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Exploring the role of technology in fostering sense of belonging in students studying by distance

Final Report 2015

Charles Sturt University

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List of acronyms used

CEQ - Course Evaluation Questionnaire
CQU - Central Queensland University
CSU - Charles Sturt University
DE - distance education
QUT - Queensland University of Technology
SEQ - Student Experience Questionnaire
SES - socio-economic status
STAR - student transition, attrition and retention
TAFE - Technical and Further Education
UWS - University of Western Sydney

Executive summary

The primary goal of this seed project was to determine the suitability and direction of a future multi-institutional project exploring the role educational technologies and practices play in fostering a sense of belonging, or social connection, amongst distance education students. We interviewed 122 distance students from four diverse courses at Charles Sturt University in 2013: Arts, Paramedics, Police and Science. The four courses represented a range of delivery styles with differing degrees of face-to-face opportunities and workplace learning. Students were randomly selected across all year levels (first year through to recent graduates) to ensure a range of perceptions were captured in light of the numerous technological affordances introduced at CSU during the past five years.

Findings revealed course-level differences, in educational design or educational technology implementation, did not significantly affect distance students' perceived connection to either their course or lecturers. High connection was exhibited across all four courses, with 72-90 percent of all students surveyed saying they felt connected to their course, irrespective of educational design and technology usage and few students feeling connected to their lecturers (53-67 percent). A moderately significant association was found between course and perceived connection to classmates, which ranged from 33 percent of arts students to 73 percent of police students feeling connected to classmates. Students from the two professional service courses (paramedics and police) reported feeling closer to their classmates than arts or science students interviewed. Preliminary analysis of course structure and qualitative data indicates engagement with classmates in employment-focused activities involving face-to-face interactions with classmates, such as the police academy and professional placements or employment where uniforms and facilities clearly demarcate, and arguably help confer, a social group identity, may in part explain the observed difference in perceived connection with classmates.

Overall, the majority of students felt a sense of connection was important to their academic success, with 100 percent of police expressing this view, followed by 77 percent paramedics, 75 percent science and 66 percent of arts students. Although the results of this pilot study indicate most students felt connection was important to their academic success, the means by which this might be achieved appeared to rely more upon the preferences and actions of individual students rather than be explainable by analysis of course or subject design. Indeed, extensive data was collected about opportunities for interaction/engagement with lecturers and classmates using various technologies (asynchronous/synchronous subject forums, telephone, face-to-face meetings with lecturers, audio lectures, residential schools, social media, and tablets, laptops or mobile phones for study away from home). None proved highly significant to perceived connection at a course level. What accounts for students' connection is certainly worthy of future in-depth investigation in light of its perceived centrality to academic success, particularly if facilitating connection lies beyond course or subject level, given the extensive time and resources being channelled into educational design that do not appear to affect perceived connection. Pursuing interactive activities assumed to enhance educational experience if students perceive them futile leaves less time for content-driven teaching activities, the only resource students repeatedly requested.

Key insights:

- The majority of students felt a sense of connection was important or highly important to their academic success. Most students felt connected to their course but fewer felt connected to their lecturers or classmates; the majority who had peer interactions felt it impacted their course experience.

- Audio lectures are an insignificant method for fostering a sense of connection. However, they are perceived to be a valuable addition to other forms of knowledge transmission, such as printed notes.
- Telephone contact with lecturers did not enhance perceptions of connection between students and academics, although their impact on academic success remains unknown.
- Students who spent more time studying were more likely to feel connected. It remains unknown if students who feel more connected study more because of they feel more connected, or, if the practice of spending more time studying produces a heightened sense of connection. Hence, further investigation of the role time-on-task plays in perceived sense of connection is warranted.

Recommendations:

For Institutions:

- First, this research suggests higher education providers would be well served to investigate the extent their distance students feel socially connected, and conversely isolated from, a range of factors affecting degree completion/retention, student experience, engagement and subsequently, academic success. Although variation in social connectivity was found, agreement emerged across student cohorts that experiencing a sense of connection was vitally important.
- Second, programs seeking to enhance distance students' sense of connection ought to first identify what level connection (institutional, course, peer) is required to meet clearly articulated institutional objectives (satisfaction, success, ongoing relationship with the institution, etc.) so relevantly-targeted programs can be developed. Perceived social connectivity was found to vary by course and was perceived by students to impact academic success. Hence, what suits one cohort may not suit others. Understanding nuances amongst students' expectations around personally connecting to their classmates, lecturers, courses and institutions may therefore enable better planning, management and delivery of strategies that not only minimise student attrition, but further maximise student satisfaction, institutional reputation and appetite for lifelong learning.
- Third, as key findings revealed the technological tools used to academically engage students in learning impacted perceived connectivity, we recommend careful, consistent and evidence-based institutional planning be undertaken to identify the most suitable tools to reach one's students. Distance students at our institution found great value in both online and face-to-face opportunities for course-related social interaction yet failed to find telephone calls with lecturers, peers or the delivery of audio lectures to heighten their sense of feeling connected to their course. Subsequently, we suggest institutions reconsider the benefit of in-house distance learning resource construction that favour extensive academic time being spent preparing distance student lectures. Further, the time saved may be well used for activities promoting student engagement, as next detailed.

For Course & Subject Designers:

- The importance of connecting through academic peer-peer and student-teacher activities, as conveyed in the 120 in-depth interviews conducted, cannot be over-emphasised. Designing face-to-face or online interactions amongst students that enhance personal career objectives,

rather than social support, proved crucial. Distance students cared less about the sophistication or aesthetics of learning resources provided and cared more about resources' practical application and relevance. Thus, prioritising relevant and focused learning interactions are likely to be well-received and may foster a sense of identity and connection.

- In light of the finding that most distance students adopted a utilitarian approach to learning, we suggest learning designers prioritise activities that encourage students to spend more time engaging with the content of their subjects, rather than communicating or interacting in ways academically irrelevant, or that fail to promote deep-learning of core material (i.e. social interactions on subject forums).

For Future Investigators:

- Individually, single institutions may use the key findings from our institutional analysis as a starting point to generate their own 'sense of belonging' indicators. These may be used both as single time-point indicators as well as to track how changes introduced over time may impact students and cohorts longitudinally.
- As a seed project, the present research was restricted to investigating a single Australian university. Future research may gain deeper insights by expanding the design to a multi-institutional analysis that includes divergent models of online teaching and learning, perhaps including Massive Open Online Courses (MOOCs), virtual worlds, social media, etc. Such an approach may better distinguish not only if/how delivery affects student perceptions and preferences, it may further permit comparison of institutional impact on the delivery of similar courses and subjects. This design would have potential to yield sector-level insights also of value for enhancing relationships with partnership organisations and accreditation bodies.

Outcomes and Deliverables:

- The project has achieved all planned deliverables.
- Although the creation of a list of practices influencing the sense of connection among distance students was planned, findings illuminate more practices that do not impact connection than specific activities that do. This led to the production of a list of key considerations, shown in the Achievement Statement, and the key recommendations in this Final Report. Collectively, these offer two primary vehicles for disseminating key findings and encouraging universities to identify and systematically review a) the existence and relevance of distance students' sense of belonging or social isolation and b) any ad-hoc, locally-developed and trialled learning practices at other institutions. These initiatives may permit more strategic, empirically-informed and evidenced-based findings to guide institutional adoption of learning practices that enhance connectivity.
- Two presentations given to Australian and international audiences at the 2014 *Australasian Society for Computers in Learning in Tertiary Education* (ASCILITE) and *Sociological Association of Aoteroa New Zealand* (SAANZ) Conferences are the second key way findings have been disseminated. These presentations informed a variety of stakeholders, including educational technologists, researchers and academics from a broad range of higher education institutions and corporate educational technology providers and yielded lively discussions.

- The foundational insights from this seed project about what students perceive impacts their sense of belonging, and its relevance for academic success, illuminated how educational technology usage varied from the prior experiences reported in extant academic literature. These unanticipated insights were presented and shared during an educational technology ASCILITE workshop around attrition for which a working party was agreed to commence. These opportunities afforded the first steps in planning a 2017 multi-institutional project proposal. Identification of future collaborators has commenced.
 - Next, it is planned that a round-table discussion be held at the 2015 Higher Education Research and Development Society of Australasia (HERDSA) Conference to not only foster cross-institutional discussion of the key recommendations around institutional findings, but importantly, to convey the relevance of prioritising sense of belonging practice-investigations across the higher education sector as well as generate ideas and gauge further interest in a future multi-institutional project.
- Lastly, the contribution to the international discourse on social isolation research began with the first publication stemming from this project, the refereed ASCILITE conference paper. Several further multidisciplinary journal articles have been commenced

Location of Outcomes:

Our four outcomes are all available online.

The Final Project Report and Achievement Statement are located on the OLT website:

The two international conference presentations delivered to the ASCILITE and SAANZ Conferences for which published abstracts and refereed paper appear in the Conference Proceedings are available at:

ASCILITE: <https://app.box.com/s/016cdyv8dq1pp0yhp1vw/1/2704865198/23032570188/1>;

SAANZ: <http://www.arts.canterbury.ac.nz/lsap/saanz/programme.shtml>

Forthcoming journal articles will all be made publicly available. Details are also available via direct request to the authors.

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Chapter 1 – Project Aims

Sense of belonging, also termed sense of community, is integral to collaborative and deeper learning (Beaudoin, 2002; Devline, Kift, Nelson, Smith, & McKay, 2012; Overbauch & Nickel, 2010). A range of important social factors related to sense of belonging, community and connection is widely discussed in the literature. A key aim of the present study was to explore distance students' sense of connection, as a component of overall sense of belonging, to various aspects of their undergraduate experience. This section commences by briefly contextualising our focus within extant international research literature and contemporary Australian practice and concludes by detailing the institutional background of the present study.

Identifying correlates of student attrition has become increasingly important in Australia and abroad. Sense of connection is typically perceived to impact student experience, and subsequently student attrition or retention. Social isolation, often expressed as a lack of connection, is considered a substantial contributor to loss of motivation and, thus, attrition (Inoue, 2007). Empirical research to date has argued for the importance of students feeling connected and has described the consequences of those feeling isolated or disconnected. For instance, the development of informal relationships amongst students was found essential to the success of social constructionist pedagogies (Martinez, 2001). Likewise, surveys of graduates reflecting on experiences throughout their degree, as opposed to evaluating a single unit/subject, found the more disconnected students felt (lower sense of belonging), the less helpful and less enjoyable they perceived their online experience (Boling et al., 2012). However, in comparison with arising benefits, the costs of creating online communities, in terms of academic time, institutional cost, academic achievement and student satisfaction has been critiqued at a course level (where an American 'course' is used to denote a single cohort in a single session studying one topic, akin to 'subject' in Australia), with costs argued to outweigh the benefits experienced at an American institution (Overbauch & Nickel, 2010).

Differences between American and Australian higher education systems ought to be considered when interpreting costs and/or benefits of establishing subjects and courses seeking to enhance students' sense of belonging and connection. In Australia, as elsewhere, identifying the cost of educational initiatives is a complex task. We suggest changes ought to proceed after careful consideration and research has been undertaken into how change might affect multiple and inter-related socio-economic factors, particularly institutional reputation, performance indices and student attrition. For example, Australian higher education quality indices presently include student satisfaction and attrition measures. Hence, an institutional cost of failing to adequately address such social factors as student perception when altering delivery style and/or content could likely affect student perceptions about educational quality and experience, and subsequently perceived university/course ranking, status, and/or prestige, all which may impact enrolment. During an historical moment where more universities in Australia, and globally, are endeavouring to enhance their capacity for online delivery, for the purpose of capturing a larger market share, specialising, enhancing accessibility and/or decreasing infrastructure cost, the broader impact of student experience ought not be underestimated. To date, however, the move to online delivery has been modelled on traditional classroom experiences through creation of various strategies designed to emulate the assumed sense of community and informal networks thought to occur in on-campus groups in face-to-face settings (Martinez, 2001). We argue this approach fails to adequately understand, or address, the inherently different nature use of new technologies brings to affecting social interactions in educational environments.

Innovative technologies spurred from the interactivity of web 2.0 have produced a plethora of studies on the effect technology has on students' sense of belonging related to podcasts

(Bolliger, Supanakorn, & Boggs, 2012), vodcasts (Borup, West, & Graham, 2012) and social media (Dorumn, Bartle, & Pennington, 2013). While informative, these studies are largely confined to a single subject and/or single offering and do not provide any indication about the sense of belonging individual activities generated. Prior research also fails to indicate whether feelings of belonging were sustained across the degree or if they needed to be re-established with each new subject. Kift and Nelson (2005) suggest a student's first few days are critical for developing a sense of belonging, yet do not provide evidence advising if 'on time' establishment of sense of belonging was maintained, or even needed in the long run.

Most Australian university programs aimed at enhancing students' sense of belonging (e.g. Succeed@Deakin, MATES@UWS, QUT First Year Experience Program, CQU MAP) focus only on first year students. While these programs have recorded some success (see Devlin et al., 2012), their sustained impact past the first year has not been well evaluated. A recent multi-university study found that factors contributing to attrition and progression differ by students' degree stage (Wilcoxson, Cotter, & Joy, 2011) and thus maintain first year specific programs may be irrelevant. These findings indicate that institutions interested in having students maintain a sense of belonging throughout their degree should be implementing relevant programs at every year level, not just first year. Wilcoxson et al. (2011) also cautioned against extrapolating results, and possible program success, across institutions as they found demographic profile affected what factors impacted retention and attrition at different year levels. While their study was multi-institutional, the researchers did not take a 'whole institution' lens; they restricted their study to business students and noted impacting factors could be different for other courses (Wilcoxson, Cotter, & Joy, 2011).

In light of the existing insights and limitations of past research and trials, CSU's experience as a leading distance education provider, along with recent curriculum renewal projects and low socio-economic students (SES) support programs, positions the university as an ideal institution from which to explore impacts of technology on distance students' sense of connection. In the past five years a plethora of strategies have been introduced (i.e. enhanced online communication technologies, student transition, attrition and retention (STAR), etc.) at CSU aimed to improve students' sense of connection and engagement in a concerted effort to address first year attrition, retention and improve student experience in online environments. Hence, the project was well-positioned to explore issues at both institutional and course levels. CSU's diverse distant student population (20 percent low SES, 60-80 percent first-in-family, 25 percent TAFE entry) further makes findings potentially relevant to a broad range of institutions, although given the exploratory nature of this pilot study care needs to be taken extrapolating findings to other populations.

Stage One of the project involved gathering and interpreting institutional data relating to both internal and external metrics. Metrics included the Student Experience Questionnaire (SEQ) question, 'I feel I belong to the University Community', Course Evaluation Questionnaire (CEQ) results and course level information on attrition and progression. Aspects of specific course design, such as optional or mandatory face-to-face sessions and links to dedicated profession, were also investigated. The core activity of this project, Stage Two, entailed interviewing 122 students from four courses that were selected in light of the analysis of the institutional data during Stage 1. The interviews enabled the exploration of aspects of interconnectedness not possible through secondary data analysis, particularly the impact of demographic attributes, such as carer responsibilities, types of interaction initiated by students with university staff and classmates and prior experience with distance or internal study. Collectively, this dual-stage approach permitted detailed analysis of how student perception of activities designed to promote engagement, such as online lectures and peer-to-peer interactions, combined with other demographic and attitudinal factors, impacted their perceived degree of connectivity.

Thus, the over-arching seed project aim was to identify possible demographic, attitudinal and technological contributors and detractors to student development of a sense of belonging, expressed as feeling 'connected'. The project also sought to explore students' perception of the relevance of connection to their academic success as distance students.

As a small, one year project, identification of issues and questions that might serve as the basis for a larger multi-institutional project designed to explore key issues in-depth and test worthwhile forthcoming recommendations from the seed project, was also important. The intended deliverables were:

- List of practices impacting a sense of belonging/connection by distance students studying at CSU from 2009 to 2013, for communication cross-institutionally to facilitate practice evaluation.
- Commence development of a multi-institutional project focusing on the effective use of technology to promote a practical sense of belonging/connection based upon findings of pilot study.
- Contribute to the general discourse on social isolation and belonging and promote discussion of the role of belonging and its contribution to student engagement and success.

The remaining sections of this report will focus on the development of the interview process and sample followed by a discussion of the key findings and suggestions for future study.

Chapter 2 – Methodology

Students were randomly selected from the four targeted courses (see below) to permit collection of a sample that had relatively equal gender representation within each course and had equal representation of total participants per course. A target of 30 participants per course (15 men and 15 women) was established and a random sample taken from university enrolment lists. In total, 122 telephone interviews were conducted. Human research ethics approval was sought and obtained prior to commencement of primary data collection. All interviews were electronically recorded and informed consent was obtained prior to commencement. Respondents were offered a \$20 gift card as an honorarium for their participation time, which ranged from 15 to 30 minutes depending upon the depth of their qualitative replies. The interviews were structured with 28 questions covering demographics, study history, educational communication and interaction activities, current course experience and perceptions of connection. Quantitative data was entered into SPSS and qualitative comments were transcribed for subsequent analysis by research assistants.

Course Selection and Background

The four courses chosen for this research were selected based on having met three selection criteria. First, the course had to have a distance education (DE) enrolment of more than 100 students in 2013 Session 2. Second, courses had to exhibit a range of delivery or interaction strategies, such as offering purely online, blended learning and/or residential school opportunities so a diversity of delivery modes could be represented across the four courses selected. Third, courses eligible for inclusion had to have data available for the 2012 SEQ question number 32, “I feel I belong to the university community” so comparative analysis could ensue. The four courses selected using these criteria were the Bachelor of Science (‘Science’), Bachelor of Arts (‘Arts’), Associate Degree Policing Practice (‘Police’) and Bachelor of Clinical Practice: Paramedic (‘Paramedics’). Table 1 offers comparative data for distance enrolments, sense of belonging, course length and opportunities for face-to-face instruction for the four courses included in our study.

Table 1: Course comparison: Arts, Paramedics, Police and Science at CSU

COURSE	2013 Distance Enrolment	Percentage expressing Sense of Belonging (n) in 2012 SEQ	Course Length (years)	Face to Face Instruction Opportunities
Arts	352	55-65% (32)	3 full-time 6 part-time*	Possible but not required
Science	150	55-65% (7)	3 full-time 6 part-time*	Required for laboratories
Police	889	>70% (82)	2 years full-time only	Mandatory on-campus and placements
Paramedics	297	>70% (17)	4 years full-time only	Mandatory on-campus and placements

*Most distance students study part-time and many take longer than 6 years due to studying 1 subject per session.

The low response rates across the numerous sectors and institutional metrics, relative to the possible responses in light of course enrolments, and the inability to disaggregate distance and internal cohort data, resulted in the SEQ indicator for sense of belonging being unable to be considered indicative or representative of perceptions of the majority of students in each course. Nevertheless, the university level data relevant to distance

students' sense of belonging has been relatively consistent in the five year period leading up to this project, with 46-47 percent expressing positive perceptions (agree/strongly agree) and 21-24 percent expressing negative perceptions (disagree/strongly disagree). The low sense of belonging indicated by distance students existed in contrast with the 70-79 percent of internal students who gave positive responses during the same five year period, with only 6-13 percent replying negatively about sense of belonging. The National University Experience Survey (UES) results, which combined distance and internal cohorts in 2012 and 2013 for questions regarding sense of belonging to the university, were in line with those derived from SEQ surveys with 40-45 percent agreeing that they felt a sense of belonging, compared with the national average of 46-50 percent. Hence, the institutional data indicated that focusing on factors that might influence students' sense of connection, particularly among distance students, was timely and relevant to the CSU distant student population. Overall, the four courses selected for our sample were generally considered to be performing well in relation to key institutional metrics, although both Arts and Science had experienced first year attrition and progress rates below the university standard at some time in the previous five years.

To achieve the target sample of 120 students, 30 per course, 522 calls were made to 348 separate individuals (34 percent response rate). The majority (63 percent) of respondents agreed to participate when first called and the rest agreed to take part at a more suitable time.

Table 2: Response rates by course

	Arts	Paramedics	Police	Science
Total students called	90	87	65	106
Total phone calls made	116	167	87	152
Response rate	33%	34%	46%	28%
Total interviewed on first call (percentage of students called)	23 (25%)	15 (17%)	22 (34%)	16 (15%)
Total declined interview (percentage of students called)	5 (5%)	8 (9%)	4 (6%)	16 (15%)
Total 'no response' after 3 calls	55	49	31	60

Chapter 3 – Key Findings

The random sample obtained from each of four courses (Arts n=30, Paramedics n=30, Police n=30, Science n=32) yielded a final sample of N=122. Only ten (8 percent) of the entire sample were not born in Australia. Most students resided in New South Wales (NSW) regardless of course, with paramedics having the broadest geographic distribution as evidenced in Table 3 below where this and other key participant demographics appear by course.

Table 3: Participant demographics by course

	Arts	Paramedic	Police	Science
Age				
17-24	2	4	4	9
25-40	10	21	25	17
41-60	15	4	1	6
60+	3	1	0	0
Caring responsibilities				
Yes	21	12	5	14
No	9	18	25	18
Community group membership				
Yes	14	16	4	13
No	16	14	26	19
Employment status				
Full-time (%)	14	21	27	17
Part-time (%)	11	7	3	5
Not employed (%)	5	2	0	10
Gender				
Females	24	17	14	14
Males	6	13	16	18
Geographic residency				
ACT	1	0	1	2
NSW	24	11	29	26
QLD	0	3	0	0
SA	0	4	0	1
TAS	5	2	0	0
VIC	0	7	0	3
WA	0	3	0	0

Comparison of descriptive statistics by course revealed Arts degrees to be pursued by more mature students than Paramedics, Police and Science degrees. This finding is consistent with the university's larger datasets, as is the employment data revealing the majority of police students were employed full-time, most commonly as police officers. Science students were least likely to be employed (n=10), followed by arts students. Again, this highlights the tendency for those in professional degrees to more readily obtain employment, even prior to graduation, in their field of study. As anticipated, those in full-time employment reported the lowest levels of caring responsibilities of either children or aged parents. Seventy percent of arts students reported having caring obligations in contrast with 44 percent of science, 40 percent of paramedics, and 16 percent of police students.

Despite considerable effort made by the researchers to obtain relatively equal representation of male and female students, notably few male art students, in contrast with all other courses sampled, agreed to participate in the study, with just 20 percent of male arts students participating in contrast with 43-56 percent for science, police and paramedics

students. Students were also asked about their membership in community organisations or groups. This variable was included based upon the large body of mental and physical health research revealing that those with the most community ties and networks tend to experience better mental and physical health. Our findings revealed the police were by far the least likely (13 percent) to belong to any community organisations. In contrast, more paramedics (53 percent), arts (46 percent) or science (41 percent) students belonged to community organisations. Hence, it was unsurprising that course significantly correlated with community organisation membership ($r=-.286, p<.001$). Community organisation membership was also weakly associated with student age, with older students more likely to actively participate in their communities than younger students ($r=-.223, p<.014$), another finding common in the research literature. Future studies may wish to explore if this trend manifests more broadly, why and if/how it impacts well-being as related to other aspects of students' experiences.

No personal demographic variables proved statistically significant as predictors of social belonging or connection to the university. Course was, however, weakly correlated with subject forum usage for social interactions ($r=.201, p<.027$) and sense of connection with classmates ($r=.187, p<.039$). Arts and paramedic students were more likely to use subject forums socially and reported a stronger sense of connection with their classmates than police or science students. Conversely, the strong association ($r=-.410, p<.000$) between course and increased face-to-face interactions with peers is indicative of police and science students having mandatory laboratory requirements and attendance at the police academy. Likewise, a significant association existed between course and the quantity of subjects taken in 2013, reflecting police and science students were enrolled in a higher credit load than their arts and paramedics counterparts. These findings lend further validity to the dataset based on comparative analysis of institutional course data revealing similar trends.

A wide range of variables relating to educational practice and technology usage for education were also collected by course. Table 4 presents descriptive statistics for each.

Table 4: Reported educational practice and interaction by course

	Arts	Paramedic	Police	Science
<u>Enrolment & study patterns</u>				
ever studied internally	21	18	15	21
average hours spent studying weekly	13	16	10	15
<u>Learning interactions experienced</u>				
received audio lectures	26	29	25	27
received face-to-face lectures	10	22	30	23
had synchronous online discussions	9	14	5	11
telephoned lecturers	19	20	14	12
used subject forums socially >once	4	4	11	5

Differences in course design manifested a range of trends and associations related to educational experience and interaction patterns. Course differences were found in reported hours spent studying weekly. Seven percent of both police and paramedics students reported spending no time at all studying weekly in contrast with all arts students reporting at least two hours per week and, with the exception of one student, four hours being the minimum weekly time allocated by science students for studying. Examining only those who spent the most time studying (between 20 and 40 hours weekly), paramedics (12 percent) reported the most hours, followed by science (9 percent), arts (5 percent) and police (2 percent), who reported the least number of total hours. A weak correlation manifested between employment and weekly time spent studying, with those working part-time or not employed reporting more time spent studying ($r=.208, p<.021$).

Social interactions facilitated by educational design were tested by course for students' optional use of subject forums, synchronous discussions, and telephone contact for studying purposes, as well as experience with face-to-face and audio lectures over the duration of

their course. It was hypothesised that individuals' sense of connection to their lecturers, course, and classmates would be influenced by such social interactions. At least 50 percent of distance students in every course had been an internal undergraduate student at some point in their lives, with the greatest percentage stemming from arts (70 percent). In their present course, all police students reported receiving face-to-face lectures during the police academy as well as most paramedic (73 percent) and science (72 percent) students who also reported internal instruction either at residential schools or in internal subjects, in contrast with only a third of arts students, many whom have no residential school requirements. With nearly all students having received audio lectures, and subsequently 88 percent of the sample having heard their lecturer's voice(s) via audio lectures at some time during their course, it was perhaps surprising that use of audio lectures failed to be associated with sense of connection to lecturers, courses or the university. Similarly, students' decision to call their lecturers also failed to yield significant associations with sense of connection and was not significantly associated with any variables explored in this research, although more paramedics (66 percent) and arts (63 percent) students had telephoned a lecturer in one or more subjects than either police (47 percent) or science (37 percent) students.

Fewer distance students in all courses experienced synchronous online discussions as part of their course than experienced face-to-face lectures. Paramedic students (47 percent) reported having the most use for synchronous discussions in their coursework and police (17 percent) reported the least. Interestingly, use of synchronous forums was not associated with course, but was positively associated with number of hours weekly spent studying ($r=.200$, $p<.027$), albeit at the .05 level. The experience of synchronous discussions in coursework failed to produce significant associations with perceived sense of connection to any aspect of distance students' educational experience. Since all subjects at the university have the capacity for asynchronous online subject forum usage, students were asked if they ever used these forums for social interactions. Findings were consistent across courses, with 13 percent-16 percent of arts, police and science students, reporting they used subject forms for social interactions, with the exception of paramedics. Thirty-seven percent of paramedics reported social engagement, a finding supported by the moderate correlation found between course and social forum usage ($r=.443$, $p<.039$). Across the sample, those who used subject forums for social interactions were also more likely to believe feeling connected impacts academic success ($r=.195$, $p<.031$).

Table 5: Reported social and educational technology usage by course

	Arts	Paramedic	Police	Science
<u>Social media usage and type</u>				
used social media	20	25	24	25
specific type used				
Blogs	1	1	1	1
Facebook	17	25	24	25
GooglePlus	0	0	2	2
Instagram	2	3	8	1
LinkedIn	2	1	0	2
Twitter	1	2	1	3
Unlisted/other	2	3	0	0
<u>Technology used for education</u>				
used technology to study away from home	27	29	28	29
specific type used				
Laptop	19	26	26	27
Mobile phone	11	12	16	21
Tablet	9	12	9	7

High social media usage was reported across the sample, with Facebook being the most common for non-educational purposes as demonstrated in Table 5. Social media usage was not associated with any other type of social interaction variables related to educational practice, such as the likelihood of engaging in synchronous or social asynchronous

discussions, audio lectures, telephoning lecturers, or interacting with peers. Neither was social media associated with any greater tendency to use technology away from home for studying, nor the type of technology used for study, such as laptops, mobile phones or tablets. Those reporting higher use of technology for their university studies were more likely to believe feeling connected impacted their academic success ($r=.181$, $p=.046$), but the relationship was fairly weak. Technology usage did not significantly vary by gender, age, course, quantity of subjects, geographic location or employment status. This is unsurprising given all distance students have mandatory technology requirements associated with all degrees. However, the type of technology used varied in several meaningful ways. First, those reporting using laptops for their studies more frequently used subject forums for social interactions ($r=.554$, $p=.008$), an association not found among mobile or tablet users. Second, those reporting using mobile phones for their studies also reported taking fewer subjects in both 2013 ($r=-.262$, $p=.004$) and 2014 ($r=-.239$, $p=.008$), again a finding not reproduced with laptop or tablet users. While this exploratory research cannot confer or imply causality, the relationship between distance students' choice of mobile technology and rate or capacity for degree progression might warrant further investigation, particularly as both laptop ($r=.204$, $p=.024$) and mobile phone ($r=.203$, $p=.025$) users felt feeling connected impacted their academic success.

Finally, a range of variables measuring distance students' perceptions about 'what mattered' to their educational experiences were collected to explore social connection. These appear in Table 6.

Table 6: Social connectivity: 'what mattered' to educational experience by course

	Arts	Paramedic	Police	Science
<u>Thoughts about connection</u>				
thought it mattered if the voice/person giving the audio lecture was their lecturer	23%	34%	23%	37%
thought feeling connected impacts their academic success	66%	77%	100%	75%
thought peer interaction impacted their course experience	75%	75%	71%	100%
<u>Feelings of connection</u>				
felt connected to their course	83%	85%	90%	72%
felt connected to their lecturers	63%	67%	53%	62%
felt connected to their classmates	33%	60%	73%	47%

Findings revealed little perceived social connectivity, whether expressed as thoughts or feelings, significantly varied by course. Table 6 shows consistent patterns for each course relating to thoughts about connection, with a few notable differences by question. Specifically, the fewest students believed it mattered if their own lecture or someone else's voice was heard in their audio lectures, with about a third or less of all students caring who delivered their audio lectures. Thoughts about whether 'feeling connected' impacted their academic success, or if peer interactions impacted their course experience, were considered more important than who was conducting their audio lectures. Arts students (66 percent) were least likely to think feeling connected impacted their academic success in contrast with the police, all of whom (100 percent) thought it did. Further, three quarters of all arts, paramedics and police students, in contrast with 100 percent of science students interviewed, thought peer interactions impacted their course experience. Feelings of connection to classmates were perceived more important by the professional service courses, paramedics (60 percent) and police (73 percent), than those in the arts (33 percent)

or sciences (47 percent). This was supported by a moderate correlation ($r=.260$, $p=.004$). Patterns of perceived connection to either course or lecturers were similar across courses, with the police exhibiting both the highest and lowest levels of connectivity. Police felt the greatest sense of connection to their course (90 percent) and least sense of connection to their lectures (53 percent).

Statistically significant predictors of social connection emerged at a university, rather than course, level. For instance, collectively, those who used portable technologies to study, such as laptops ($r=.204$, $p=.024$) and mobile phones ($r=.203$, $p=.024$), those using subject forums socially ($r=.195$, $p=.031$) and those who felt connected to their peers ($r=.248$, $p=.006$) also tended to believe that feeling connected impacted their academic success more broadly. However, again, as association cannot predict causality, further investigation is warranted. Lastly, comparison of group means found all students who reported a stronger sense of connection at multiple levels also spent the most time studying. This lends support for research showing increased 'time on task' is associated with enhanced sense of belonging/connection. These findings shall be detailed in forthcoming journal articles, along with in-depth qualitative analysis exploring *what* aspects of educational design mattered most / least and *why* individuals felt more or less connected to their peers/classmates, lecturers, courses, and ultimately, the university.

Chapter 4 – Discussion of Key Findings

In this chapter, we discuss our key findings in light of the extant research literature. Four major areas are covered in relation to sense of connection: technology, community, time and face-to-face delivery.

Connection and Technology

Our respondents overwhelmingly (75 percent) considered the content of audio lectures to be more important than whether or not the voice or author of the audio resources was that of their lecturer (Crampton & Ragusa, 2014). This finding is in contrast to claims by others that hearing a lecturer's voice, either as an audio lecture or as part of an asynchronous session, enhanced distance students' sense of connection (Bolliger, 2010; Borup, West, & Graham, 2012). In this study, our respondents appreciated the alternative learning style provided by audio, as a supplement to written learning materials, but did not feel any more connected to their lecturer(s) or course for having had access to them. Interestingly, the mobile affordances often described as an advantage of audio (i.e. listen when you like, where you like) were rarely noted (8 percent). In relation to sense of connection, the lack of importance of audio lectures is perhaps best articulated by a qualitative quote received from a science student. For this person, the only concern regarding audio lectures was "as long as it's a human voice". Most other students noted as long as the person "knew what they were talking about," and the content was "relevant", particularly to assessment items, then it did not matter whose voice was heard or who was providing the audio lectures.

Anderson (2003) identifies three types of interactions (student-teacher, student-student and student-content). Of these, student-teacher interactions are the most valued of all Anderson (2003). Audio lectures could be considered an automated type of student-teacher interaction. However, their asynchronous nature, in our study, resulted in students perceiving them as a less valued student-content interaction, rather than the more valued student-teacher interaction. Thus, they failed to generate or enhance student-teacher connections.

A more direct student-teacher interaction was facilitated by telephone interactions instigated by students. The majority of students reported having phoned a lecturer at least once in the duration of their course. Nevertheless, even this synchronous student-teacher interaction did not promote reported connection with either the lecturer or course. Future studies looking at the impact telephone interactions with teaching staff may have on student success or satisfaction may uncover valuable insights in relation to the communication options provided by academics to students. Given that neither direct interaction with teaching staff via telephone, nor indirect interactions via audio lectures, promoted connection, we suggest academics' role and time commitment to these activities ought to be re-evaluated. Students may be better served by the provision of a more centralised, course or university-based service offering guidance about subject learning materials, which may be more readily available due to time constraints of individual lecturers. The centralised approach could also be extended to the construction of learning resources rather than continuing to focus on augmenting the capacity of every subject coordinator to re-produce learning materials readily available at national and global levels. De-centralisation of learning materials, their provision, and response to administrative enquiries, away from the academic, would, it is suggested based on qualitative feedback, permit enhanced quality of student-teacher interactions, whereby academics could have more time to facilitate relevant, deeper and more personalised learning activities as well as individualised feedback on assessment.

Connection and Community

While many have suggested that the creation of communities enhances connection amongst students (Chickering & Gamson, 1987; Ouzts, 2006; Rovai, 2002), our results align more with others' findings that note designed activities that force interaction and community development may not be worth the time and effort they take to create due to limited returns (Overbaugh & Nickel, 2011). Our respondents had variable levels of interactions with their peers, mostly due to course design requirements (i.e. in labs during residential schools or while at the police academy or on placement), versus in dedicated interactions online as part of subjects or assessment tasks. Thus, while the circumstances provided by subject design enabled technologically-mediated connection with peers, it was the self-initiated activities and personal engagement opportunities that occurred during face-to-face interactions that enabled the greatest perceived sense of connection with classmates.

Overbaugh and Nickel (2011) and Drouin and Vartanian (2010) have noted that students may be satisfied with a course, but still not feel a sense of connection or value the academic communities created for them. Presuming that enhancing interaction would improve student success, without also addressing student perceptions about such interactions, was a downfall of a Sri Lankan information technology program re-designed to force interaction in an attempt to address high failure rates. This re-design involved the sequential adoption of not one, but two more elaborate learning management systems, no doubt more costly and time intense for staff and students to learn. Despite the re-design, the changes did not improve student success (Andersson & Hatakka, 2010). Subsequent investigation identified that students still saw learning as the responsibility of the lecturer and did not want, or like, the collaborations, failing to see their academic value and requested to only engage with their lecturer (Andersson & Hatakka, 2010). While such findings cannot be extrapolated to Australian students, findings from our study found students' perceived a sense of connection was important to their academic success, but the type of interactions that facilitated connection varied. For example, the majority of students (80 percent) interviewed highly valued face-to-face or telephone contact with classmates and thought it impacted their course experience, yet only 15 percent of distance students having online interactions with classmates followed up in non-technologically mediated environments. Online activity was not significantly associated with enhanced sense of connection – to peers, academics or course.

The focus on creating communities with an online sense of presence by lecturers and expectations of online engagement with peers may, therefore, not always be the most appropriate structure for promoting deeper learning for a given cohort or course/subject. There are possible instances where well designed content promoting a high level of student-content interaction would be more effective in terms of learning and return on time and effort. Anderson (2003) noted that deep learning is supported as long as at least one of the three possible forms of interactions are prioritised (student-teacher, student-student or student-content), rather than attempts to mix all three, which is often the goal of time intense, highly interactive, online communities. Whilst Anderson (2003, 2005, 2008) notes the value of all types of connection, he also notes that the demographic attributes of distance students, including being greatly separated by geography and time zones, do present challenges for formally designed attempts to promote engagement between individuals (student-student or student-teacher) and thus suggests providing opportunities for the development of less formal supportive networks, such as 'study-buddies', can greatly enhance student experience and success (Anderson, 2005). Designing to facilitate and support student driven social networks for social learning contexts may also meet the diverse preferences of students who study by distance which, as Lapointe and Reisetter (2008) found, include many with no interest or perceived need to engage with peers.

Current practices that promote interactions for the sole reason of enhancing connection, rather than pedagogical needs related to subject and course content, do not serve the preferences of many learners who prefer not to interact. Similarly, they may not be well received by time poor students who need all interactions to address their primary goal of gaining a deeper understanding of what they need to know, particularly for assessments related to passing subjects, and thereby progressing towards their degree.

Connection and Time

Drouin and Vartanian (2010) noted that sense of connection was linked to time spent studying, although in their study it was assumed that the more credits the students undertook, the more time they spent studying, rather than explicitly asking students how much time they spent studying overall. While our findings relative to time are consistent with previous findings, namely that increased time-on-task enhances student experience, including success (Crampton, Ragusa & Cavanagh, 2012) and connection (Drouin & Vartanian, 2010). On average, all distance students interviewed spent 13.5 hours in total on their university studies per week, with a wide range (zero to 40 hours) of variation exhibited by individuals. University policy suggests a minimum of ten hours per week per subject, revealing students sampled were on par with institutional guidelines, if only studying one subject, with the exception of the 7-10 percent across courses sampled who spent less than the suggested minimum. While it may seem logical to seek to enhance the design of subjects to promote more time-on-task, given increased time and improved student experience are positively correlated, it is important to take into account the competing time commitments of the average distance students, particularly family and work (Rovai & Wighting, 2005). Further, the type of activities and skills required of those facilitating interactive learning environments also needs to be carefully considered so that students find adequate value in such activities and the value of engagement to academic performance is clear. A well designed interactive activity designed to enhance time-on-task and student-teacher and/or student-student interaction can suffer poor uptake and promote student attrition if poorly facilitated by teaching staff (Rovai & Wighting, 2005).

Connection and the Face to Face element

The greater sense of connection expressed by those exposed to mandatory face-to-face learning activities was consistent with the findings of Conrad (2002) who noted that even a single face-to-face opportunity for distance learners can significantly impact satisfaction and sense of connection. Studying successfully by distance requires students to be effective self-directed learners (Caffarella, 1993). This is not, however, assumed to occur in a vacuum of social independence. Opportunities for the social construction of knowledge are still considered important elements in distance courses that largely rely on students' self-directed learning (Rovai & Wighting, 2005). For the students in our study, the face-to-face interactions at the police academy and residential schools included both formal social construction of knowledge opportunities (group work in laboratories for the science and paramedic students and scenario teamwork for police) and informal opportunities (meal breaks and evening study or socialising while at residential schools). What requires more research is the quantity of such face-to-face opportunities needed to help students 'sufficiently' develop a sense of connection. The police students' face-to-face interactions did not occur until the second session of their studies while most of the science and paramedic students attended compulsory residential schools from their first session of enrollment. Further research would also need to identify what level of connection positively enhances student success and experience (i.e. institutional, course, cohort or subject). A broader consideration of the role face-to-face interactions play in the development of connection may also enable the promotion of student-driven and sustained communities which have been found more resilient and considered of greater value by

some distance students (Conrad, 2005). These considerations must also occur within the framework of institutional strategic goals in relation to distance education (i.e. target student population – local, state, national, global) and capacity to include face-to-face opportunities. For example, institutions with larger national than international population targets may negate the suitability of providing face-to-face opportunities. This is an area that may be later bridged by enhanced use of virtual worlds and immersed virtual interaction experiences where face-to-face may occur by way of an avatar in a virtual café or classroom, provided the target population has been shown receptive to technologically-mediated interactions.

Future Recommendations

Future studies would be well served to select a wide range of course types that prioritise various methods of social interaction / engagement, with specific cohorts sampled so their particular experiences may be clearly mapped. Such a broad design would enable the gathering of information on connectedness, technology use, satisfaction, attrition and success, enabling clear measurement of the impact of connectedness on perceived student satisfaction and academic success. We recommend a larger study be conducted that also explores the psychological dimensions of distance students' approach to tertiary education, including their levels of self-motivation and independence as well as personal reasons for choosing to study by distance rather than internally for the chosen degree. Such consideration may enable the sector to better understand the unique nature of distance students and subsequently develop practices and strategies that meet these unique students' needs, rather than continue the current practice of working to adapt and fit what has been found to be effective for on-campus populations into an online environment. A more direct analysis of connection and student satisfaction and/or success would also enable institutions to better judge the costs versus benefits of programs currently employed to enhance sense of connection/belonging by distance students, particularly as the question of whether such development is necessary, preferable or even appreciated remains unanswered.

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