



Social learning in a longitudinal integrated clinical placement

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Abstract Recent research has demonstrated that longitudinal integrated placements (LICs) are an alternative mode of clinical education to traditional placements. Extended student engagement in community settings provide the advantages of educational continuity as well as increased service provision in underserved areas. Developing and maintaining LICs require a differing approach to student learning than that for traditional placements. There has been little theoretically informed empirical research that has offered explanations of which are the important factors that promote student learning in LICs and the relationships between those factors. We explored the relationship between student learning, student perceptions of preparedness for practice and student engagement, in the context of a rural LIC. We used a sequential qualitative design employing thematic, comparative and relational analysis of data from student interviews (n = 18) to understand possible processes and mechanisms of student learning in the LIC. Through the theoretical lens of social learning systems, we identified two major themes; connectivity and preparedness for practice. Connectivity described engagement and relationship building by students, across formal and informal learning experiences, interprofessional interactions, social interactions with colleagues, interaction with patients outside of the clinical setting, and the extent of

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integration in the wider community. Preparedness for practice, reflected students' perceptions of having sufficient depth in clinical skills, personal and professional development, cultural awareness and understanding of the health system, to work in that system. A comparative analysis compared the nature and variation of learning across students. In a relational analysis, there was a positive association between connectivity and preparedness for practice. Connectivity is a powerful enabler of students' agentic engagement, collaboration, and learning within an LIC. It is related to student perceptions of preparedness for practice. These findings provide insight for institutions wishing to develop similar programmes, by encouraging health professional educators to consider all of the potential elements of the placements, which most promote connectivity.

Keywords Professional development · Clinical education · Longitudinal integrated clerkships · Preparedness for practice · Social learning system · Connectivity · Rural and remote health education · Work place learning

Introduction

Longitudinal integrated placements are an increasingly researched alternative mode of clinical education. Extended placements in community engaged settings provide educational continuity with subsequent educational advantages as well as increased service provision in underserved areas (Crampton et al. 2013; Hirsh et al. 2012; Strasser and Hirsh 2011). Longitudinal integrated placements, also known as longitudinal integrated clerkships (LICs) in the North American literature, are effective for advancing student learning of science and clinical practice. They enhance professional identity, and support workforce goals such as promoting students' interest in primary care and rural and remote practice (Thistlethwaite et al. 2013). Several papers document the increasing use of longitudinal integrated placements and provide insight for institutions that may wish to develop similar clinical programs (Hirsh et al. 2012; Norris et al. 2009; Shahi et al. 2015). Longitudinal placements are considered to be of at least 6 month's duration, and tend to follow a community-based education model integrated in different community contexts e.g. concurrent general practice and hospital team membership, unlike traditional placements, which tend to focus on only one clinical area for a shorter period of time. They are designed around principles of continuity and integration with a focus on particular areas, for example, rural and remote health and interprofessional learning. A defining feature is that students who "participate in the comprehensive care of patients over time, have longitudinal learning relationships with those patients, and clinicians." (Dornan et al. 2014)

Much of the current literature has been concerned with the logistics of running such programmes and with providing descriptive evaluations (Thistlethwaite et al. 2013; Ellaway et al. 2013; Brooks et al. 2014). There has been some explanatory research to understand which aspects of the longitudinal integrated placement are most impactful on student learning. In transitioning into an LIC, students can experience moments of confusion and burnout, contrasting to the eventual gains in confidence and competence in the clinical roles of a physician (Dubé et al. 2015). Student engagement in LICs arises from consistent, wider, and more direct access to patients and can be enhanced through structured systems of supervision and through the provision of authentic roles for students in

clinical teams (Shahi et al. 2015). The contribution of this paper is to further develop explanatory research as to how longitudinal placements shape student learning. This would allow medical and health science educators to further determine which elements of their placements could be enhanced to impact student learning, at both the individual student level and at the program level.

Theoretical framework

Two promising strands of inquiry in providing a richer theoretical perspective from which to view longitudinal integrated clinical placements are first, the social learning literature, and second, the work-based learning literature. Social relationships in clinical placements are critical to the development of professional identity, which is considered an important process in learning and teaching in clinical placements (Dornan et al. 2007; Roberts et al. 2012). Dornan et al. (2014) have described learning in a clinical placement as taking place “within relationships between students, patients and doctors, supported by informal, individual, contextualised and affective elements of the learned curriculum alongside formal, standardised elements of the taught and assessed curriculum.” In exploring links between learners in different domains in education research, researchers have conceptualised relationships in a learning environment as a social network. Researchers in the health professional field have explored student’s social networks by focussing on individual networks (Hommes et al. 2012; Woolf et al. 2012). Rienties et al. (2013) have explored inter- and intra-group dynamics within a social network in order to explore why some learners or groups are actively looking to extend their internal and external group network, while other learners are primarily focussed on their own group (Rienties and Kinchin 2014). A key methodological component of the analysis of the social interactions influencing student learning is developing and analysing quantitative measures developed from qualitative data (Hommes et al. 2012; Rienties et al. 2013).

Learning outcomes are often discussed in terms of preparedness (or readiness) for work or the trainability of the learners (Billett 2015). Scholars across many disciplines have examined the affordances of student learning in the context of the environment in which they eventually practice as a professional. There is evidence that work related learning has a positive influence on student learning outcomes, and their readiness for work or preparedness for practice (Warren 2012; Burford et al. 2014; Morrow et al. 2012; Svirko et al. 2014). Medical students’ preparedness for practice as junior doctors can be improved by prior experiential, work-based learning in clinical practice during their medical programme (Brennan et al. 2010). There are a number of ways in which the nature of learning in clinical placements can influence preparedness for practice (Westerman et al. 2013; Tokuda et al. 2010). For example, early clinical exposure allows medical students to ‘act-up’ as junior doctors and may ease their transition to internship (Brennan et al. 2010; Hauer et al. 2012; Daly et al. 2013a); At the same time failure to be prepared for practice can have negative consequences. For example, insufficient preparedness is a significant contributor to stress and ultimately burnout in the early junior doctor years (Brennan et al. 2010; Willcock et al. 2004). Daly et al. (2013b) have suggested that within the context of a longitudinal placement, developing clinical skills, particularly procedural skills, and professional behaviours, were key factors in influencing student’s confidence in being prepared for work as a junior doctor.

The underlying theory exploring the readiness for work-based learning, (Billett 2015) draws a distinction between what individuals might know, are able to do, and what they value (i.e. intended learning outcomes, competencies or expected professional activities)—not just what they know, and the context in which they learn. Billett et al., stress the importance of aligning experiences with what those practicing the profession are expected to know, do and value (Billett 2015; Billett and Sweet 2015). Billett suggests that what students learn in the workplace depends on how and to what degree they engage. Full engagement makes the students become agentic learners (Billett 2009). However work-places differ in their affordances, which are situational factors that invite and support learner participation (Billett 2001, 2015).

This research was initially informed by Daly et al. (2013b) who suggested that longitudinal integrated placements can be conceived of as a social learning system (SLS), based on theories of situated learning (Wenger 2000; Lave and Wenger 1991). Thus the placement could be conceived of as a series of learning spaces, through which students traversed as they built their own social learning networks (Hommes et al. 2012; Rienties and Kinchin 2014; Woolf et al. 2012). Through their formal and informal interactions with their peers and other network contacts, students may passively or actively engage in a dialogue with others about their learning in practice. In an SLS, students are thought to engage with a specific community of practice, which is contained within each of these learning spaces. In longitudinal placements students commonly move through general practice, the Emergency Department of a hospital, or a community-led service, and therefore students are typically engaging with multiple communities of practice, each with their own social rules that need to be negotiated in the pursuit of learning. Daly et al. (2013b) suggested that there were three factors that helped explain the impact of the placement on student learning and their preparedness for practice; ‘Geography of Place’, ‘Learning Spaces’ and ‘Connectivity’. Geography of Place was drawn from Cresswell’s (2014) social geography definition of the “location” and “locale” of the place where the clinical learning was based, and a “sense of belonging” that students had with the professional and broader community hosting the longitudinal placement. The location offers particular affordances (i.e. situational factors that invite and support learner participation) (Billett 2001, 2015) for student learning through work in a range of clinical practices, and the locale (i.e. culture) is responsive to student engagement (Billett and Sweet 2015). Learning spaces (Wenger 2000) provide a structure for communities of practice and their production and reproduction of knowledge (Lave and Wenger 1991). These learning spaces provide student learning opportunities that can be both formal and informal in nature, (Eraut 2000; Hafler et al. 2011) both of which contribute in differing ways to students acquiring appropriate clinical knowledge, skills and competencies, and professional behaviours. Formal learning is considered to be learning around structured activities organised by both the home medical school program and the program of the hosting department of rural health. The term ‘informal learning’ provides a simple contrast to formal learning and suggests greater flexibility regarding the sources of learning. Informal learning recognizes the significance of learning from other people, but implies greater scope for individual agency in terms of realising learning opportunities (Billett 2001; Richards et al. 2013). Informal learning takes place in the spaces surrounding activities and events with a more overt formal purpose, and occurs in a much wider variety of settings than formal education or training (Eraut 2004). Student engagement is dependent on both the learner and the context (Billett 2015; Billett and Sweet 2015; Reeve and Tseng 2011). It is an important educational outcome in its own right as a marker of students’ positive functioning, but its further importance is in

predicting highly valued outcomes, such as students' academic progress and achievement (Reeve and Tseng 2011).

Despite this range of possible factors which might shape student learning in an LIC, there has been little theoretically informed empirical research which offers explanations of which are the important factors that promote student learning and the relationships between those factors. In the context of a longitudinal clinical placement viewed through the lens of SLS and work place learning theory, our research aims were to explore the associations between student learning, student perceptions of preparedness for practice, and student engagement, in the context of an LIC hosted by a rural community.

Methods

Research context

Our research context is the “The Broken Hill Extended Clinical Placement Program” (BHECPP) program. A decade long collaboration between the community of Broken Hill and several universities, developed by Broken Hill University Department of Rural Health (BH UDRH), has brought about a variety of clinical placement programs for students from 16 differing disciplines (Lyle et al. 2006). Broken Hill is an outer regional population centre of 19,500 in Far West New South Wales. The region is socioeconomically disadvantaged with a high burden of chronic disease, and increased prevalence of behavioural risk factors such as smoking in pregnancy, obesity, and physical inactivity (Kennedy 2005). These issues are amplified across Indigenous communities in the region. As with other rural and remote centres, the Broken Hill health workforce includes a significant fly-in-fly-out population.

The Broken Hill extended clinical placement program, described in detail elsewhere, (Roberts et al. 2012) is an integrated multi-university program in rural and remote medicine for senior medical students in the last 2 years of medical school. Students from three Australian Universities, Sydney, Wollongong (Graduate programs) and Adelaide (Undergraduate program) live and work in the rural and remote setting and surrounding regions for between 6 and 12 months. Clinical learning occurs in community and hospital settings, including remote healthcare teams and with the Royal Flying Doctor Service (RFDS). All students are hosted by a general practitioner (GP) supervisor for the duration of their stay, and work for an average of four sessions each week in the practice, some of which employ a parallel consulting setting. Students live in accommodation hubs with other student health professionals, also undertaking clinical placements, and are encouraged to engage in broader community activities (sport, music, community service, volunteering etc.).

Data collection

Our data consisted of interviews with 18 medical students from three consecutive cohorts who undertook their longitudinal clinical placements in Broken Hill during 2010 ($n = 6$), 2011 ($n = 5$), and 2012 ($n = 7$). This was a representative 75% sample of the cohort of 24 medical students who had consented to be interviewed by MD near the end of their longitudinal placement between 2010 and 2012. Of the 18 students, 9 were male and 9 were female. The students were from the Universities of Adelaide ($n = 5$), Sydney

($n = 6$), and Wollongong ($n = 7$). Interviews were semi-structured, open-ended, and designed to draw out issues of significance for participants in relation to their experience of the longitudinal placement. The interview guide was drawn from the then-current literature on integrated placements and important processes in exploring learning and teaching in clinical placements. Interviews explored students' perceptions and experiences of learning, their interactions within and outside the clinical learning environment, prior rural experience, motivations for choosing the placement, their expectations including any anxieties and perceived preparedness for living and working in a rural location, barriers to living and working rurally, types and sources of support, and reflections on their own personal and professional growth. All interview data was transcribed and de-identified prior to analysis by removing participants' names and any other identifying information. Institutional ethics was received (Human Research Ethics Committee, Protocol No: 11674).

Data analysis

This study used a sequential design (Bakeman 1997; Small 2011) as an established method of “illuminating dynamic processes of social interaction” (p. 1), following the methodology of Miles and Huberman (1994). We undertook three forms of analysis; thematic, comparative and relational, using the methods detailed by Bazeley (2013). This is an emerging methodology within health professional education, to explore student learning (Askill-Williams and Lawson 2006; Visschers-Pleijers et al. 2006) and workplace learning (Cuyvers et al. 2015). It has been used in the wider educational research literature investigating teacher learning (Zwart et al. 2008) and online learning communities (Jeong 2003).

In the thematic analysis, initial coding focused on the socio-cultural influences of the experiences, interactions, and beliefs that impacted on student learning. Next, we debated our interpretations and understandings of the data through a series of meetings and emails. This helped in refining or re-labelling the codes, and clustered them into both main and sub-themes. At this stage of the data analysis, we noted that the emergent themes from the inductive analysis resonated with key constructs within both SLSs theory and workplace learning. At this point we discussed the value of integrating these theories as the theoretical framework for this paper. Codes were then related to concepts within this literature, and those that didn't fit were further revised, until we had developed a thematic framework, which was applied to a portion of the dataset by three authors (MD, CR and FH). Subsequently, we checked for any new and emerging issues of importance that would extend the analysis. MD applied this coding schema to all 18 interviews.

Also at this point we were interested to what extent we could help “visualise the invisible” by quantising the qualitative data (Hommes et al. 2012). We then undertook a comparative analysis, (Bazeley 2013) in order to compare students case by case. This type of cross-case analysis enabled us to “explore similarities and differences across cases” (p. 275). Cases, adequately sampled and carefully analyzed, assist in answering reasonable questions of data to make sense beyond the specific case. We were able to explore and describe how widely the different themes and subthemes were represented in the data. For this comparative analysis the third author (FH) independently coded the 18 transcripts to determine the frequency of occurrences of each major theme and subthemes. In this way the data was transformed from textual responses to numeric form allowing the creation of a simple matrix which Bazeley (2013) describes (p. 301) as a ‘proximity matrix’. This visual representation of the coding framework was undertaken as a way of portraying information succinctly and efficiently. The matrix illustrated details provided in longer textual

information (Bazeley 2013), and collated themes and subthemes that 'belong together' (Miles and Huberman 1994).

Finally, for the relational analysis, in a process akin to a correlation, non-parametric correlations of the frequencies of themes and subthemes were undertaken. Qualitative data was handled in NVivo (QSR 2012. International Pty Ltd. Version 10), and quantitative analyses and graphing were conducted in R (R Foundation for Statistical Computing, Vienna, Austria 2014).

We employed the quality criteria of qualitative research based on trustworthiness criteria; confirmability, dependability, credibility, transferability, and application (the pragmatic value of the research) (Lincoln and Guba 1986; Miles and Huberman 1994).

Results

Thematic analysis

Our findings suggest there is a complex relationship between student learning, student perceptions of preparedness for practice, and student engagement, in the context of an LIC hosted by a rural community. We found two important aspects, which impacted student learning from the perspective of a SLS. The first is 'connectivity,' and the second is student's perceptions of 'preparedness for practice'. (see Fig. 1) Connectivity describes a process of learning through proactive engagement with the differing types of learning situations that could be experienced within the LIC. Students exhibited connectivity depending on the extent to which they engaged and learnt from *formal* and *informal learning experiences, interprofessional interactions, social interactions with colleagues, interaction with patients outside of the clinical setting, and the extent of integration in the wider community*. Students' perception of their preparedness for practice describes the extent to which students felt they had sufficient depth in *clinical skills, personal and professional development, cultural awareness, and understanding the health system*. The students are referred to by their number in the dataset.

In considering connectivity, the *Formal Learning Experiences* sub-theme addressed the interactions that students have as they perform the duties and activities that are prescribed by their course program, and in contrast with informal learning, resonated with the definitions provided by Eraut (2004). These formal experiences included their work in their placement with a GP supervisor, hospital duties in their allocated wards, and planned activities during visits to remote communities. Typical student activities would include

...presentation of cases and doing exams or doing procedures like taking blood or inserting and things like that. S12

In contrast *Informal Learning Experiences* captured more serendipitous clinical activities, beyond the mandated program, such as assisting clinical staff in other wards, and following patients from general practice into hospital. One participant described the nature of being proactive in gaining additional informal learning experiences from receptive staff.

.... through asking for things but also just from staff being willing and ready to identify the learning opportunities and treating you as an almost doctor. S09

Through their engagement in their own clinical education through self-advocacy, and self directed learning most students demonstrated themselves to be what Billet termed “agentic learners” (Billett 2009; Richards et al. 2013). This resonates with Reeves and Tseng’s (2011) notion of agentic engagement.

..because you’re helping them out they want to teach you more as well, so it works both ways. S02

Next we identified *Interprofessional Interactions* with members and students of other health disciplines, such as nurses, physiotherapists and speech pathologists. Also, professional interactions with other members of the community, such as the police, teachers or community leaders. These enabled the medical students to develop their sense of learning with, and from a range of healthcare professional students, enabling “a broader sense of who is responsible for the bulk of community care.” S12

We get to see the speech pathologists, OTs, physios, everyone out in the student accommodation so you do get to interact with a lot of other students which is really nice ‘cause as a med student you can get very med student centric. S08

While *Interprofessional Interactions* were characterised by their professional nature, the theme *Social Interactions with Colleagues* specifically captured extra-curricular interactions of a social nature, with other students, supervisors, and other health professionals. Social relationships could traverse the anticipated hierarchy of clinical seniority.

Especially being a small hospital, you get to socialise with all the different levels of doctors S02

One participant explained the value of this deeper engagement with the healthcare community;

...having that social and educational and professional relationship you just get, you just want to be a sponge. You just want to soak it all up. S08

The subtheme *Patient Interactions—non-medical* highlighted interactions with patients that they had socialised with outside of the medical setting, for example serendipitously encountering patients they had seen in the clinical setting.

You would see someone who’s relative had died and you’d see them three weeks later in the shopping centre and things like that. S12

The subtheme of *Community Integration* summarised students’ engagement with members of the public and their participation in the cultural life in Broken Hill.

I very quickly met lots of different circles of people and of course Broken Hill isn’t that big and you would go to [the supermarket] and run into people, and that kind of sense of frequently seeing the same people makes you feel like you belong there. S15

Such engagement was mediated by Creswell’s notion of the social geography of the city in terms of its isolated location, its locale and the sense of belonging the students felt (Creswell 2013).

Within the theme of “Preparedness for Practice,” we identified four subthemes across which students expressed their depth of learning; *Clinical Skills*, *Personal Professional Development*, *Cultural Awareness* and *Understanding the local health system*. The subtheme *Clinical Skills* summarised the students’ learning of clinical, practical and proce-

dural skills relevant to their profession, under clinical supervision. The several opportunities to learn procedural skills under supervision with real patients, rather than in the simulation laboratory was valued.

The second time I sutured, I did the anaesthetics, I did the sterile environment and just did it myself. S17

Personal Professional Development captured the students' self-efficacy, and confidence, such as feeling confident in their own assessment of patients they had seen on their own, and for handover to the clinicians.

I just feel a lot more prepared and confident for handing over cases or being in perhaps sort of a tough situation for the future. S14

They developed a sense of professional identity as they socialised within the social order of the rural healthcare community (Bernstein 2000; Wenger 2010). This included an appreciation of how to manage stress and maintain balance and well-being in the role of a rural and remote health professional.

We've got all these amazing role models who love their medicine and are passionate about their medicine but also have a great cultural and social life as well S08

Cultural Awareness described the students' familiarity with cultural, and also socio-economic issues and the challenges that are specific to rural health and indigenous health such as

...being able to see how people live and why that produces particular health issues. S12

In particular understanding the social determinants of health in a cultural context

Everyone knows that Aboriginals have worse health and die 15 years younger or whatever so, whereas I found coming out here and experiencing a lot more, you get a better feel for it. S06

They were able to practice their cultural awareness because of being immersed in the community. For example during a visit to schools, one of the medical students linked up with school pupil who was an Aboriginal and Torres Strait Islander and

...had a yarn about Indigenous pathways into health careers." S13.

The use of the word yarn, suggested cultural competence in that medical student, who had recognised the importance of story telling (yarning) in Indigenous culture ("Australian Indigenous HealthinfoNet: Yarning Places" 2016). *Understanding the local health system*, the final sub-theme, addressed insights specific to how the health system in Broken Hill worked by

.....just to be on the other side and to see how everybody's job works and how it all fits together. S05

Comparative analysis

Case comparison helped to develop our understandings by exploring differences and similarities across student cases (Bazeley 2013; Miles and Huberman 1994). When transformation of all the textual data was undertaken, the mean number of codes, per

interview, associated with connectivity, across all 18 transcripts was 45.9 (SD 19.4), and the mean number associated with preparedness for practice was 20.7 (SD 11.9)—see Table 1.

The visual display of the comparative distribution of thematic codings for both, connectivity and preparedness for practice is shown in Fig. 2. For this, we looked at the individual codes on each sub-theme as detailed in Table 1 and illustrate the occurrence of each sub-theme (represented as variations in shading) in each interview (represented as bars). The bar charts in the top panel (Fig. 2a) show how often the interviewees addressed aspects of connectivity throughout their interviews, whereas the lower panel (Fig. 2b) shows the occurrence of preparedness for practice subthemes.

In detail, the bar charts for connectivity (Fig. 2a) illustrate proportional estimates of the occurrences of students' social learning interactions in each of the themes making up connectivity. Namely, formal and informal education, interactions they had with members of other health disciplines, interactions with colleagues (not necessarily part of the program) of a more social nature, their interactions with patients outside, and lastly their integration with the local community. Noteworthy, is that formal learning features prominently in all but one interview, contributing around a third of the interactions. However, the other elements consistently account for more than half of the students' overall experience of the longitudinal integrated placement. Informal education experiences that are characterised as going beyond the prescribed structure of the placement, as well as interprofessional interactions with other health practitioners make up the largest part of the remaining themes. However, with the exception of two students (S03 and S06) the social nature of learning outside the clinical context (social interactions with colleagues and community integration) account for up to a quarter of the occurrences. Few students reported on interacting with patients outside of the professional setting.

The relative proportion of each of the preparedness for practice outcomes are depicted in Fig. 2b. We found that the majority of students report progress regarding their personal professional development, as the key element in their preparedness for practice. This includes shaping their professional identity, their sense of belonging, but also their self-efficacy and confidence in their skills and capabilities. Improvements in their clinical and procedural skills are the second most-important topic that is mentioned throughout most student interviews, followed by an improved understanding how a rural and remote health system, especially the local system in Broken Hill, operates. Lastly the majority of students mentioned their increased understanding of cultural and socio-economic issues during the placement.

Investigating the patterns between the themes, we find that those students that refer more frequently to subthemes of connectivity often also report more experiences that increased their preparedness for practice. At the same time individual interviews explain the mechanisms of this process: students that show a higher degree of connectivity more often accept opportunities to learn and report more often about receiving information or being asked to help or participate in tasks that led to an increased preparedness for practice.

Relational analysis

On investigating the relational patterns between the two sets of themes, we used the count of themes and subthemes as an indicator of importance of these themes in any particular interview (Onwuegbuzie and Teddlie 2003). Converting the qualitative data to quantitative coding allows us to use descriptive quantitative analysis to more easily identify interrelationships between emerging themes and patterns in the data that would not be readily

Table 1 Mean and total number of occurrences per student interview by main theme and subtheme

Definition of theme/sub themes	Mean (SD) of occurrences per student interview	Total no. of (sub)theme occurrences across all interviews
Connectivity	45.9 (19.4)	827 (total)
Formal learning experiences (prescribed duties and activities: GP, hospital, remote communities)	15.9 (7.8)	286
Informal Learning experiences (activities beyond mandated program: helping out in other wards, proactivity)	8.8 (4.1)	159
Interprofessional interactions (interactions with nurses, physiotherapists and speech pathologists, as well as police, teachers or community leaders)	7.7 (4.5)	138
Social interactions with colleagues (socialising with students, supervisors and other health professionals)	6.3 (4.2)	114
Patient Interactions (non medical) (interactions with patients outside of the medical setting)	0.4 (0.7)	7
Community integration (Interactions with members of the public, cultural events)	6.8 (4.3)	123
Preparedness for practice	20.7 (11.9)	374 (total)
Clinical skills (clinical, practical, procedural skills)	3.0 (1.8)	54
Personal and professional development (self-efficacy, confidence, professional identity, balance and well-being)	12.1 (8.4)	218
Cultural awareness (sensitivity to cultural and socio-economic issues)	2.3 (2.5)	42
Understanding the health system (specific insights about the local health system)	3.3 (2.5)	60

evident in the detail of the qualitative analyses (Bazeley 2013; Morgan 1998). Considering the small sample size, we used nonparametric methods to identify these relations. Overall the number of interview segments relating to connectivity and preparedness for practice across all 18 transcripts shows a strong positive significant correlation. Frequent references to aspects of connectivity were found to be consistently associated with frequent references to perceived preparedness for practice, (Spearman's Rank, $r = 0.66$, $p < 0.001$). Accounting for the variability in interview duration, we repeated this analysis for the percentage of each interview text that was associated with the themes. The average proportion of an interview that had codes associated with connectivity was 44.5% (SD 18.1%), and the average proportion associated with preparedness for practice was 24.9% (SD 15.1%). Analysis of the relative codings confirmed the positive associations of the previous analysis, but at lower thresholds for significance tests ($p < 0.05$).

Discussion

Within a longitudinal clinical placement, we have explored the associations between student learning, student perceptions of preparedness for practice, and student engagement, in the context of an LIC in a rural community. Our findings suggest that connectivity is an important mediator of student learning, and strongly related to student engagement. This



Fig. 1 Key themes and subthemes

develops the concept of ‘connectivity’ as a process of learning through engagement and relationship building by the students within and across a series of learning spaces, for example in primary care or within a particular hospital based team. This resonates with the definition of Wenger (2000) who suggested that connectivity is a process by which students access the ‘rich fabric’ of learning spaces and is thought to involve “brokering relationships between people who need to talk or between people who need help and people who can offer help.” In the LIC, viewed as a SLS, students traverse learning spaces, which contain differing communities of practice e.g. a formal learning experience in the seminar room, or an informal learning experience in the emergency department.

Connectivity provides an explanation as to how students embed themselves in an authentic medical and social context, and how this is associated with enhanced student learning and preparedness for practice. It encompasses a readiness for engagement with the learning environment for knowledge production through informal and formal learning. Connectivity describes a process by which learners identify, negotiate and cross the boundaries of the communities of practice contained within these learning spaces, (Wenger 2010) through their desire and motivation to form and maintain social bonds (Baumeister and Leary 1995). It captures the relationships and interactions of students, which provide a rich range of meaningful learning experiences both formal, and informal whilst working in a longitudinal clinical placement in a rural and remote setting. The importance of informal learning gained through social learning relationships in the LIC reflects Eraut’s (2004) emphasis on the importance of informal learning in the workplace. Connectivity enhances students’ links with the professional community through role modelling and mentoring opportunities, which are often synergistic to students learning, and contributes to the formation of their professional identity. It offers opportunities to take up interprofessional learning by learning with, from, and about other healthcare disciplines (CAIPE 1997). Connectivity also requires the growth of trust over time, a more general characteristic of students’ legitimate peripheral participation, as they become more central to the communities of practice in which they learn (Lave and Wenger 1991). At the same time connectivity provides students with opportunities for greater social inclusion and a sense of belonging, a feature of the geography of place (Cresswell 2014; Daly et al. 2013b).

Preparedness for practice describes an appreciation of having appropriate clinical skills, professionalism, cultural awareness, and knowledge of the health system to work in the

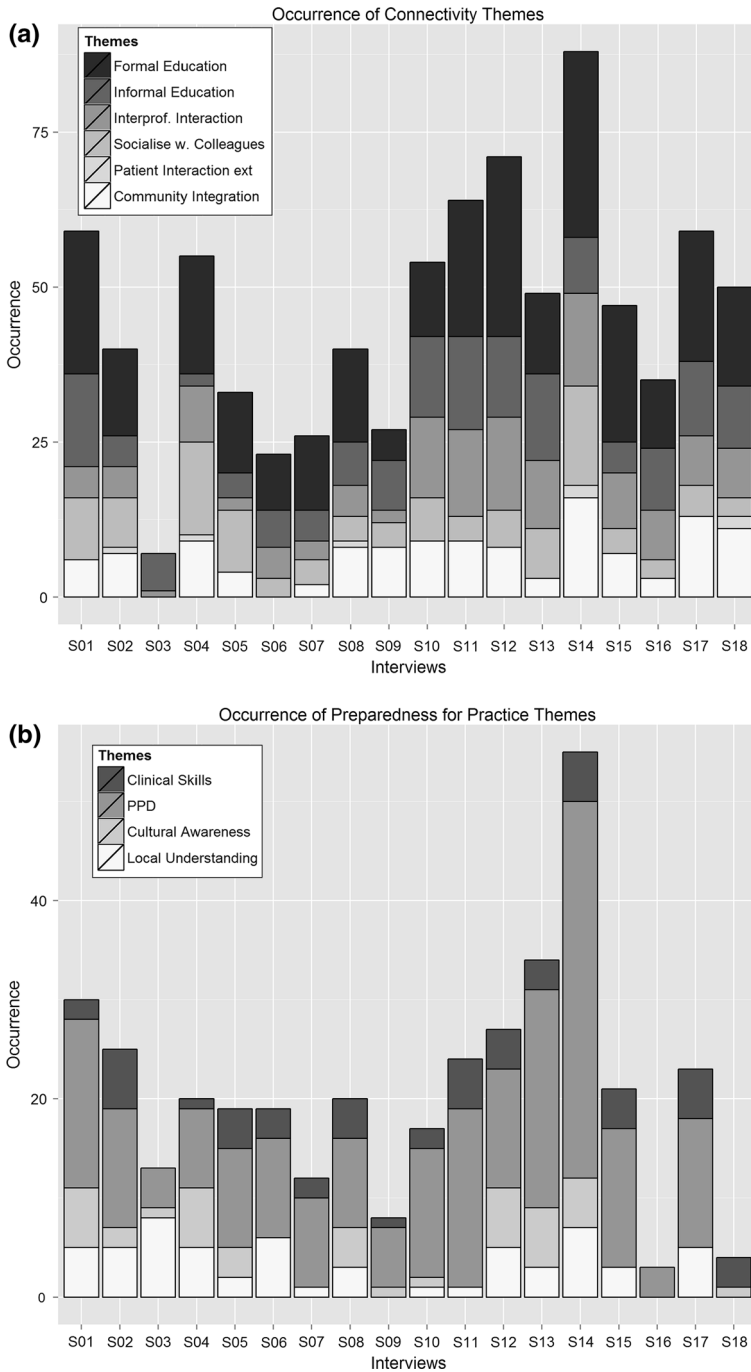


Fig. 2 Visual display depicting the occurrence of themes in each interview. Individual subthemes of connectivity are shown in (a) and preparedness for practice in (b)

rural setting not only as a student but also as a future health care professional. Students' increased preparedness for practice was realised through enhanced opportunities for personal and professional development, practicing clinical skills, and the necessity of being cultural competent. Coming face to face with disadvantaged communities helped students develop personally by increasing confidence, and self-efficacy. These include opportunities to 'act up' as an 'almost doctor' in a safe, well supervised environment. This picture of the beneficial learning outcomes, both clinical and professional, of these types of extended placements has been severally acknowledged (Crampton et al. 2013; Hirsh et al. 2012; Strasser and Hirsh 2011; Thistlethwaite et al. 2013; Brooks et al. 2014; Ellaway et al. 2013; Norris et al. 2009).

Our finding suggest that most students had enhanced their preparedness for practice by becoming agentic learners, (Billett 2009) and making the most of the affordances of workplace learning that the community of Broken Hill and its health services offered (Billett and Sweet 2015). They were not simply engaging in the longitudinal placement at a cognitive, emotional, and behavioural level but were actively contributing to the learning they received. This resonates with (Reeve and Tseng 2011) notion of agentic engagement. Such students contribute constructively into the flow of the education they receive, by personalizing it and by enhancing both the learning and the conditions under which they learn. Walton et al., suggest that "a mere sense of social connectedness" can cause one to take on board the values, goals and motivations of others (Walton et al. 2012). Given that the students in our study did have a sense of social connectedness, this may explain why they were more motivated to seek learning opportunities during the LIC. Agentic engagement, (Reeve and Tseng 2011) which includes the broader engagement at a community level, helped the students to get a better perspective on socioeconomic determinants of health and indigenous health issues, and enhanced the quality of patient interactions. Individual students engage differently with the differing types of learning opportunities that are available, whether informal, formal or interprofessional interactions in the clinical workplace or within more social interactions.

Implications

Our findings indicate that the Broken Hill Extended Placement Program is significantly different from traditional urban hospital based placements where student learning is focused around major clinical disciplines. However, there are some similarities with other rurally based LICs, where students also spend several months in a community setting. For example in Ontario, Canada, (Dubé et al. 2015), or in Northern New South Wales, Australia (Birden et al. 2016). Our paper adds to the literature in extending explanatory understanding of longitudinal placements as a SLS (Daly et al. 2013b) informed and shaped by theoretical concepts drawn from student work based learning, including sociological and social network perspectives (Billett 2009; Guile and Griffiths 2001; Engeström 2001; Reeve and Tseng 2011). It highlights the importance of agency and connectivity. It has suggested that within an LIC, connectivity is a critical student learning strategy, and an important pathway to student perceptions of preparedness for practice. Successful longitudinal integrated placements should acknowledge the need to develop new curriculum frameworks, which enable students to relate to social learning opportunities. This can allow health professional educators to reflect on the ways in which the elements of a placement might be changed in order to enhance student learning, at the student level, and at the program level, underpinned by theory development.

For students to enrich their social networks in their interactions with other students, staff, or community members, they need to develop strategies to create a joint problem-solving space in which they can negotiate boundary crossing between differing individuals, groups and disciplines. It is during these boundary spanning activities that knowledge is transferred, translated and transformed between students and those they engage with (Rienties and Kinchin 2014; Akkerman and Bakker 2011).

The formal aspects of curriculum provide important structure to learning. The concept of connectivity would broaden the focus of health professional educators away from formal learning and promote informal learning, and social interactions. The role of the supervisor (Kilminster and Jolly 2000) in the longitudinal placement needs to evolve to take account of the importance of the varied learning spaces and the communities of practice within them. The supervisor needs to focus student attention not on just mastering individual skills defined beforehand, but on the operations and activities of the work community and the student's own participation in it, and evaluating their own practice as supervisors (Collin and Valleala 2005). In this way they encourage agentic engagement (Reeve and Tseng 2011) and learning for students (Billett 2009). To promote social learning, supervisors could orientate students beginning a placement, by facilitating students to develop their connectivity, as a key process of self-directed learning. Supporting students to understand the significance of connectivity constitutes a challenge for learning and teaching, for academics and clinical teachers as well as those with responsibility for development of the placement at the community level. Additional support may be required for the minority of students who demonstrate little agency. Thus health professional educators need to resist the prevailing 'instructional discourse' in work place learning (Beck and Young 2005; Bernstein 2000; Hammick 1998; Wheelahan 2007) and focus on process skills which are transferable and will enhance preparedness for future learning transitions, (Kilminster et al. 2011) rather than the achievement of specific learning outcomes from a formal learning program.

The orientation for students undergoing such a major learning transition as entering an LIC is important, so that students' level of preparedness for such an intensive learning period is optimised (Dubé et al. 2015; Kilminster et al. 2011). This particularly relates to preparing students for agentic engagement (Reeve and Tseng 2011) and agentic learning (Billett 2009). For new students to the LIC, the forming and maintaining social bonds (Baumeister and Leary 1995) is important. The successful mediation of students' learning relationships is based upon recognition that learning involves the negotiation of learning as part of the workplace experience (Griffiths and Guile 2003). However, we suggest that the SLS theory extends useful concepts from workplace learning theory, as learning is significantly contributed to by immersion in the community beyond the workplace.

The challenge in integrating wider community engagement in order to create further possibilities for workplace learning is for participation and collaboration across a diversity of communities of practice, both within and across institutions (Akkerman and Bakker 2011). Host organisations of an LIC, such as the Broken Hill University Department of Rural Health should consider how they can further enhance opportunities for students to gain work experience in a wide and diverse range of 'communities of practice'. This is a matter for further research. Future research could also undertake further analysis of the social interactions influencing student learning by developing the methodology of finding meaningful quantitative measures of learning developed from qualitative data using social network analysis (Hommes et al. 2012; Rienties et al. 2013).

Strengths and limitations

As far as we are aware this is the first paper in the clinical education literature to use a cross-case comparative analysis and a relational analysis following the method of Miles and Huberman (1994). We acknowledge that many qualitative researchers believe Miles and Huberman's methods are too focused on trying to address positivist concerns of reliability and validity and have a tendency to reductionism, losing the richness of the qualitative data. From a methodology perspective our research has provided "a more credible and more detailed understanding of the meaning of the phenomenon" of longitudinal integrated placements (Creswell and Tashakkori 2008). In particular the cross-case analysis revealed causal processes and mechanisms, (Small 2011) that deepened our understanding and explanation of the SLSs model when applied to a longitudinal clinical placement. We acknowledge that the relational analysis between the major themes of connectivity and preparedness for practice is exploratory in nature and was undertaken to illustrate the methodological issues in quantising larger data sets of social learning relationships in a future social network analysis. Although our findings add to the literature, their generalisability to other contexts may be limited. The implementation of LIC in sites around the world has been significantly different.

Conclusions

Our findings indicate connectivity, the forming and maintaining of social bonds through relationships and interactions, is a fundamental learning process within a longitudinal placement. Connectivity is a powerful enabler of students' agentic engagement, collaboration, and learning within a SLS. It is related to student perceptions of preparedness for practice. These findings help provide insight for institutions that wish to develop similar programmes, by encouraging health professional educators to consider the elements of the placements, which most promote health connectivity, participation in practice, and social learning.

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