus students. Also significant, four of 156 fully online students reported speaking English as a foreign language, versus five of 29 on-campus students. Twenty of 156 fully online student reported not being born in Australia, versus eight of 29 on-campus students. Regardless of mode of study, students were twice as likely to be enrolled in the primary-education program as in the early childhood education program. Current number of unit enrolments significantly differed for on-campus and fully online students. However, the difference was an artifact of the structure of study periods and, regardless of mode, indicated full-time university enrolment. Students who studied on-campus did not differ from students who studied fully online in terms of hours of paid employment or perception of financial need.

Table 2. Comparison of On-Campus and Fully Online University Students

Demographic Characteristic	Mean Significance	T
Student Age (years)		
On-Campus	20.9	
Fully Online	31.6	-7.26
	p < .001	
Student Gender (1 = male; 2 = female)		
On-Campus	1.9	
Fully Online	1.9	
First Language English (1 = yes; 2 = no)		
On-Campus	1.2	
Fully Online	1.0	3.46
	p < .01	
Born in Australia (1 = yes; 2 = no)		
On-Campus	1.3	
Fully Online	1.1	2.05
	p < .05	
Current Unit Enrolment (number)		
On-Campus	3.9	
Fully Online	2.0	9.94
	p < .001	
Program of Study (1= early-childhood education; 2 = primary education)		
On-Campus	1.7	
Fully Online	1.7	
Expected Final Grades (1 = 90% and above; 6 = below 50%)		
On-Campus	3.0	
Fully Online	3.4	-2.1
	p < .05	
Weekly Hours of Employment (1 = 0; 6 = more than 40)		
On-Campus	2.8	
Fully Online	3.1	
Enough Money (1 = strongly disagree; 5 = strongly agree)		
On-Campus	3.2	
Fully Online	3.0	

Table 3 presents the mean ratings for use of digital technology for students who reported studying on-campus and those who reported studying fully online. Regardless of self-reported study mode, student use of mobile phones was similar: both groups regularly used their phones to send text messages, often used their phones to send and receive email, take photographs and access websites and rarely used their phones to play games. On average, both

groups frequently used a computer or laptop to access websites and send and receive email, often used a computer or laptop to organise, send and receive photographs, and rarely used a computer or laptop to play games. However, one significant group difference emerged in computer or laptop use: students who studied fully online chatted or tweeted less often than students who studied on-campus.

Table 3. Comparison of On-Campus and Fully Online University Students: Use of Digital Technology

Use of Digital Technology	Mean[a] Significance	T
I send and receive text messages on my phone.		
On-Campus	1.6	
Fully Online	1.9	
I use my phone to send and receive email.		
On-Campus	2.8	
Fully Online	2.8	
I play computer games on my phone.		
On-Campus	4.0	
Fully Online	4.0	
I access websites on my phone.		
On-Campus	2.1	
Fully Online	2.6	
I use my phone to take photographs.		
On-Campus	2.6	
Fully Online	2.7	
I use my computer or laptop to chat or tweet.		
On-Campus	2.8	
Fully Online	3.6	-3.05
	p <.01	
I use my computer or laptop to send and read email.		
On-Campus	2.2	
Fully Online	2.2	
I play games on my computer or laptop.		
On-Campus	4.5	
Fully Online	4.5	
I access websites on my computer or laptop.		
On-Campus	1.5	
Fully Online	1.8	
I use a computer or laptop to organise, send and/or receive photographs.		
On-Campus	3.1	
Fully Online	3.5	

[a] 1 = many times each day; 2 = a few times each day; 3 = a few times each week; 4 = a few times each month; 5 = never or hardly ever.

Table 4 presents the mean ratings of the eight assessed metacognitive learning characteristics for students who studied on-campus and those who studied fully online. In both modes of

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study, students generally reported moderate use of reading-comprehension strategies, moderate level of self-efficacy in the processes of learning and moderate levels of intrinsic motivation to learn. In both modes of study, students generally reported moderate to high levels of study management and belief in personal capacity to control learning. However, compared to students who studied fully online, students who studied on-campus reported significantly higher levels of extrinsic motivation, preference to learn with peers and need for learning support.

Table 4. On-Campus and Fully Online University Students: Learning Characteristics

Metacognitive Learning Characteristic	Mean[a] T Significance	
Reading Strategies		
On-Campus	6.2	
Fully Online	6.4	
Study Management		
On-Campus	7.7	
Fully Online	7.5	
Learning-Control Beliefs		
On-Campus	7.6	
Fully Online	7.9	
Learning Self-Efficacy		
On-Campus	6.8	
Fully Online	6.8	
Intrinsic Motivation		
On-Campus	7.0	
Fully Online	7.2	
Extrinsic Motivation		
On-Campus	8.2	
Fully Online	7.5	2.49
	$p < .05$	
Peer Learning Support		
On-Campus	6.1	
Fully Online	5.1	2.40
	$p < .05$	
Seeking Help for Learning		
On-Campus	6.7	
Fully Online	5.7	2.87
	$p < .01$	

[a] Minimum score = 2; maximum score = 10; the higher the score, the higher the level of the metacognitive learning characteristic.

Discussion of Results and Implications for Instructional Practice

Results of the current investigation suggest that while the difference between on-campus and online students may be eroding, some distinctions persist. In contrast to previous reports (Colorado & Eberle 2010; Kahu et al. 2013), the current sample of on-campus and fully online students did not differ in terms of patterns of university enrolment and employment. Regardless of mode of university study, participating students reported the equivalent of full-time enrolment, equivalent distribution across programs, similar patterns of employment and comparable perceptions of financial need. Gender distribution was also comparable across student-reported modes of study. The stereotype of the full-time mother or employee studying

part-time online is inconsistent with the demographic description of the current sample of participating first-year university students.

However, consistent with previous reports (Quinn & Stein 2013), fully online students in the current sample were considerably older than on-campus students, suggesting a return to school after focusing (particularly in the case of females) on family (Stone & O'Shea 2012). With respect to early-childhood and primary teacher education candidates, maturity and personal experience with young children may be especially desirable characteristics. In addition to providing choice to student-parents, fully online programs may actually contribute to improved qualifications in specific professions (e.g. teaching young children). Further, while this is perhaps a function of student age and patterns of immigration in Australia (Australian Bureau of Statistics 2009), no respondent who reported studying fully online spoke English as a foreign language, and few were born outside of Australia. On-campus programs may continue to appeal to students who are in the process of enculturation. Direct contact with peers and lecturers may be necessary for some students, particularly those who aim to be in professions that require a high level of language proficiency and cultural familiarity (e.g. teaching young children). Despite the convenience and flexibility of fully online learning, on-campus classes appear necessary for certain types of students under certain conditions.

Perhaps also related to maturity, students in the current sample who studied fully online had lower expectations of final university grades. Examination of group means in relation to the scale used to rate expectations of academic achievement reveals that on-campus students (mean age 20.9 years) anticipated final grades of 70% to 79%, while fully online students (mean age 31.6 years) anticipated final grades of 65% to 74%. The academic expectations of fully online students appear more realistic than those of on-campus students; this may be an artifact of the difference in age and corresponding maturity between students in the two study modes. Age is related to realistic self-appraisal; that is, younger and less competent individuals tend to overestimate their ability (DeAngelis 2003). Indeed, the marks expected by fully online first-year university students appear better aligned with reality than those expected by their on-campus counterparts.

Hypothesis 1 proposed differences in demographic characteristics between university students who studied on-campus and those who studied fully online. Some demographic differences were confirmed and some were refuted. Compared to university students who studied on-campus, those who studied fully-online were older, always native English speakers and more likely to be born in Australia. However, compared to university students who studied on-campus, those who studied fully online were not enrolled in specific programs, did not study part-time, did not report more hours of weekly employment, were not financially more secure and expressed lower, not higher, expectations of academic achievement. Results of the current investigation suggest changing demographic trends in on-campus and fully online university students. On-campus university courses increasingly cater to non-traditional students such as those who are mature, employed and enrolled part-time (Bell 2012). Results of the current investigation suggest that fully online courses might increasingly cater to traditional students such as those who are young, unemployed and enrolled full-time.

In keeping with previous research findings (Andaleeb et al. 2010; Dabaj 2009), *Hypothesis 2* proposed that on-campus university students were heavier users of digital technology than fully online students due to age differences associated with the two modes of study. The hypothesis was marginally confirmed; a significant difference in frequency of use occurred in only one of 10 student-rated uses of digital technology. Regardless of study mode, students did not differ in mean frequency of mobile phone use to text message, email, play games, access websites and take photographs. Correspondingly, on-campus and fully online students did not differ, on average, in self-reported frequency of computer or laptop use, with the exception of *chatting or tweeting*. On-campus students reported using a computer or laptop to

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chat or tweet more often than a few times each week, on average. In contrast, fully online students reported using a computer or laptop to chat or tweet, on average, less than once a week.

Cohort effects, particularly student age, may explain the eroding but persistent differences in use of digital technology between on-campus and fully online university students. In the current sample, those who studied on-campus were more than 10 years younger, on average, than those who studied fully online. Researchers have found that younger students are typically heavier users of digital technology than older students (Zickuhr & Smith 2012). However, such a pattern may not hold true when the older students study fully online. It may be that those who study fully online are the heaviest users of digital technology among their age cohort, with one glaring exception: first-year university students with a mean of 31.6 years do not frequently chat or tweet. Indeed, synchronous chat is rarely used in online learning contexts (Johnson 2012). In comparing on-campus and fully online university students, cohort effects appear to endure for some, but not all, uses of digital technology. Technologically active individuals increasingly characterise the general population (Australian Bureau of Statistics 2012; Zickuhr & Smith 2012); emerging technologies continue to be particularly attractive to younger adults (Smith 2013). In this regard, care should be exercised in introducing emergent learning technologies in fully online programs; for example, Twitter micro-blogging (i.e., 140 character text messages), which was recently rated as the single most important tool for learning (Centre for Learning and Performance Technologies 2012).

Hypothesis 3 proposed that university students who studied fully online had higher levels of eight metacognitive learning characteristics (i.e., reading strategies, study management, learning-control beliefs, self-efficacy, intrinsic motivation, extrinsic motivation, peer learning support and seeking help for learning) than university students who studied on-campus. No significant differences emerged between students in the two study modes on five metacognitive learning characteristics (reading strategies, study management, learning-control beliefs, self-efficacy and intrinsic motivation); significant differences emerged in three metacognitive learning characteristics (extrinsic motivation, peer learning support and seeking help for learning). Such differences did not necessarily depict on-campus students as more competent learners than fully online university students – quite the contrary. Compared to university students who studied fully online, students who studied on-campus had higher levels of extrinsic motivation and expressed greater need for peer and teacher support for learning, none of which may be assumed to be desirable learning characteristics. For example, extrinsic motivation implies focus on external rewards, which is not necessarily associated with deep and meaningful learning (Pulfrey, Darnon & Butera 2013). Peer learning support and seeking help for learning, while theoretically valuable in learning (Credé & Phillips 2011), may indicate dependent student behaviour (Cheng, Liang & Tsai 2013). Demographic characteristics such as age and ethnicity may influence motivation orientation and need for learning support. The traditional young university student may require traditional on-campus university programs. Students of ethnic-minority status may also require the nature of support provided in traditional on-campus learning environments. Mature and acculturated university students may be well-suited to fully online learning environments. Given the increasing diversity of universities' student populations (Bell 2012), correspondingly diverse programs appear increasingly necessary.

Limitations and Further Research

A notable limitation of the current investigation is the narrow sample of first-year university students. All participating students were drawn from those enrolled in one course offered at one university. Consequently, caution must be exercised in generalising findings to other learning contexts and conditions. Additionally, approximately 17% of the students who were invited to complete the online questionnaire complied. It is likely that students who completed

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the questionnaire differed from students who did not complete the questionnaire. This further restricts the representational nature of the sample. Participating university students self-reported their demographic characteristics, use of digital technology and metacognitive learning characteristics. An enduring criticism of self-report measures is the potential for misrepresentation, particularly to present oneself in a positive manner (Kreuter, Presser & Tourangeau 2008). Subsequent research may establish the extent to which results of the current investigation can be generalised to students who study under different conditions (e.g. faculty and year of program). Different mechanisms of collecting information and determining student learning characteristics may reveal the extent of influence of research measures on research findings (Johnson 2008).

The value of comparing on-campus and fully online university students may reside in the conclusion that both modes of study are necessary to ensure access to high-quality courses for learners who vary in demographic, experiential and learning characteristics. Indeed, the proposed dichotomy of on-campus versus fully online may be more meaningfully conceptualised as two extremes of a continuum of instructional delivery. Revised conceptualisation may provide impetus for research that examines goodness-of-fit between program and student characteristics.

Historically, access to university education has been extremely limited. Human innovation (e.g. postal services) provided options that were initially considered inferior but, nonetheless, enhanced access (Johnson 2007). Ideally, comparison of on-campus and fully online university students may be unnecessary. Increased democratisation of university education has been facilitated by digital technologies; since university-student populations are increasingly diverse, university opportunities and alternatives must be correspondingly diverse.

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