Fostering connections for professional identity formation: two case studies of Discord discipline-focused communities

Eva Heinrich and Lucila Carvalho
Massey University

This research focusses on the links between online communication environments in university teaching contexts and supporting students in their professional identity formation. The online communication environments studied have been formed with Discord (https://discord.com) to complement the learning management system by providing informal chat-based environments. These environments can be easily maintained beyond semester limitations and membership is independent of enrolment status with the teaching institution. The first of two case studies is situated in the disciplines of computer science, information technology, mathematics, and statistics. A Discord community of current and past students and academics has been active for over three years. This community has developed organically and provides students with a variety of support – for specific courses and for their disciplines more generally, for making connections with others, and for gaining insights into their future professions. The second case study examines the introduction of Discord in support of a second-year veterinary sciences course. The learning design of the course aims at connecting knowledge to practice, and at helping students to understand the links between course content and professional work. Discord was introduced as a first step towards establishing an online community of students, academics and veterinary professionals. In interviews with students (first case study) and academics (second case study) the links between the Discord communities and professional identity formation are examined.

Keywords: chat-based online communication, student-professional communities, professional identity formation

Introduction

One of the core functions of universities and tertiary institutions is to prepare students for future professional roles. Students need to develop an ability to respond to the demands of work tasks and professional workplaces, and more so, they need to understand how to deal with real-world problems so that they can meaningfully contribute to society (Markauskaite & Goodyear, 2017). Professional identity formation is seen as an important step in helping students to prepare for work life and has replaced a narrow focus on employability skills (Tomlinson & Jackson, 2021). Professional identity formation is a complex process that draws on multiple components. Nyström (2008) describes the stages of professional identity formation individuals typically go through as non-differentiated, compartmentalised and integrated identities. On their way to becoming professionals, students negotiate the interplay of the personal and professional aspects of their lives. According to Tomlinson & Jackson (2021) this process involves building human capital (specialised and generic knowledge and skills), cultural capital (insights to enable understanding of socio-cultural practices), and social capital (ability to connect with significant others) as important aspects of professional identity formation.

Nyström (2008) emphasises the important role both university and work contexts play in professional identity formation. While professional identity formation can be aided by work placements or work-integrated-learning (Jackson, 2017), community of practice models (Lave & Wenger, 1991; Wenger, 1998) are another important approach and highlight the role of higher education, for example by connecting students with alumni and other professionals (Jackson, 2016). A yearly education forum, connecting employers and students across Australian universities to network, develop skills and discuss transition-related challenges (Gill, 2018), is an example for such an initiative.

Even though many approaches may contribute to professional identity formation, professional networking can

arguably play a key role. With a general shift to online communication and networking and a reduction in opportunities for in-person meetings in times of the COVID-19 pandemic, attention has shifted to examining the affordances of online professional networking. Research in networked learning provides a solid body of evidence for professional learning as part of online, formal and informal networks, with many studies exploring collaborative learning in networks or communities (Carvalho & Goodyear, 2014; De Laat, 2012; Hodgson, McConnell & Dirckinck-Holmfeld, 2011; Jones 2015).

Studies, such as Heidari et al. (2020), establish links between online social networking and professional identity formation. Other studies foreground the use of specific platforms to foster connections amongst members of a network. For example, LinkedIn is seen as the premier online professional networking platform (Carmack & Heiss, 2018; Davis et al., 2020) and features in several studies.

Davis et al. (2020) examined engagement with LinkedIn for professional networking with a focus on finding out if online networking is comparable to in person networking. The authors found networking with LinkedIn brought a variety of career benefits. Important factors included the frequency of LinkedIn usage and learning about interests and activities based on postings of contacts to plan how to approach these contacts.

Carmack and Heiss' (2018) research was situated in a business communication studies context and aimed at helping students to successfully engage with LinkedIn for finding internships and jobs. The study showed that students mainly used passive features of LinkedIn, such as creating profiles, instead of using LinkedIn actively, such as approaching others, introducing themselves, seeking information or requesting feedback. The authors found that students are "not using the networking site for networking" and suggest that "It is unlikely that simply asking a student to launch a LinkedIn profile will teach them the communication skills needed to network effectively on the site" (Carmack & Heiss, 2018, p. 156).

A recent study by McGregor et al. (2022) introduces a project aimed at assisting students in the life sciences in the development of professional networking skills using closed LinkedIn groups. The authors refer to the importance of using online platforms for professional networking and to the need of separation between social and professional networking. Results of the study suggest that students are interested in developing their professional networking skills but lack confidence, e.g., in making their own postings. McGregor et al. (2022) found closed LinkedIn groups effective for connecting students and staff with alumni of their discipline areas.

Anders (2018) describes the redesign of an undergraduate business communications course by integrating networked learning principles and assignments targeting social networking skills. The aims included increasing students' self-efficacy to positively impact professional development, drawing on both educational and social capital. Besides LinkedIn, tools such as Google Docs and Google Communities were used to facilitate open and networked exchanges, reflecting workplace practices. Anders (2018) concluded that the opportunities for networking with professionals provided in the course was valuable for the students' professional development. Further, the networked learning with peers that occurred in the course contributed to lowering communication apprehension, preparing students for communication with professionals. Importantly, Anders (2018, p. 17) found that "students need support to overcome apprehension and to develop self-efficacy for social networking and communicating with professionals".

The Networked Learning Editorial Collective (2021) defines networked learning as involving "processes of collaborative, co-operative and collective inquiry, knowledge-creation and knowledgeable action, underpinned by trusting relationships, motivated by a sense of shared challenge and enabled by convivial technologies" (p. 320). This definition also highlights the importance of promoting connections "between people, between sites of learning and action, between ideas, resources and solutions, across time, space and media" (Networked Learning Editorial Collective, 2021, p. 320). The importance of networking for graduate students on their path towards joining academia as their professional field was raised by Kim and colleagues (2021). They emphasise the importance of relationship building, of claiming one's space as member of the academic community, of actively contributing and creating welcoming and inclusive spaces. Like the authors of other studies, Kim et al. (2021) point to the increasing importance of online engagement and describe an online community for early career job seekers. The authors used Slack as a platform, and established a Slack channel as a "supportive, inclusive, non-anonymous, and multi-way communication forum" (Kim et al., 2021, p. 310). With a focus on connecting, providing information and support, the Slack channel facilitated a supportive community of academics on a variety of experience levels.

The brief review of the literature presented sets important foundations for our research.

- Professional identity formation is a complex process that stretches over several years of study and early professional live; it requires subject knowledge but also understanding of workplace culture and finding one's place in relationships with others (Nyström, 2008; Tomlinson & Jackson, 2021).
- Higher education plays an important role in assisting students with professional identify formation (Jackson, 2016) and initiatives in variety of disciplines show how educators are trying to assist students in professional identity formation via the provision of online communication spaces; communication with peers forms a valuable step towards communication with professionals (Anders, 2018).
- Authors report that students need support to build the confidence required for active participation in online communication spaces (Anders, 2018; Carmack and Heiss, 2018; McGregor et al., 2022).

Our context and the argument for Discord

The context for our study reaches back to 2018 when a tutor in the computer science and information technology (CSIT) subject areas introduced Discord (https://discord.com) to complement the learning management system. Discord is a chat system that provides groups with dedicated online environments (servers) featuring a variety of communication channels. Anyone can setup their own servers. Users join by invitation. Discord is available at no cost, is ads-free and does not have social media features such as recommendation algorithms. Besides text-based chat, Discord also features audio and video support, file sharing and meeting support. An introduction to using Discord to assist groups is available at https://discord.com/college. In the CSIT context, the motivation for introducing Discord was to facilitate communication among students and staff by using a chat tool already popular with many of the students (personal communications). The use of Discord quickly grew, extending to all CSIT courses and, on student demand, stretching into mathematics and statistics courses. Informal observations showed that Discord was highly successful in connecting students and staff. Besides enhanced communication within courses, communities developed in which current and past students discussed a wide range of topics relating to study disciplines, course advice and professional issues. In 2022, academics in veterinary sciences started to use Discord in one of the core courses of the bachelor program. The initial aim was to increase online communication within the course setting, addressing the traditionally low levels of exchange in the learning management system forum environment. The longer-term goal was to explore how Discord could help to form an online community of veterinary students, alumni in veterinary practice and academics.

Veterinary sciences is an area with a with a strong sense of profession and a professional body that regulates study and professional learning as well as practicing requirements. Following the definitions provided in Johnson (2001), veterinary sciences is a strongly differentiated profession. The concept of professional identity, as described in Fitzgerald (2020) for health-related fields, is highly important and supporting students in the development of their professional identity should be part of their university education (Cruess et al., 2019). In contrast, CSIT can be considered a non-differentiated profession, again following the definition provided by Johnson (2001). While CSIT has some characteristics required for professions, such as an esoteric body of knowledge, professional organisations and a code of ethics, the roles within the area are highly varied and there is no professional oversight defining these roles or controlling access. Still, professionalism is an important topic, and a professional standard is highly desired, as can be seen, for example, by looking at information provided by ITP (https://itp.nz), an organisation representing information technology professionals in New Zealand. The CSIT example provides a well-established online community in a discipline area related to a loosely defined profession, whereas the veterinary studies example has an emerging online community in a discipline related to a tightly defined profession. We suggest that this context provides an interesting platform for the examination of opportunities for supporting students in professional identity formation.

In contrast to the studies reviewed in the introduction, the online communities we are looking at are based on Discord and not on LinkedIn or Slack. We are not aware of other research on professional identity formation in Discord communities. Based on prior research (Heinrich et al., in print; Kahu et al., in print) we suggest that Discord is well-suited to support online communities that facilitate students' development of professional identity. Discord provides an environment for informal communication, where connections among students and between students and staff can flourish and makes it easy to maintain active communities beyond semester durations and course enrolments. This allows connecting students of different year levels, current and past students, and all staff from a discipline area, and creates an environment for a learning community through opportunities for engagement in collaborative, co-operative and collective inquiry (Networked Learning Editorial Collective, 2021).

Methodology

The two discipline areas described in the context for this research form the two case studies for this article. The first case study focused on the analysis of the use of Discord in combination with Moodle in the context of CSIT, mathematics and statistics courses at a New Zealand university over several years of teaching. Nineteen students were interviewed, and the resulting data were analysed using both structured and thematic coding, initially guided by literature on student engagement (Kahu & Nelson, 2018) and communication spaces (Healey et al., 2008). The second case study focuses on the use of Discord in combination with Moodle and content provided via kuraCloud in a second-year course (130 students) in veterinary sciences at a New Zealand university. This study is in progress and for the first phase four teachers involved in the course were interviewed from a learning design perspective (Goodyear et al., 2021). Both studies were assessed following our university's ethics guidelines and conducted under the low-risk ethics notifications framework.

For the research presented in this article we analysed the data collected for the two studies under the angles of discipline communities and the development of professional identities. For the first study we were able to build on existing codes such as university-wide-connection, outside-university-connection, non-course-discussion and ongoing-connection. For the second study we focused on coding for the veterinary professional community and community hopes based on Discord, as well as statements relating the students' readiness to participate in the communities. Participants are referred to using pseudonyms.

Findings

Case Study 1: Computer Science, Information Technology, Mathematics and Statistics (CSIT)

Looking at the first case study, our focus in this article is on the exchanges that happened within the discipline communities beyond course boundaries. In CSIT, staff operating the Discord server had set up a variety of community channels open to anyone on the server beyond semester times. The community channels stay open and do not close when the teaching semester ends. This sense of connection is important, as Stevie said, 'people do still talk to each other in the other [non-course specific] channels which are available permanently'.

The students welcomed the ability to connect with others across courses on a social level and to gain insights about other people's experiences, as identified by Jennifer who mentioned, 'it is nice to chat with people who have done the same sort of thing'. Similarly, Dixie who described how the Discord channels facilitate connections across courses for off-campus students, said 'we can see each other, we can talk about how it's all going'. The special importance of the Discord community for off-campus student was also reported by CJ, 'as a distance student, it helps sort of give you that camaraderie of studying'.

Being able to connect with more advanced students was seeing as valuable. Both Rabbit ('I can talk to someone who's taking like a level up') and Stephan ('they've helped me along with it') talked about receiving help from more senior students in mastering the concepts. Others, like Kate, emphasised the usefulness of having help regarding course advice.

> Kate: It's good for gaining insight on courses and how people found them and recommendations for future study too.

Participants pointed out how the Discord community helped making industry connections. This can be as simple as listening in as described by Kate who follows conversations to check 'if there's anything in the industry that's interesting going on'. The Discord community includes part-time students who already have professional roles and alumni. Ben refers to this connection when saying 'they can also provide even more insight' as compared to undergraduate peers, who are not yet in professional roles. Ben benefitted from being pointed into the right direction when wanting to learn things 'related to [his] career'. Similarly, Stephan also made the connection to the professional space:

> Stephan: I've made a couple of friends from Discord, and that has been useful in my career. One of them, is I believe starting to do his masters now, he is a Senior Solutions Architect. I was asking how to progress, interview tips and things like that, hiring people, and he helped me with that, and I, myself have got a job with […] now

The students expressed the valuable role Discord plays in facilitating connections to others who share their passions for their subject areas. The computer science and information technology server has a programming

channel and Ben has used this channel to talk to others 'about programming specifically' and found this highly useful as 'programming is a large part of [his] major'. Likewise, Amy enjoyed how their statistics lecturer used Discord to share 'live videos about R' and how helpful this was even for 'someone not doing those specific courses necessarily'. Jennifer and Stevie described how students have created a channel for 'people who are interested in pursuing higher level maths' (Jennifer).

> Stevie: We invite other [university] students who are taking any maths courses, and we post resources, and we have study sessions together. We also have a bunch of things that, you know, people can jump in on so just like fun maths videos that you might want to learn about so you can tell that these guys they, they really love math and they want to have fun and understand it. And that's what, what, Discord has facilitated for us.

Case Study 2: Veterinary (VET)

The course at the centre of our second case study is an anatomy and physiology course taken by all students enrolled in a bachelor's in veterinary science. Students work through lectures and quizzes online in their own time. Twice-weekly sessions on campus provide opportunities to explore, discuss and consolidate knowledge. A central aim of the course is to guide from recall of facts towards application in clinical situations to prepare students for when 'they're standing in a surgery with one of the surgeons in fifth year' (Jude). The learning activities were designed to challenge students, to put them into situations of 'productive struggle' (Ash), while providing them with enough support to find solutions. The teaching team focuses on the importance of making students ask questions as formulating those questions is 'really helpful for identifying the gaps in your knowledge' (Mia). The course design allows lecturers to build 'rapport with the students' (Jude) instead of being the 'anonymous person' (Jude). The students work in groups, for example in analysing weekly problem scenarios. Besides targeting subject knowledge, this aims at building strong relationships among students to help them cope with the demanding degree program. Establishing connections is perceived as highly valued by the lecturers:

> Sam: What they don't understand is that they need those connections with their classmates to be able to survive the degree, you know it's a long, hard degree, you need your peers.

> Ash: It's really important that they get good social relationships with each other, because it's … a five-year degree, is a long haul, the workload is really intense, and they need to look after each other.

Part of the motivation for strengthening the online communication component of the course 'is to include the people who weren't able to make it to the lab in person' (Jude), something that has been an issue over the last years, with international students being located offshore and others isolating at home, with COVID-19. The Discord online communication space has been used to provide updates, for example by posting about the weekly case studies, but also for strengthening relationship building, as 'they had all of Semester one last year, and yet they don't know who other people are in the class' (Sam). Using Discord aimed at improving online interactions, as previous experience was that the forums in the learning management were hardly used. As Mia said, 'it's replaced what might have previously happened [on Moodle] in the forums, but never really worked that well'. The idea was to 'get that same kind of feeling of interaction [as in the hands-on sessions on campus] and just keep it going throughout the week, rather than just on Friday or Tuesday classes' (Ash). Besides strengthening the communication within the course, a longer-term goal is to connect students across year levels, and with past student, practicing vets and staff.

> Ash: I definitely want to eventually explore that whole kind of vertical possibility of Discord, across cohorts and new graduates even, or whoever the whole profession.

As a first step towards connections across year-levels, several third-year students were invited to join the Discord community. Staff were hoping for 'students in the class to ask questions and have some senior students chime in and sort of help answer them' (Jude), and for getting 'peer teaching going' (Ash). The thought was that the second-year students might relate more easily to their senior peers than to staff, and also that senior students can have an opportunity to experience being on a tutor role.

Compared to the very low levels of online communication on the learning management system forums in previous years, more exchanges happened in the Discord environment, even if that only 'has happened to a small degree' (Jude). There were postings around tutorial question, for example related to the completion of diagrams, where 'another student might offer their own version that's got the missing part' (Ash) and 'there's

quite a bit of discussion' (Sam). Some of the exchanges have created valuable learning opportunities for the whole class.

> Jude: [There] have been like really good questions, like really nice for someone to ask it and then for everyone to be able to see the answer.

While seeing 'huge potential', Ash says 'we haven't really realised it yet'. The students who asked questions online 'are probably the ones that would also tend to dominate discussions in any kind of like format' (Ash) and 'the vast majority of our students don't tend to use it to post questions' (Jude). While the questions posted by the strong students have been valuable, Mia would have liked to see 'some more conversation about some more basic concepts … more helpful for a bigger proportion of the class'. Jude observed that most interactions consist of students posting questions and staff providing answers and said, 'I don't know if we've quite developed that sort of peer-to-peer aspect so much yet'. A lack of confidence seems to be an important factor in the hesitancy to contribute to the Discord community. Mia reported on conversations with students who explained their hesitancy in contributing with their own postings.

> Mia: They are too shy to post anything on Discord because they think that the other students know more than them and what they've asked to be silly.

Being part of the veterinary profession and a tightly controlled degree structure offers opportunities for the establishment of a rich online community. All students take the same courses, 'we have essentially … a continuation of the same course next semester' (Jude) and introducing Discord 'the first time this group would be brought together would be quite different' (Mia). Veterinarians in New Zealand are tightly connected. As the only veterinary school in the country, the school educates new vets, provides professional development and plays an important role in the registration of overseas-trained vets. As Ash puts it, 'it's a very, very small veterinary world'. Due to these connections, practicing veterinarians feel close to the university and are willing to get involved. Ash stated, 'I'm always amazed … how many vets in practice actually really want to contribute to student training', and explained how this could be done, for example by posting photos of cases and challenging students to come up with diagnoses. Within the university, Discord provides opportunities to enrich students' learning by posting events from the associated teaching hospital, with 'putting up cool stuff … things that are relevant … have happened in the vet hospital' (Ash).

Discussion

The first case study shows evidence of well-established online community that connect students across year levels and are sustained year-round beyond semester times. Students discuss their discipline areas, ask for and receive course advice, ask for and receive insights relevant to their career development. This evidences that human and social capital building is happening in the Discord community. Students use the online space for networking, in contrast to what Carmack and Heiss (2018) reported in their study in which students did not engage in networking. Like in the closed LinkedIn group researched in McGregor et al. (2022), the Discord community serves to connect students with alumni. As the professionals who are part of the community are recent graduates (or part-time students working already in industry), the community forms a relatively low stakes environment that allows students to build confidence, something also valued in the study by Anders (2018). Students build relationships in the Discord community, similar to Kim et al.'s (2021) observations from their Slack community, and students also benefitted from contact with professionals from their professional area, like reported by Anders (2018).

The second case study describes the early efforts of a group of teachers aiming to build an online community for their discipline of veterinary sciences. While using Discord has increased the levels of online communication compared to prior reliance on the tools in the learning management system, the utility of the new Discord online community is still under negotiation. Though a good first step, challenges around student confidence were observed and seem to have limited a richer exchange. The hesitation to contribute actively compares to experiences reported by McGregor et al. (2022). Davis et al.'s (2020) thought, that those already good in networking face-to-face might be also good doing the same online, is reflected in the observations on the contributions of the veterinary students. Introducing Discord may require careful consideration for strategies that can help foster interactions.

The second case study is situated in veterinary sciences, an area linked to a strongly differentiated profession. This means that the program of study is highly regulated, with all students taking the same set of courses. It also means that a close professional community exists in which the university plays a central role. The study

participants have expressed a strong desire to reach into this professional community via an online environment that brings the professional community and students together. They see valuable opportunities for their students to benefit from interactions with veterinarians outside the university and in the university's teaching hospital. Such interactions would align well with the aims of the course discussed which is designed to guide students on their path towards professional practice.

We suggest that professional identify formation is happening as part of the interactions in the Discord communities discussed in the first case study. This developed organically, facilitated by the informal nature of the Discord environment, and by the way the Discord channels were setup to provide communication spaces for discipline areas. Other publications (Heinrich et al., in print; Kahu et al., in print) explain why it is unlikely to achieve such online communities within learning management systems. The second case study shows the potential for supporting professional identity formation using Discord as part of a learning environment. While there is a long way to go, first steps in increasing online communication have been achieved, and, besides the efforts of the teaching team in encouraging interactions, students and teachers also need to get familiar with the affordances Discord provides. We assume Slack could be used in similar ways to Discord based on the experiences reported by Kim et al. (2021). We know that Ash considered the use of Slack but decided for Discord on hearing about the success in the CSIT area. We suggest that LinkedIn would be less suited than Discord. LinkedIn's focus is on creating profiles and networking to improve one's positioning for the job market. This is important, yet this seems to be more related to the later stages of professional identify formation. While it is possible to create closed groups and connect students and alumni in LinkedIn (see McGregor et al., 2022), students first need to grow in confidence, and need to develop their professional networking skills over time. Setup as in the CSIT context, with community channels and channels dedicated to individual courses, Discord provides multiple opportunities for students to engage and grow, from making course specific postings in a small group to engaging in a wider range of topics with the larger community. Discord is a chat tool that foregrounds transient conversations (past conversations are available to search without drawing too much attention on the individual). This adds to Discord lowering barriers to participation (publication under review) and is in stark contrast to LinkedIn which centres on attention to the individual and their professional identity.

Conclusion

Professional identity plays an important role in graduates' successful transition into professional roles. Professional identity formation is a complex, lifelong process that draws on personal, private and professional spheres of life. The years of university education play an important role in identity formation and institutions should integrate support for identity formation into their programs. While this can be in the shape of work placements or work integrated learning, initiatives within the university are also important and of particular importance in assisting students with a gradual development of skills and confidence levels.

We have looked at two case studies. The first study focused on student voices and showed evidence of professional identity formation in organically developed online communities in CSIT, mathematics and statistics contexts using Discord. The second study, situated in veterinary sciences, explained the rich opportunities for assisting students in their professional identity formation via an online community based on the characteristics of the strongly differentiated veterinary profession. The study described the learning design of a specific course that aims at preparing students for professional practice. The first attempt to establish a Discord community was reviewed and highlighted the need for assisting students in building confidence for active participation, a pre-requisite for successful professional networking. The study also reveals that strategies for encouraging participation are also needed, as the platform alone does not magically encourage students' co-operation or collective inquiry. We suggest looking at the Discord communities from two directions – as a welcoming space for the development of skills and confidence; and as a space that allows outside, professional influence into the teaching settings.

We see many opportunities for further research, some of which are related to the limitations of our work so far. Our first case study draws on interviews with students. What students reported shows clear links to professional identity formation. Due to the qualitative nature of the study, we cannot assess what proportion of the students in the discipline areas covered take an active role in Discord and experience professional identity formation. We did not have access to the Discord chat data for our research. Informally we know that the Discord communities continue to go strongly and feature many exchanges related to professional development. Gaining access to the chat data would open up valuable research directions, for example in attempting to link exchanges in the course and community channels to the stages of professional identity formation.

The data collection for our second case study continues and will include a survey with the students taking the

course. The resulting data should provide further insights, for example on how students explain the apparent reluctance to engage actively and their awareness of opportunities for professional identity building. The teachers we interviewed see a strong potential in establishing a vibrant Discord community that links students across year levels and interfaces with veterinary professionals. They are committed to push further ahead and we hope to be able to research their progress.

References

Anders, A.D. (2018). Networked learning with professionals boosts students' self-efficacy for social networking and professional development. *Computers & Education*, *127*, 13–29. https://doi.org/10.1016/j.compedu.2018.08.009

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

Carvalho, L., & Goodyear, P. (Eds.). (2014). *The architecture of productive learning networks*. Routledge.

Cruess, S.R., Cruess, R.L. & Steinert, Y. (2019). Supporting the development of a professional identity: General principles. *Medical Teacher, 41*(6). https://doi.org/10.1080/0142159X.2018.1536260

Davis, J., Wolff, H.-G., Forret, M.L. & Sullivan, S.E. (2020). Networking via LinkedIn: An examination of usage and career benefits. *Journal of Vocational Behavior*, *18*, 103396. https://doi.org/10.1016/j.jvb.2020.103396

De Laat, M. (2012) *Enabling professional development networks: How connected are you?* Open Universiteit of the Netherlands.

Fitzgerald, A. (2020). Professional identity: A concept analysis. *Nursing Forum*, *55*. https://doi.org/10.1111/nuf.12450.

Gill, R. (2018). Building employability skills for higher education students: An Australian example. *Journal of Teaching and Learning for Graduate Employability*, *9*(1), 84–92. http://doi.org/10.21153/jtlge2018vol9no1art739

Goodyear, P., Carvalho, L. & Yeoman, P. (2021). Activity-Centred Analysis and Design (ACAD): Core purposes, distinctive qualities and current developments. *Education Tech Research Dev, 69*, 445–46. https://doi.org/10.1007/s11423-020-09926-7

Healey, P.G.T., White, G., Eshghi, A., Reeves, A.J. & Light, A. (2008). Communication spaces. *Computer Supported Cooperative Work*, *17*, 169–193. https://doi.org/10.1007/s10606-007-9061-4

Heidari, E. Salimi, G. & Mehrvarz, M. (2020). The influence of online social networks and online social capital on constructing a new graduate students' professional identity. *Interactive Learning Environments*, https://doi.org/10.1080/10494820.2020.1769682

Heinrich, E., Thomas, H, & Kahu, E. (2022). An exploration of course and cohort communication spaces in Discord, Teams and Moodle. *Australasian Journal of Educational Technologies, 38*(6).

Hodgson, V., McConnell, D., & Dirckinck-Holmfeld, L. (2011). The theory, practice and pedagogy of networked learning. In L. Dirckinck-Holmfeld, V. Hodgson, & D. McConnell (Eds.), *Exploring the theory, pedagogy and practice of networked learning* (pp. 291–305). Springer.

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

Jackson, D. (2017). Developing pre-professional identity in undergraduates through work-integrated learning. *Higher Education, 74*, 833–853, http://doi.org/10.1007/s10734-016-0080-2

Johnson, D.G. (2001). Professional ethics. In Johnson, D.G (Ed.), *Computer Ethics* (3rd ed.), (pp. 54–80). Prentice Hall.

Jones, C. R. (2015). *Networked learning: An educational paradigm for the age of digital networks.* Springer.

Kahu, E. R., & Nelson, K. (2018). Student engagement in the educational interface: Understanding the mechanisms of student success. *Higher Education Research & Development*, *37*(1), 58-71. https://doi.org/10.1080/07294360.2017.1344197

Kahu, E, Thomas, H., & Heinrich, E. (2022). "A sense of community and camaraderie": Increasing student engagement by supplementing an LMS with a Learning Commons Communication Tool. *Active Learning in Higher Education* (Online first). https://doi.org/10.1177/14697874221127691

Kim, S.-Y.S., Leboyits, H. & Shugars, S. (2021). Networking 101 for Graduate Students: Building a Bigger Table. Cambridge University Press. https://doi.org/10.1017/S1049096521001025

Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation.* Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511815355

Markauskaite, L. & Goodyear, P. (2017). *Epistemic Fluency and Professional Education. Innovation, Knowledgeable Action and Actionable Knowledge*. Springer.

McGregor, A., Sherry, L., Price, K., Le Vin, A., Stubbs, F., Boguslawska, Z. & Connor, K. (2022, 29 March). LinkedIn to Get In: Increasing student awareness and confidence in professional networking through embedding LinkedIn into undergraduate bioscience course. *15th Annual University of Glasgow Learning and Teaching Conference*. http://eprints.gla.ac.uk/269428/

Networked Learning Editorial Collective (NLEC) (2021). Networked Learning: Inviting Redefinition. *Postdigital Science and Education* 3, 312–325. https://doi.org/10.1007/s42438-020-00167-8

Nyström, S. (2008). The Dynamics of Professional Identity Formation: Graduates' Transitions from Higher Education to Working Life. *Vocations and Learning*, 2:1-18, https://doi.org/10.1007/s12186-008-9014-1

Tomlinson, M. & Jackson, D. (2021). Professional identity formation in contemporary higher education students, *Studies in Higher Education*, 46:4, 885-900, https://doi.org/10.1080/03075079.2019.1659763

Wenger, E. (1998). *Communities of Practice: Learning, Meaning, and Identity*. Cambridge University Press.