STEM students see the value of LinkedIn as a career development tool and continue to use it in the long-term post-assignment

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Abstract

Some empirical case studies provide support for using LinkedIn as a 21st century career development tool; however, little is known about the long-term impact on students' use of LinkedIn. A LinkedIn assignment was implemented in a third-year subject taken by students in non-specialist science, technology, engineering and mathematics (STEM) degrees. The study aimed to determine: 1) Student use of LinkedIn prior to, and during the four months after the assignment was completed; 2) Student intentions to use LinkedIn as a career development tool in the long-term future; 3) Student perceptions of a LinkedIn assignment and associated employability skills; 4) Changes to students' LinkedIn profiles and professional connections in the two years following completion of the assignment. Four months after the assignment, students completed an anonymous and voluntary questionnaire comprised of open-ended and Likert-scale questions. Descriptive statistical analysis was conducted on the Likert-scale responses and content analysis was conducted on the open-ended responses. Students' LinkedIn profiles were analysed upon completion of the assignment and two years post-assignment to determine changes during this time. Students saw value in the assignment and LinkedIn as a career development tool, and many thought they had developed skills in building a connected identity and social network literacy. Students were less confident in their ability to build and engage with professional networks, although they thought this was important. Most students continued to use LinkedIn in the two years post-assignment. In conclusion, a LinkedIn assignment is an effective career development tool for students in non-specialist STEM degrees.

Introduction

The internet and social media have permeated all aspects of our lives in the past two decades, changing how we live, interact, work and study. It has been argued that for career builders, the internet is a career resource library, an opportunity marketplace, a space for the exchange of social capital, and a democratic media channel (Hooley, 2017). Job opportunities are increasingly found via informal channels and recruiters use professional networking sites to recruit and hire employees (Slone & Gaffney, 2016). Of concern is that undergraduate students are generally lacking in skills

associated with online technology proficiency and professionalism (Bridgstock, 2019), and they therefore need support to develop these skills. To assist in the development of building a career online, Hooley (2017) developed a framework of key digital career management skills which includes creating an effective online brand, and connecting with others to build professional networks that support career building. Related to this, leading scholars have urged educators in higher education to support undergraduate students in the building of their professional networks while at university, and advise that the development of a professional online presence and professional network is an iterative process that takes time (Bridgstock, 2009; Slone & Gaffney, 2016; Wetsch, 2012). Social media is one of the connectedness pedagogies in Bridgstock's (2020) connectedness learning model, with connectedness meaning the state of being linked with others for professional and career development purposes. Social media has been defined as "Internet-based channels that allow users to opportunistically interact and selectively self-present, either in real-time or asynchronously, with both broad and narrow audiences who derive value from user-generated content and the perception of interaction with others" (Carr & Hayes, 2015, p. 50).

Recently, employability scholars have argued for an expansion of the definition of employability beyond a skills-centred approach that focusses on graduate attributes and experience, to incorporate development of pre-professional identity (Jackson, 2016) and graduate capitals, the "key resources that confer benefits and advantages onto graduates" (Tomlinson, 2017, p. 339). Jackson (2016, p. 926) defines pre-professional identity as "an understanding of and connection with the skills, qualities, conduct, culture and ideology of a student's intended profession". Pre-professional identity develops over time into professional identity, the "attitudes, values, knowledge, belief and skills that are shared with others within a professional group and relates to the professional role undertaken by the individual" (Adams et al., 2006, p. 56). Fowlie and Forder (2021) argue that using LinkedIn in final year core business subjects promoted students' pre-professional identity development by helping them to envisage themselves in professional roles (Fowlie & Forder, 2019). A related concept is career identity, which is described as an intellectual compass that helps direct relevant learning, and supports informed and appropriate career choices (Fugate et al., 2004). A career identity can be achieved through personal investment in the advancement of one's future career and employability, and is illustrated in the ability to draw on experiences and clearly communicate a personal narrative which aligns to favoured career options (Tomlinson, 2017). A proposed difference between professional and career identity is that one's professional identity is anchored in one's profession (e.g., a surgeon even if currently a trainee), whereas career identity is anchored in one's work at their current employer (e.g., medical trainee at a hospital) (Khapova et al., 2007).

Bridgstock's (2020) connectedness learning model extends beyond a focus on skills and encompasses a range of capabilities, learning and teaching approaches, and enabling strategies that foster the development of connectedness and social network capabilities. Key capabilities include developing social network literacy, building a connected identity, growing connections, working with connections, and strengthening and maintaining connections. Development of, and engagement with, professional networks provide a powerful opportunity for students to develop their pre-professional identity. LinkedIn is an example of a social media connectedness pedagogy and career development learning (CDL) tool that has the potential to facilitate development of connectedness capabilities in undergraduate students (Bridgstock, 2019). CDL can be defined as:

> *Learning about the content and process of career development or life/career management. The content of [CDL] in essence represents learning about self and learning about the world of work. Process learning represents the development of the skills necessary to navigate a successful and satisfying life/career* (McMahon et al., 2003, p. 16).

LinkedIn is the largest professional social media site that is used to find jobs, internships, and connect with and strengthen professional relationships (LinkedIn Corporation, 2020). Launched in 2003, LinkedIn has 756 million users, most (60%) aged between 25 and 34 years, and 57 million companies listed in 2021 (LinkedIn Corporation, 2020). Fifty-one percent of Americans with bachelors or

advanced degrees report using LinkedIn (Pew Research Center, 2021). In 2021, 40 million people used LinkedIn to search for jobs every week, and more that 65% of recruiters in America regularly used LinkedIn to find and vet candidates (Jobvite, 2021). In Australia, recruitment using social media has increased from 6% in 2016 to 19% in 2020 (National Skills Commission, 2020). Given the potential benefits to one's career, it is not surprising that LinkedIn has been promoted by employability scholars as a valuable CDL tool in higher education in the 21st century (Bridgstock, 2019).

A small number of empirical case studies provide support for using LinkedIn as a career development tool in higher education. Studies have investigated student perceptions of LinkedIn upon completion of an assignment that required them to authentically engage with the social media platform. Overall, students had positive attitudes towards LinkedIn, and perceived it to be an important career development tool (Badoer et al., 2021; Fowlie & Forder, 2021; Gerard, 2012; McCorkle & McCorkle, 2012; Peterson & Dover, 2014). Importantly, students appreciated that LinkedIn was a valuable tool for making professional connections (Gerard, 2012; McCorkle & McCorkle, 2012; Peterson & Dover, 2014). Fowlie and Forder (2021) found that receiving recommendations on their LinkedIn profile from members of their professional network provided students with "small wins", that is, minor steps forward that signal progress and contribute positively to motivation, emotion, and engagement in work (Amabile & Kramer, 2011). Interestingly, Peterson (2014) found that a significant number of students initially thought the professor was receiving a pay-off for implementing the LinkedIn assignment, or did not see its value or relevance. However, by the end of the assignment all students found value in the associated activities.

Other studies have surveyed students on their perceptions of LinkedIn, without implementing an assignment incorporating its use. Carmack and Heiss (2018) found through a survey of 107 junior level business and professional communication students, and senior communication students, that they were infrequent and passive users of LinkedIn (Carmack & Heiss, 2018). Similarly, Starcic et al. (2017) found that only 24% of 224 civil and geodetic engineering students had LinkedIn profiles. Bridgstock (2016) found that only 12% of third year students surveyed from two Australian universities used LinkedIn regularly, while 82% used Facebook every day. Similarly, studies assessing student perceptions of a LinkedIn assignment found that most students were not using LinkedIn prior to the assignment being introduced (Badoer et al., 2021; Peterson & Dover, 2014; Russ, 2015).

It is becoming increasingly understood that systematic integration of employability skill development into the curriculum at a course-level is more effective than co- and extra-curricular activities alone, individual subjects, and other 'bolt on' programs (Bridgstock et al., 2019; Bridgstock & Jackson, 2019; Campbell et al., 2019; Minocha et al., 2017). Importantly, embedding opportunities to develop employability into the core curriculum allows the entire cohort to benefit and increase equity of access to this learning, and its benefits (Bridgstock & Jackson, 2019). Taken together, these findings indicate that including LinkedIn as part of assessment is important for introducing students to the authentic career development tool, and without such assignments, students may miss out on the opportunity to experience the many benefits that LinkedIn has to offer.

Over three semesters, McCorkle and McCorkle (2012) surveyed 54 students in senior marketing majors, and in a capstone marketing management course to investigate student perceptions of a LinkedIn assignment, and found that 89% of students intended to use LinkedIn in the future for their job searches and career. Ninety-six percent of students thought the professor should continue with LinkedIn assignments, reflecting the importance they placed on being introduced to the career development tool through the assignment. In the recommendations for future research section of the paper, the authors commented that a simple post hoc review of former students connected to the professor on LinkedIn showed that more than two-thirds had continued to update their profiles after graduation and into their careers. To our knowledge, more formal longitudinal research has not been conducted to determine if LinkedIn assignments embedded into the higher education curriculum result in students' continued use of the social media tool beyond the bounds of an assignment. The present study aimed to explore this notion, along with student perceptions of a LinkedIn assignment.

The basis of the study reported in this paper was an assessed LinkedIn assignment for third-year human physiology students in undergraduate non-specialist health-related science, technology, engineering and mathematics (STEM) degrees. The objectives of the study were to determine:

1. Student use of LinkedIn prior to, and during the four months after, the assignment was completed.
2. Student intentions to use LinkedIn as a career development tool in the long-term future.
3. Student perceptions of a LinkedIn assignment and associated employability skills.
4. Changes to students' LinkedIn profiles and professional connections in the two years following completion of the assignment.

Methods

Participants and context

The LinkedIn assignment, worth 4% of the final subject grade, was embedded into a third-year human physiology subject as part of an employability module delivered over 12 weeks. The subject was core to the human physiology and anatomy major in the Bachelor of Health Sciences. Ninety-three students were enrolled in the subject, with students enrolled in the Bachelor of Health Sciences (94%) and other STEM non-specialist undergraduate degrees (Biomedical Science 5%, Science 1%). Eighty-eight students attempted the LinkedIn module.

The LinkedIn assignment was introduced to students in the first week of semester, both in class and via the subject Learning Management System site. A guide was provided to students which set out the requirements of the assignment, including a weekly schedule and marking rubric (access guide here DOI redacted for review; see Appendix 1). Students were provided with a suite of online LinkedIn resources for higher education students (LinkedIn Corporation, 2021), and links to online resources on how to use social media responsibly and safely. Two face-to-face classes were held, (weeks 1 and 11) and included presentations by career services staff on employability, professional identity, and the use of LinkedIn, and several alumni, who shared their career experiences and employability advice.

Students were instructed to create a LinkedIn profile that included a professional photo, headline, summary, relevant experience, education, and skills and expertise. Students were required to connect with their subject coordinators, three people in industry(s) they were interested in or considering entering in the future, and an industry group or community of interest. Students were directed to the institution's LinkedIn Alumni tool as a starting point if they didn't have any existing contacts to connect with. Students were advised to engage with specific online resources (Byers, 2018; University of California Berkeley Career Center, 2019) before requesting to connect with someone they didn't already know.

The study was conducted with approval of the institution's Human Research Ethics Committee (HEC18107).

Study design and data analysis

There are two components to the study design. To determine LinkedIn use and student perceptions after completion of the assignment a mixed methods concurrent triangulation design was conducted. In this design, a researcher collects and analyses quantitative (numeric) and qualitative (text) data concurrently (Creswell et al., 2003). The rationale for this approach is to attempt to confirm, cross-validate or corroborate findings within a single study resulting in well-validated and substantiated findings (Creswell et al., 2003). The second component to the study design was a longitudinal panel design (Deschenes, 1990) where changes to students' LinkedIn profiles were analysed over time. Panel designs involve two or more iterations of data collection using the same measures on the same sample.

To address the objectives of the study the following were analysed: 1) student questionnaire responses completed four months after the assignment finished: 2) students' LinkedIn profiles at completion of the assignment and two years later.

Four months after completion of the assignment, students were invited to complete a paper-based questionnaire comprised of 4- and 5-point Likert-scale questions and an open-ended question. The questionnaire was administered at the end of class; students were assured that this was a voluntary activity (no incentives were offered), and staff members left the room to ensure anonymity of responses. Descriptive statistical analysis was conducted on the quantitative data to show each component of the Likert-scale as a percentage. Inductive content analysis (Hsieh & Shannon, 2005; Vaismoradi & Snelgrove, 2019) was conducted on the responses to the open-ended question. Frequency of responses within the identified themes are presented quantitatively to show how common the themes are relative to each other. Forty-six students completed the questionnaire, which is a response rate of 52.3%.

Likert-scale questions analysed related to students' use of LinkedIn; student perceptions of CDL in higher education; student perceptions of the importance of using LinkedIn to develop connectedness capabilities; and student ratings of their connectedness capabilities. The open-ended question was: Will you continue to use LinkedIn in the future? Why or why not?

Table 1: Connectedness Capabilities (Bridgstock, 2020)

Developing Social Network Literacy	Making Connections
Ability to reflect upon and articulate the roles that social networks play in professional life, and how professional social networks operate; the ability to navigate social networks strategically and effectively.	Ability to extend and expand professional networks and develop weak ties, including online and face-to-face 'networking'. Activities including joining and participating in professional, industry and interest groups; face-to-face professional networking; development of a digitally mediated professional identity and sharing of content through social media; and informational interviewing.
Building a Connected Identity	**Working with Connections**
Ability to represent professional identities effectively in the context of social networks, including social media profiles and personal / professional 'branding'.	Ability to work effectively and professionally with collaborators in authentic professional contexts and for professional applications. Ability to make the most of connections for purposes such as collaborative innovation and problem solving; career development and enterprise; and socially based learning.
	Strengthening And Maintaining Connections
	Ability to strengthen professional connections and develop strong ties through reciprocity, and then maintain these as needed. Often involves more extended face to face contact and interaction and is based in reciprocal benefit and working toward shared goals.

Connectedness capabilities

Connectedness capabilities (Bridgstock, 2020) are required to allow for meaningful connections with professional networks and to work productively with networks (Table 1). Through creation of a LinkedIn profile, students were supported to develop their social network literacy and build a connected identity. By connecting with professionals through LinkedIn, students were supported to develop their ability to make connections, which progresses to work with, strengthen and maintain connections. To evaluate the impact of this module on students' development of connectedness capabilities, students were asked to rate their connectedness capabilities relating to (1) social network literacy and building a connected identity and (2) professional connections, and to rate the importance of LinkedIn as a tool for developing their connectedness capabilities.

Table 2: LinkedIn Profile Assessment Tool

Profile Feature	Immediately Post-Assignment	Two Years Post-Assignment
Study and employment status	N/A	Primary status: study (details on enrolment in study) / work (details of job provided) / unclear
Profile photo	Present – Yes/No	Present – Yes/No Updated – Yes/No
Headline	Present – Yes/No Addressed personal strengths, skills, and aspirations – Yes/No	Present – Yes/No Updated – Yes/No Addressed personal strengths, skills, and aspirations – Yes/No
Summary	Present – Yes/No Addressed personal strengths, skills, and aspirations – Yes/No	Present – Yes/No Updated – Yes/No Addressed personal strengths, skills, and aspirations – Yes/No
Experience	Present – Yes/No	Present – Yes/No Updated – Yes/No
Education	Present – Yes/No	Present – Yes/No Updated – Yes/No
Connections	Connected with facilitators – Yes/No Number of mutual connections with facilitators Total number of connections	Connected with facilitators – Yes/No Number of mutual connections with facilitators Total number of connections

Analysis of LinkedIn profiles

Eighty-one students had LinkedIn profiles two years post-completion of the assignment; therefore, 81 profiles were analysed for the longitudinal study.

The authors of this paper developed an assessment tool to compare student LinkedIn profiles upon completion of the assignment and two years later (Table 2). Ratings by a single evaluator are subjective, so to ameliorate this, a sample of three randomly selected submissions were first analysed by all co-authors of this paper together, to discuss and refine the parameters, and agree on standards, with the remainder then being completed by one author.

Results

LinkedIn use pre-assignment and four months post-assignment

Prior to the LinkedIn assessment, 80% of respondents did not have a LinkedIn profile. Sixty-one percent of respondents had used LinkedIn in the four months following completion of the LinkedIn

assessment, and 39% had not. Students who had used LinkedIn in the four months following completion of the assessment had done so for a range of reasons with some students choosing multiple options: updating profile (57%), reading other profiles (29%), connecting with professionals (68%), and building relationships with professionals (25%). Most respondents reported using LinkedIn monthly or more (46%), followed by weekly or more (32%), and once or twice a semester was the least cited occurrence (21%).

Future plans to use LinkedIn as a career development tool

When asked if they would continue to use LinkedIn in the future, 86.8% of respondents said Yes, 7.9% said No, 2.6% said Most likely not, and 2.6% said Maybe. The most reported reasons for answering yes to this question are related to the themes (with representative quotes) presented in Table 3.

Table 3: Themes Identified from Student Responses (N=33).

| |
|---|
| **To develop and maintain professional connections (53% of comments)** |
| Connect with professionals in the same field as me (Student No. 2) |
| Build and maintain a network that may be useful for the future (Student No. 27) |
| **To find a job or internship (25% of comments)** |
| It provides information on current jobs suited to me (Student No. 45) |
| It will be useful when I am looking for a job (Student No. 2) |
| **Professional social networking platform (9% of comments)** |
| Professional social media platform (Student No. 14) |
| Excellent professional platform (Student No. 42) |
| **To improve professional practice (9% of comments)** |
| Improve contributions to science &/or medicine (Student No. 29) |
| Professionals share information relating to new research in my field of interest (Student No. 45) |

Three students reported that they were not planning to use LinkedIn in the future. Two of these students thought that LinkedIn was not an effective way to make connections, and the other thought that LinkedIn would not be relevant to their career path but did not elaborate on what the career was. One student said they would most likely not use LinkedIn with their reason being that their requests to make professional connections went unanswered. The student who was undecided said they would only use LinkedIn if their career required it.

Student perceptions: CDL in higher education

Most students placed some level of importance on the embedding of CDL modules in the higher education curricula, with the distribution of ratings as follows: Not important 13%, Somewhat important 43%, Important 33%, Very important 11%.
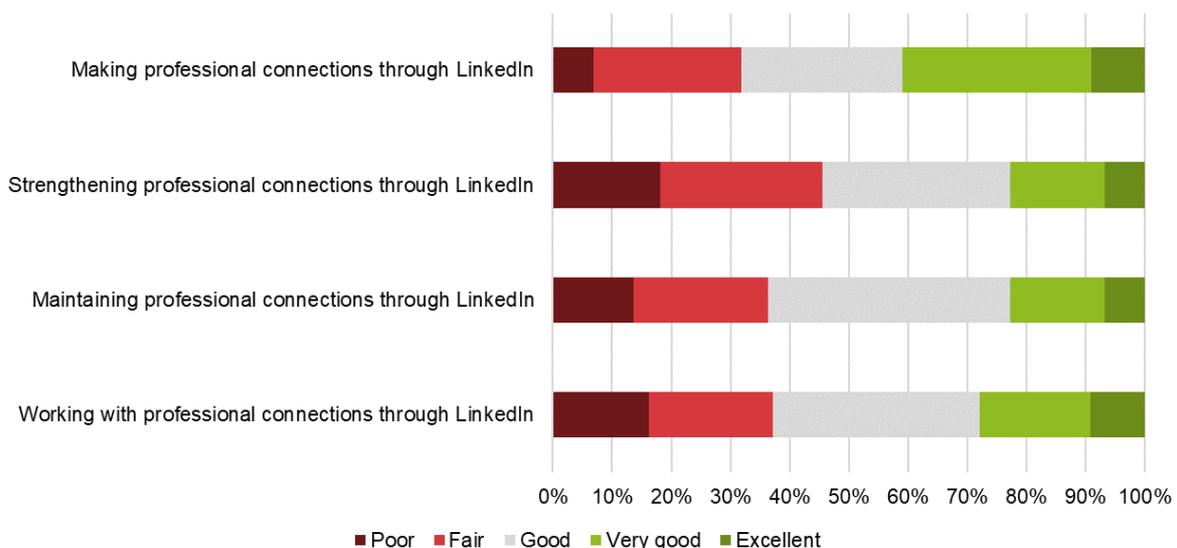
Student perceptions of their connectedness capabilities

Ratings were provided four months after completion of the assignment on a 5-point Likert scale: Poor, Fair, Good, Very good, or Excellent. Students rated their ability to create a profile and use LinkedIn provided insight into the development of their connectedness capabilities Developing social network literacy and Building a connected identity. Just under 80% of students rated their skills in Creating a profile (including all the features) and using LinkedIn and as either Good, Very good or Excellent. A minority of students rated their capabilities as Fair or Poor (Fig. 1).
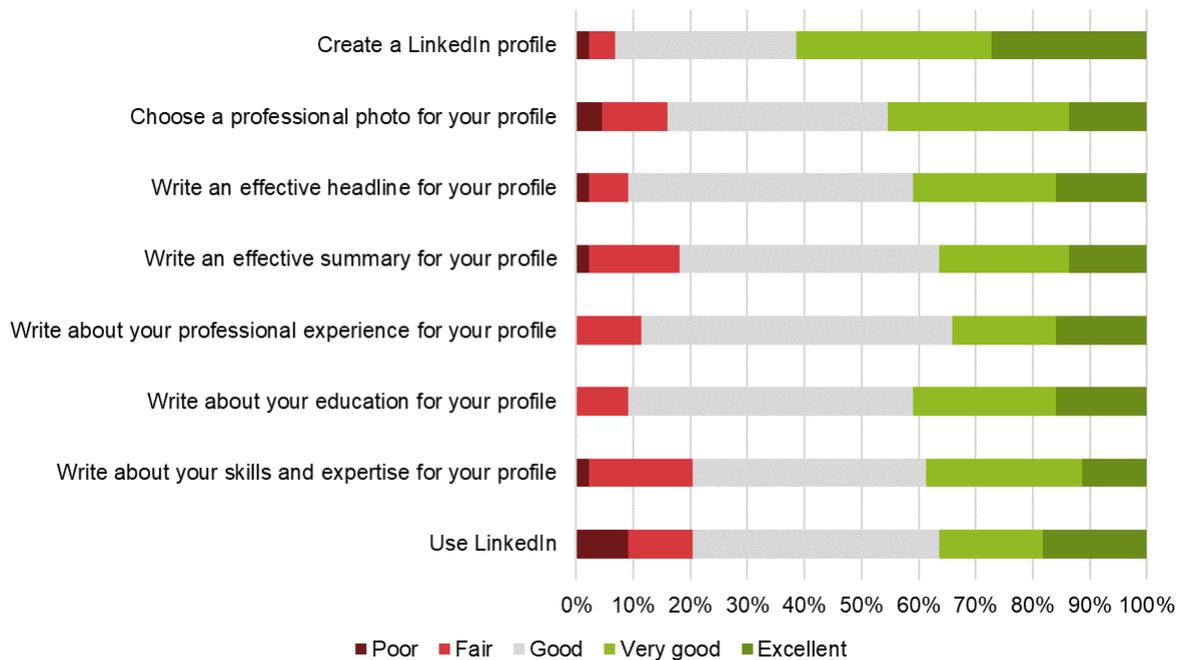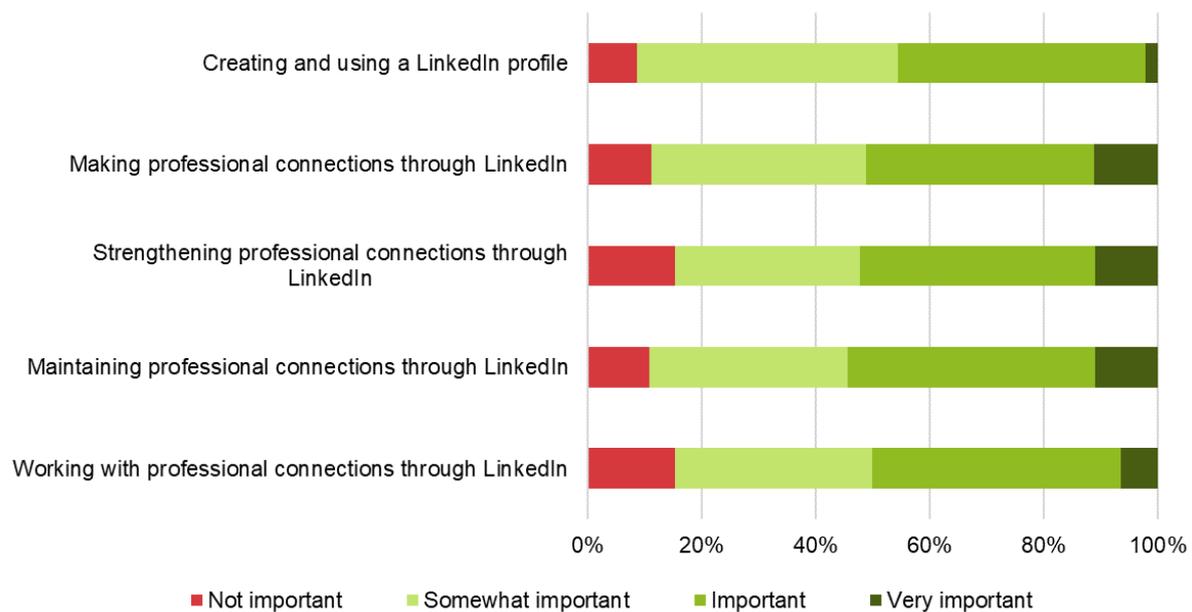
Figure 1: Student Ratings of Their Connectedness Capabilities Relating to Social Network Literacy and Building a Connected Identity.

Student ratings of their connectedness capabilities relating to professional connections were variable, with responses ranging from Excellent to Poor (Fig. 2). Over half of students rated their capabilities as Good, Very good or Excellent. Over 30% of students rated their capabilities as Poor or Fair. Again, ratings were provided four months after completion of the assignment on a 5-point Likert scale: poor, fair, good, very good excellent.

Figure 2: Student Ratings of Their Connectedness Capabilities Relating to Professional Connections.

Over 80% of students placed a degree of importance on using LinkedIn to develop their connectedness capabilities (Fig. 3). A minority of students placed no importance on using LinkedIn to develop their connectedness capabilities. Ratings provided four months after completion of the assignment on a 4-point Likert scale: not important, somewhat important, important, very important.

Figure 3: Student Ratings of the Importance of Using LinkedIn to Develop Connectedness Capabilities.

Analysis of LinkedIn profiles

Two years after the assignment was completed, a search on LinkedIn located profiles for 81 students, which is 92% of students who completed the assignment two years prior. Seven students had deleted their profiles in the two years following the assignment. Interestingly, the five students who did not complete the assignment had profiles two years later; these were not analysed due to absence of a comparator. For the data provided in this section, percentages are calculated based on the 81 profiles that were active two years post-completion of the assignment.

Work and study status two years post-assignment

Analysis of LinkedIn profiles two years post-assignment showed that 16% of students were employed full time; 56% were engaged in further study, mostly in fields they had previously listed as their aspiration; and there was no information for the remaining 28%. The courses that students were enrolled in included physiotherapy (undergraduate and postgraduate), occupational therapy, speech pathology, podiatry, medical imaging, chiropractic, data science, and safety and ergonomics. Employment was more diverse, but also included many jobs in related fields (sports trainers, allied health assistance, dental assistant), as well as some in retail and hospitality. Several profiles included both postgraduate study as well as employment – in these cases, study was assumed to be the primary engagement, with part-time employment subsidiary.

LinkedIn profile features

Features present in the original profiles and two years post-assignment, along with updates, additions, and removal of features from LinkedIn profiles in the two years since the assignment was completed are shown in Table 4. All major features were present in most profiles immediately post-submission

and two years later (Table 4). All students who maintained profiles had updated features of their profile, except for one student who had only increased their connections.

Table 4: LinkedIn Profile Features Present in the Original and Two Years Post-Assignment Profiles and Updated, Added, or Removed in the Two Years Post-Assignment.

| Profile Feature	Present in Original Profile (%)	Present Two Years Post-Assignment (%)	Updated (%)	Added (%)	Removed (%)
Photo	94	86	17	2	10
Headline	100	99	78	0	1
Summary	95	93	73	2	5
Experience	88	88	60	0	0
Education	100	100	75	0	0

Headline and summary updates

In the original profiles, approximately half had headlines that addressed personal strengths, skills, or aspirations (Table 5). Only 6% of headlines two years post-assignment addressed personal strengths, skills, and aspirations, with most updates only stating current study or employment status. In the original profiles, over half of the summaries addressed personal strengths, skills, or aspirations. Only 38% of the profile summaries two years post-assignment addressed personal strengths, skills, and aspirations, with most updates only detailing current study or employment status. Summaries that did address personal strengths, skills, or aspirations focused on career or long-term goals (e.g., I aim to pursue a career in physiotherapy, focusing on pain and musculoskeletal therapy). The percentage of students with headlines or summaries is included in Table 5.

Table 5: Percentage of Headlines and Summaries That Addressed Personal Strengths, Skills, or Aspirations in the Original and Two Years Post-Assignment Profiles.

Addressed personal strengths, skills, and aspirations	Headline		Summary	
	Original profile (%)	2 Years Post-Assignment (%)	Original profile (%)	2 Years Post-Assignment (%)
No	55	94	43	62
Yes	45	6	57	38

Connections

Data on the number of connections was recorded as an indication of the use of LinkedIn for professional networking (Fig. 4). In the original profiles, 99% of students had connected with their teaching staff (as recommended). All students had maintained that connection two years later. Students have expanded their networks in the two years post-assignment, with the average number of mutual connections with staff growing from 12 to 19. There was a greater increase in the number of non-mutual connections, with average total connections increasing from 37 to 88. Values given in Fig.4 are means, plus standard deviation.
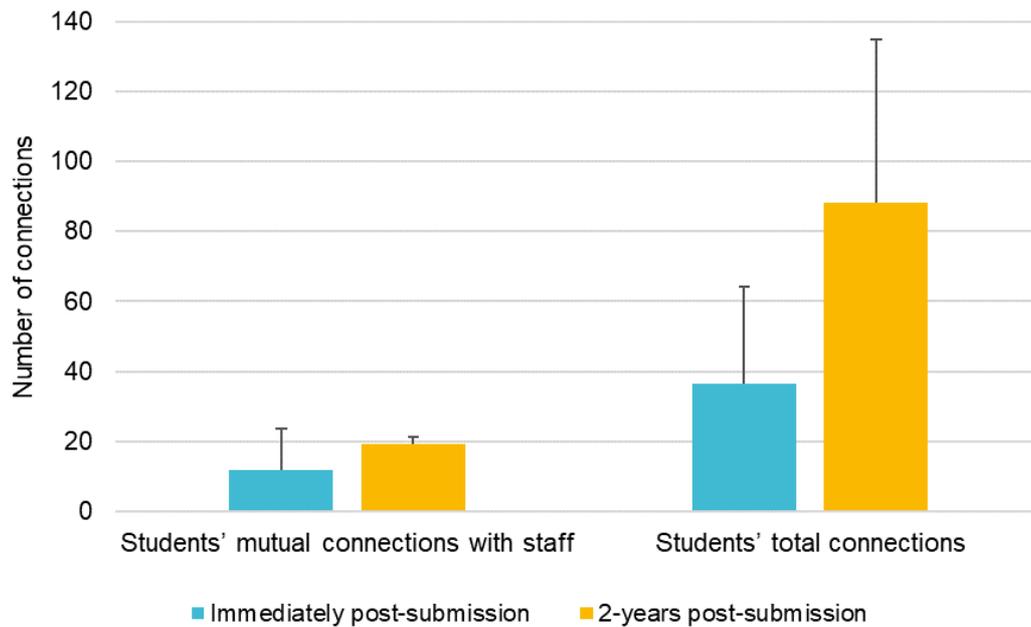
Figure 4: Students' Mutual Connections With Staff and Total Connections Immediately After, and Two Years Post Completion of the LinkedIn Assignment.

Discussion

The main findings of this study showed that most students did not have a LinkedIn account prior to the assignment. However, after being exposed to LinkedIn, students intended to use it as a career development tool. Four months post-assignment, students generally thought it was important to develop social network literacy and build a connected identity, and they were relatively confident in using LinkedIn for this. Students also thought it was important to develop connectedness capabilities related to professional networking but were less confident in their ability to do so. Most students continued to use and update their LinkedIn profile in the two years post-assignment and, despite low confidence in networking after completing the assignment, students had significantly grown their connections. Less well-developed two years post-assignment were the headlines and summaries on the LinkedIn profiles, suggesting that most graduates lacked professional identity and were still at the beginning stages of creating an effective online brand.

Student perceptions of career development learning and LinkedIn

Pleasingly, most students in the present study, who were completing non-specialist STEM undergraduate degrees, thought it was important to undertake CDL modules as part of their higher education studies. After completion of the LinkedIn assignment, most students agreed that it was important to create a profile and use LinkedIn, indicating that they saw the value in developing social network literacy and building a connected identity. This is consistent with perceptions of students in pharmaceutical sciences Badoer et al. (2021), human physiology (Brown et al., 2019), sales and marketing (Peterson & Dover, 2014), and business and professional communication (Carmack & Heiss, 2018) disciplines. In the present study, the minority of students not planning to use LinkedIn in the future, or undecided, gave the reasons that they did not think it was an effective way to make connections, it was not relevant to their career path, and because their connection requests went unanswered. These reasons are consistent with those observed by others (Peterson & Dover, 2014; Starcic et al., 2017) and align with the contention that people who do not use LinkedIn are inclined to overlook the benefits and do not know how to use the site or find it confusing (Colbeck, 2015). Alternatively, there may be value in modifying the assessed module to provide students with choice

in the networking tool they engage so we support their development of connectedness capabilities if they do not resonate with LinkedIn. Other professional networking tools include Behance, Medium, Meetup, Xing, and Bark.

In summary, students from a wide range of disciplines saw the value of LinkedIn for their future careers, and this tended to be the case if they had completed a LinkedIn assignment or associated in-class activities. Students who had not been exposed to the social networking tool tended not to appreciate the potential benefits LinkedIn has to offer. Collectively, the findings support the call of Bridgstock (2019) that social media sites such as LinkedIn should be used as a CDL tool in higher education programs.

Student use of LinkedIn

In the present study, 80% of students in the final year of their undergraduate degree did not have a LinkedIn account prior to the beginning of the assignment. This finding is echoed by several other studies (Badoer et al., 2021; Peterson & Dover, 2014; Russ, 2015; Starcic et al., 2017), indicating that most students do not take the initiative to create and use a LinkedIn account unless prompted. Indeed, Carmack and Heiss (2018) found that students are infrequent and passive users of LinkedIn. A lack of engagement with the social media tool has the potential to diminish students' graduate outcomes and hinder their careers (Bridgstock, 2019).

In the present study, 87% of students intended to use LinkedIn in the long-term future, which is consistent with the findings of McCorkle and McCorkle (2012) who reported that 89% of students intended to use LinkedIn to search for employment opportunities and to support their career. Sixty-one percent of students in the present study indicated that they continued to use LinkedIn in the four months post-assignment, with more than half of students using it to update their profile and connect with professionals. Fewer than half of students used LinkedIn to read other profiles and build relationships with professionals. Two years post-assignment, 92% of students still had LinkedIn profiles, with most having updated their profiles and grown their connections. McCorkle and McCorkle (2012) similarly found, through a simple post hoc review, that former students continued to update their profiles after graduation and into their careers, although the authors did not comment on the time frame. Together, these findings indicate that if students are exposed to LinkedIn during their higher education studies, they are inclined to continue using LinkedIn beyond the bounds of an assignment.

Connectedness capabilities

Building a connected identity

Four months after completing the assignment in the current study, most students were confident in creating and using their LinkedIn profile, indicating that they had begun to build social network literacy and a connected identity. Similarly, Brown et al. (2019) reported that over half of the students were confident in their ability to use LinkedIn. Analysis of written reflections demonstrated that students had begun to advance their connectedness capabilities related to developing social network literacy and building a connected identity. Given that 80% of students in the present study did not have a profile prior to the assignment, it is hypothesised that the process of completing the assignment was instrumental to students' beginning to build their social network literacy and connected identity. This hypothesis is supported by the findings of Badoer et al. (2021), that students in first and third years of their course had little confidence using LinkedIn prior to engaging in scaffolded in-class LinkedIn activities, however, after the class activities 36% of first year students were confident (4 fold increase) and 68% of third year students were confident (over 5 fold increase). These findings are aligned to others who have shown that casual use of social media by students does not translate to the ability to confidently and ably use it for work and career (Benson et al., 2014; Pozzi, 2015). Bridgstock (2019) advises that it is mostly through exposure and experience that individuals learn how to use LinkedIn

advantageously for career development. Taken together, these findings indicate that LinkedIn assignments or related in-class activities are important for introducing students to LinkedIn and helping them to develop social network literacy and a connected identity.

Analysis of students' LinkedIn profiles in the present study showed that over half of students had updated their profile headline, summary, experience, and education in the two years post-assignment. A minority of students had updated their profile photo. Bridgstock (2019) contends that LinkedIn can be used for career identity development, and states that as students update their LinkedIn profiles, they are revising their career identity. The LinkedIn summary, or "I am" statement, can connect many incongruent education and career experiences with an all-encompassing statement about career intent and activity, which can incite deeper thinking about career identity (Bridgstock, 2019, p. 147). Analysis of student profiles two years after completion of the assignment showed that few profiles had headlines (6%) and summaries (38%) that adequately addressed personal strengths, skills, or aspirations and were unlikely to engage the reader and make them want to know more. The lack of long-term career aspirations apparent in the headlines and summaries suggests students limited their aspirations to completing study or getting their first job, and not for whole of career development. This suggests that students were not developing their pre-professional identity, or were at least not conscious of doing so, even as they engaged in specialist postgraduate education with defined career outcomes.

This is consistent with the findings of Slone and Gaffney (2016) showing that most students did not include work passions, key skills and unique qualifications in their LinkedIn summary. The findings also resonate with Daniels and colleagues (2021) who analysed 340 publicly available LinkedIn profiles of students that reported attending community colleges in America. The authors found that key sections of students' profiles were often left blank, and profiles did not convey students' unique value proposition. Collectively, the findings indicate that there is much scope in the higher education sector for CDL activities to explicitly introduce students to what is meant by professional identity and the value in communicating features of their identity to others, including through social media. Opportunities may also exist for higher education institutions to provide ongoing professional development to alumni to support graduates to continue developing their connected identity as part of their life-long learning journey.

Professional networks

Most students in the current study placed a degree of importance on using LinkedIn to develop connectedness capabilities related to professional networks. In agreement, Brown et al. (2019) reported that students felt it was important to connect with others on LinkedIn, and Gerard (2012) found students valued people as an important career asset. Aligned to this, students perceived LinkedIn to be a useful tool for social networking and making connections for employment and career (McCorkle & McCorkle, 2012; Peterson & Dover, 2014). Collectively, these findings indicate that most students who have been exposed to LinkedIn see its value for making professional connections with others. This should give confidence to educators who are considering embedding LinkedIn as a CDL tool in higher education curricula.

Over half of the cohort in the present study rated their connectedness capabilities related to forming and working with professional connections as good, very good, or excellent, whereas over 30% rated them as poor or fair. Evidence shows that LinkedIn assignments encouraged students to build their networks. Russ (2015) reported that students' average number of connections before an assignment was 6, and post assignment was 27. Similarly, Peterson and Dover (2014) reported that pre-assignment the average number of students' connections was 6 and post assignment was 52. Gerard's (2012) findings showed that over half of students thought LinkedIn helped them develop a professional network and make greater use of professional contacts. These findings differed from those of Carmack and Heiss (2018) who surveyed students on their perceptions of LinkedIn and found that less than half of students were comfortable using LinkedIn to communicate with their

connections, and students were unlikely to use features of LinkedIn that allowed them to proactively network and connect with potential employers. Brown et al. (2019) found through analysis of students' reflections, that although they appreciated the value of connecting with others on LinkedIn, development of connectedness capabilities were at the foundational level. Most students demonstrated the ability to grow connections, but the connectedness capabilities of strengthening and maintaining connections, and working with connections were only apparent in a small number of students, and this was despite students being in their final year of an undergraduate degree. This may be related to the fact that most students had created a LinkedIn account for the assignment and were novice users of social media for professional purposes.

Similarly, in the present study, just under half of students rated their ability to strengthen professional connections as poor or fair. Analysis of students' LinkedIn profiles in the present study showed that students' average total connections increased from 37 to 88 in the two years post-assignment. Students' mutual connections with staff also increased, but not to the same extent. This suggests that students had been making connections beyond their initial networks (comprised predominantly of staff, fellow students, and a small number of professionals) which likely included professionals in wider networks on LinkedIn. Further research is required to evaluate these professional networks to determine whether the connections are 'weak' or 'strong' (Bridgstock, 2020) and if, and how, graduates are strengthening and maintaining connections. These results are promising, as active participation and networking are argued to be a crucial element of success for members on LinkedIn (McCabe, 2017). It is therefore not surprising that employability scholars attest that the connectedness capabilities are understated in higher education curricula (Bridgstock, 2019). This also aligns with proclamations that CDL should be embedded as assessable and iterative components in the higher education curricula, and introduced early in degree programs to allow time for the development of career management capabilities (Bridgstock, 2009, 2019; Bridgstock et al., 2019). The findings presented here suggest that students should be encouraged to build professional networks early in their degree, so they have time to hone their skills relating to making connections, maintaining, and strengthening connections, and working with connections.

Future research

Undertaking further longitudinal analysis of the LinkedIn profiles discussed in the present study would provide insight into how graduates' use of this tool changes as they progress in their careers. Interviews or focus groups with students and graduates at different stages of their careers would provide more detailed information about how LinkedIn is used and positive and negative experiences of using this platform. The nature of the connections students and graduates make could also be of interest, that is, investigation of the disciplines and industries the connections belong to and evidence of the impact of connections on the career trajectories of graduates. Future research could focus on evaluation of strategies that embed LinkedIn as assessable and iterative components in degree programs, with early integration, to determine the effect on development of students' professional networking connectedness capabilities and their ability to represent professional identities effectively in the context of social networks. It would be valuable to investigate the impact of strengthening the scaffold to provide students with more guidance on how to present themselves (their personal/professional brand) through the LinkedIn headline and summary. It is important to mention that LinkedIn may not be the most appropriate social networking tool for all disciplines. We believe that the principles of the module described in this paper would translate well to other disciplines and platforms; this could be a focus of future research.

Summary

While the internet and social media have become an integral part of our lives, harnessing their potential to support career development is just emerging. While LinkedIn has existed as a professional networking site for almost two decades, it has only recently started to be incorporated into curricula at higher education institutions, as part of their preparation of job-ready graduates. The present study found that incorporation of a LinkedIn assignment into a third-year core physiology subject prompted health science, biomedical science, and science students to create a LinkedIn account for the first time. Following completion of the assignment, most students planned to continue using LinkedIn and investigation two years after the assignment was completed found that most had indeed continued using the platform. Opportunities exist to strengthen the scaffolding within a course to support students' continued development of their connected identity to allow them to represent their professional identity effectively through social media and work with their professional networks. It is recommended that academics from all disciplines consider incorporating the connectedness pedagogy of social media, through discipline-specific authentic CDL social media tools (e.g., LinkedIn, Behance), within their programs to enhance graduate employability.

References

Adams, K., Hean, S., Sturgis, P., & Clark, J. M. (2006). Investigating the factors influencing professional identity of first-year health and social care students. *Learning in health and social care*, *5*(2), 55-68. https://doi.org/10.1111/j.1473-6861.2006.00119.x

Amabile, T. M., & Kramer, S. J. (2011). The power of small wins. *Harvard business review*, *89*(5), 70-80. https://hbr.org/2011/05/the-power-of-small-wins

Badoer, E., Hollings, Y., & Chester, A. (2021). Professional networking for undergraduate students: a scaffolded approach. *Journal of Further and Higher Education*, *45*(2), 197-210. https://doi.org/10.1080/0309877X.2020.1744543

Benson, V., Morgan, S., & Filippaios, F. (2014). Social career management: Social media and employability skills gap. *Computers in Human Behavior*, *30*, 519-525. https://doi.org/10.1016/j.chb.2013.06.015

Bridgstock, R. (2009). The graduate attributes we've overlooked: Enhancing graduate employability through career management skills. *Higher Education Research & Development*, *28*(1), 31-44. https://doi.org/10.1080/07294360802444347

Bridgstock, R. (2016). Graduate employability 2.0: Social networks for learning, career development and innovation in the digital age. *Paper for discussion*.

Bridgstock, R. (2019). Employability and career development learning through social media: Exploring the potential of LinkedIn. In J. Higgs, S. Cork & D. Horsfall (Eds.), *Challenging future practice possibilities* (pp. 143-152). Brill Sense. https://doi.org/10.1163/9789004400795_012

Bridgstock, R. (2020). *Graduate Employability 2.0 Enhancing the connectedness of learners, programs and higher education institutions* (1761140361). Department of Education, Skills and Employment. https://ltr.edu.au/resources/FS15-0241_Bridgstock_Report_2020.pdf

Bridgstock, R., Grant-Iramu, M., & McAlpine, A. (2019). Integrating Career Development Learning into the Curriculum: Collaboration with the Careers Service for Employability. *Journal of Teaching and Learning for Graduate Employability*, *10*(1), 56-72. https://doi.org/10.21153/jtlge2019vol10no1art785

Bridgstock, R., & Jackson, D. (2019). Strategic institutional approaches to graduate employability: navigating meanings, measurements and what really matters. *Journal of Higher Education Policy and Management*, *41*(5), 468-484. https://doi.org/10.1080/1360080X.2019.1646378

Brown, J. L., Healy, M., Lexis, L., & Julien, B. L. (2019). Connectedness learning in the life sciences: LinkedIn as an assessment task for employability and career exploration. In R. Bridgstock & N. Tippett (Eds.), *Higher Education and the Future of Graduate Employability* (pp. 100-119). Edward Elgar Publishing. https://doi.org/10.4337/9781788972611.00015

Byers, A. (2018). *How to Cold Connect on LinkedIn*. LinkedIn. Retrieved 6 August from https://www.linkedin.com/pulse/how-cold-message-people-linkedin-allyson-byers/

Campbell, M., Cooper, B., Rueckert, C., & Smith, J. (2019). Reimagining student employability: a case study of policy and practice transformation. *Journal of Higher Education Policy and Management*, *41*(5), 500-517. https://doi.org/10.1080/1360080X.2019.1646379

Carmack, H. J., & Heiss, S. N. (2018). Using the theory of planned behavior to predict college students' intent to use LinkedIn for job searches and professional networking. *Communication Studies*, *69*(2), 145-160. https://doi.org/10.1080/10510974.2018.1424003

Carr, C. T., & Hayes, R. A. (2015). Social media: Defining, developing, and divining. *Atlantic journal of communication*, *23*(1), 46-65. https://doi.org/10.1080/15456870.2015.972282

Colbeck, K. (2015). *Navigating the social landscape: An exploration of social networking site usage among emerging adults* (Publication No. 29242638) [Doctoral dissertation, The University of Western Ontario]. ProQuest Electronic Thesis and Dissertation Repository. https://ir.lib.uwo.ca/etd/2815

Creswell, J. W., Plano Clark, V., Gutmann, M. L., & Hanson, W. E. (2003). An expanded typology for classifying mixed methods research into designs. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 209-240). SAGE Publications.

Daniels, R. A., Pemble, S. D., Allen, D., Lain, G., & Miller, L. A. (2021). LinkedIn blunders: A mixed method study of college students' profiles. *Community College Journal of Research and Practice*, *47*(2),1-16. https://doi.org/10.1080/10668926.2021.1944932

Deschenes, E. P. (1990). Longitudinal Research Designs. In K. L. Kempf (Ed.), *Measurement Issues in Criminology* (pp. 152-166). Springer New York. https://doi.org/10.1007/978-1-4613-9009-1_7

Fowlie, J., & Forder, C. (2019). Pre-professional identity formation through connections with alumni and the use of LinkedIn. In A. Diver (Ed.), *Employability via Higher Education: Sustainability as Scholarship* (pp. 331-345). Springer.

Fowlie, J., & Forder, C. (2021). Using LinkedIn in the curriculum: How pre-professional identity development and celebrating success enhances graduates' work-readiness. Proceedings of the Learning, Teaching & Student Experience 2021 (LTSE 2021), UK, 68-73 https://cris.brighton.ac.uk/ws/files/32008060/LTSE_2021_Conference_Proceedings.pdf#page=68

Fugate, M., Kinicki, A. J., & Ashforth, B. E. (2004). Employability: A psycho-social construct, its dimensions, and applications. *Journal of Vocational behavior*, *65*(1), 14-38. https://doi.org/10.1016/j.jvb.2003.10.005

Gerard, J. G. (2012). Linking in with LinkedIn®: Three exercises that enhance professional social networking and career building. *Journal of Management Education*, *36*(6), 866-897. https://doi.org/10.1177/1052562911413464

Hooley, T. (2017). Developing your career: harnessing the power of the internet for "digital career management". *Development and Learning in Organizations: An International Journal*, 31(1), 9-11. https://doi.org/10.1108/DLO-07-2016-0066

Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative health research*, *15*(9), 1277-1288. https://doi.org/10.1177/1049732305276687

Jackson, D. (2016). Re-conceptualising graduate employability: The importance of pre-professional identity. *Higher Education Research & Development*, *35*(5), 925-939. https://doi.org/10.1080/07294360.2016.1139551

Jobvite. (2021). *2021 Recruiter Nation Report*. https://www.jobvite.com/lp/2021-recruiter-nation-report/

Khapova, S., Arthur, M., Wilderom, C., & Svensson, J. (2007). Professional identity as the key to career change intention. *Career Development International*, *12*, 584-595. https://doi.org/10.1108/13620430710834378

LinkedIn Corporation. (2020). *What is LinkedIn and How Can I Use It?* https://www.linkedin.com/help/linkedin/answer/111663/what-is-linkedin-and-how-can-i-use-it-?lang=en

LinkedIn Corporation. (2021). *LinkedIn Higher Education*. https://university.linkedin.com/

McCabe, M. B. (2017). Social media marketing strategies for career advancement: An analysis of LinkedIn. *Journal of Business and Behavioral Sciences*, *29*(1), 85.

McCorkle, D. E., & McCorkle, Y. L. (2012). Using LinkedIn in the marketing classroom: Exploratory insights and recommendations for teaching social media/networking. *Marketing education review*, *22*(2), 157-166. https://doi.org/10.2753/MER1052-8008220205

McMahon, M., Patton, W., & Tatham, P. (2003). *Managing life, learning and work in the 21st century: Issues informing the design of an Australian Blueprint for Career Development*. Miles Morgan Australia. https://cica.org.au/wp-content/uploads/Managing-Life-Learning-and-Work-in-the-21-Century-MMcM_WP_PT.pdf

Minocha, S., Hristov, D., & Reynolds, M. (2017). From graduate employability to employment: policy and practice in UK higher education. *International Journal of Training and Development*, *21*(3), 235-248. https://doi.org/10.1111/ijtd.12105

National Skills Commission. (2020). *Employers' insights on the Australian labour market*. Australian Government Retrieved from https://lmip.gov.au/PortalFile.axd?FieldID=3195317&.pdf

Peterson, R. M., & Dover, H. F. (2014). Building student networks with LinkedIn: The potential for connections, internships, and jobs. *Marketing education review*, *24*(1), 15-20. https://doi.org/10.2753/MER1052-8008240102

Pew Research Center. (2021). Social media use in 2021. *Pew Research Center*. https://www.pewresearch.org/internet/2021/04/07/social-media-use-in-2021/

Pozzi, M. (2015). 'Create a Better Online You': designing online learning resources to develop undergraduate social media skills. *International Journal of Social Media and Interactive Learning Environments*, *3*(4), 305-321. https://doi.org/10.1504/IJSMILE.2015.074011

Russ, K. R. (2015). Building professional social capital among minority business students. *Academy of Educational Leadership Journal*, *19*(3), 271.

Slone, A. R., & Gaffney, A. L. (2016). Assessing students' use of LinkedIn in a business and professional communication course. *Communication Teacher*, *30*(4), 206-214. https://doi.org/10.1080/17404622.2016.1219043

Starcic, A. I., Barrow, M., Zajc, M., & Lebenicnik, M. (2017). Students' Attitudes on Social Network Sites and their Actual Use for Career Management Competences and Professional Identity Development. *International Journal of Emerging Technologies in Learning*, *12*(5). https://doi.org/10.3991/ijet.v12i05.6778

Tomlinson, M. (2017). Forms of graduate capital and their relationship to graduate employability. *Education+ Training*, *59*(4), 338-352. https://doi.org/10.1108/ET-05-2016-0090

University of California Berkeley Career Center. (2019). *Connecting on LinkedIn: The 5-Point Email*. Retrieved 6 August from https://web.archive.org/web/20221007184221/https://career.berkeley.edu/connecting-linkedin-5-point-email

Vaismoradi, M., & Snelgrove, S. (2019). Theme in qualitative content analysis and thematic analysis. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, *20*(3). https://doi.org/10.17169/fqs-20.3.3376

Wetsch, L. R. (2012). A personal branding assignment using social media. *Journal of advertising Education*, *16*(1), 30-36. https://doi.org/10.1177/109804821201600106

Appendix 1

My Career LinkedIn (Version 1): https://doi.org/10.26181/17134220.v1