

**Peer Assisted Learning in Higher Education:  
Towards an Integrated Conceptual Framework  
for Theory and Practice**

Submitted by  
Ana Garcia-Melgar  
BPsych (Hons), M.Ed.

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La Trobe Rural Health School  
College of Science, Health and Engineering  
La Trobe University  
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# ABSTRACT

Peer Assisted Learning (PAL) programs, whereby experienced students provide support to fellow students, have gained increased visibility within academic and support systems in higher education contexts. Findings from numerous studies into PAL suggest that PAL strategies can effectively contribute to student academic and socio-psychological development in terms of increased academic grades, study skills, self-efficacy in academic contexts, retention, persistence and psychological satisfaction with their studies. Despite positive assessments of the value and impact of PAL, there has been limited development of its theoretical framework. As a result, research has focused on providing evidence of PAL effectiveness, but not on the processes that enable success, which remain under-theorised. Presented in this thesis are four studies and one theoretical paper that propose, apply and refine a framework of effective peer learning relationships in PAL. These papers develop understandings of PAL processes that contribute to effective peer learning dynamics and consequent student outcomes. Building on a critical analysis of PAL empirical evidence and the theoretical foundations of peer learning, a conceptual framework to study peer learning interactions that acknowledges peer-to-peer relationships, congruence between students, help-seeking behaviours, and the impact of contextual variables on PAL dynamics is introduced. Subsequently, the conceptual framework is applied to two different PAL contexts with the aim of examining the development of peer relationships and interactions between conceptual framework variables. Collectively, the studies that form this thesis demonstrate that social and cognitive congruence between peers are key to successful peer learning relationships and can be employed to monitor relationship quality and assess PAL effectiveness. Rather than being inherent characteristics of PAL environments, congruence can be affected by student-level and contextual factors - including differences in cognitive development between students providing and receiving support, and training/support offered to PAL mentors. Interactions between students' help-seeking goals and motivations when seeking support, their expectations about PAL, and contextual factors surrounding PAL programs can potentially impact peer learning relationships and outcomes for participants. Implications for the development of theoretical frameworks for peer learning and the implementation of PAL programs in higher education are also discussed.

# STATEMENT OF AUTHORSHIP

This thesis includes work by the author that has been published or submitted for publication as described in the text. Except where reference is made in the text of the thesis, this thesis contains no material published elsewhere or extracted in whole or in part from a thesis accepted for the award of any other degree or diploma. No other person's work has been used without due acknowledgement in the main text of the thesis. This thesis has not been submitted for the award of any degree or diploma in any other tertiary institution.

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A handwritten signature in blue ink that reads "Ana M. Garcia". The signature is written in a cursive style with a long, sweeping underline.

Ana Garcia-Melgar

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# LIST OF ABBREVIATIONS

PAL Peer Assisted Learning

PASS Peer Assisted Study Sessions

PL Peer Learning

PLA Peer Learning Adviser

PM Peer Mentoring

PLR Peer Learning Relationships

STEM Science, Technology, Engineering, and Mathematics

SI Supplemental Instruction

# Chapter 1. Introduction

---

Peer Assisted Learning (PAL) programs have become central strategies to support students' academic and social development from primary to tertiary education (Topping, Buchs, & Duran, 2017). PAL programs employ the beneficial influence of peers – students of similar ability, equivalent age, or social standing – to provide enrichment opportunities and skills development (Breece, 2012; Calhoon & Fuchs, 2003; Iyer, 2011; Latino & Unite, 2012; Mattatall, 2011; Ross & Cameron, 2007). PAL's unifying theme comes via the individual and their interactions with peers, whether one-on-one, one-to-many or among groups. Peer interactions feature an interpersonal relationship that serves to define PAL. An experienced student with a set of skills and knowledge (Mentor) forms a relationship with a student (Mentee) to support development of skills or knowledge (Falchikov, 2001; Kram & Isabella, 1985). The value of having peers as mentors derives from support for student learning and skills based on the recency of shared learning experiences and backgrounds. Peers can support students' development – and target specific learning needs – because they recently transitioned from mentees' current level of understanding (Lockspeiser, O'Sullivan, Teherani, & Muller, 2008; Terrion & Leonard, 2007).

Arendale (2014) identifies PAL variants to include peer mentoring, peer-led study sessions, and peer tutoring. For the purposes of this thesis, peer mentoring comprises mentors that support students to gain skills, knowledge, or abilities in the most general of contexts of study. In contrast, peer tutoring and peer-led study sessions provide academic enrichment within the framework and context of a specific subject or discipline area (Schunk & Mullen, 2013; Topping, 2005). Two additional variants reside within the peer-led study stream: Supplemental Instruction (SI) and Peer Assisted Study Sessions (PASS), in which mentors lead activities designed to consolidate knowledge and acquisition of academic skills in the context of a specific unit of study (Geerlings, Cole, Batt, & Martin-Lynch, 2016; Malm, Bryngfors, & Mörner, 2012).

In higher education, PAL programs have evolved from being considered fringe strategies to mainstream acceptance and adoption. In Australia, for example, most universities offer PAL programs as part of their suite of academic support strategies (for example, The University of Queensland, 2018; La Trobe University, 2020). The existence of academic and socio-psychological outcomes for participating students (both students providing and

receiving support) and its cost effectiveness compared to other academic and learning support programs provide one justification for the increased uptake of PAL programs (Boud, Cohen, & Sampson, 2000). A suite of additional, student centred benefits offer compelling arguments for the programs as well. PAL's reported gains include improved academic skills, academic grades and subject content knowledge (Bowman-Perrott et al., 2013; Dawson, van der Meer, Skalicky, & Cowley, 2014; Ning & Downing, 2010), self-regulation and critical thinking (Backer, Keer, & Valcke, 2011), self-efficacy, engagement and satisfaction with study and learning (Ginsburg-Block, Rohrbeck, & Fantuzzo, 2006; McKenna & Williams, 2017) and students' improved psychological wellbeing (Zentz, Kurtz, & Alverson, 2014). With the PAL literature including many positive outcomes for students, peers and institutions, predictable increases in programs – and reports on their success – become more common. So too, do the number of disciplines and researchers represented in the growing body of PAL literature, particularly in peer tutoring and peer-led study sessions.

PAL has moved from the fringe to mainstream. Yet, PAL research remains at a relatively early stage. The diversity of disciplinary backgrounds of PAL researchers has produced an eclectic suite of contributions, although several themes and tropes emerge. Any analysis of the PAL literature reveals methodological and definitional issues that challenge subsequent researchers to replicate or validate previous outcomes (Capstick, 2004; Dawson et al., 2014; Falchikov, 2001). With most research studies focused on measurement and demonstrated effectiveness, a body of literature has dominated with ensuring outcome-oriented research. In contrast, few studies have examined peer learning processes associated with success in PAL programs (Eller, Lev, & Feurer, 2014; Tamachi, Giles, Dornan, & Hill, 2018); fewer still consider interactions between the theoretical foundations of peer learning and PAL programs. As a consequence, PAL researchers have called for theoretical models to inform current and future understandings of the discipline (Crisp & Cruz, 2009; Riese, Samara, & Lillejord, 2012). These calls are neither isolated nor confined to past research or specific areas of PAL practice; instead, such calls represent an agreed increased focus on future direction in PAL research.

Duran (2017) extends the case for improved theoretically models for PAL stating that limited understanding of PAL processes impedes improved and expanded pedagogical initiatives in educational contexts. PAL, as a body of knowledge and pedagogical tool, requires the development and validation of theoretical frameworks to understand, investigate, and replicate processes associated with effective peer learning and student engagement in these programs.

In this thesis, I present five thematically linked publications that contribute to the development of theory and practice in PAL and address conceptual and theoretical gaps in the peer learning literature. The studies included in this thesis develop understandings of PAL processes that contribute to effective peer learning dynamics and consequent student outcomes. To contextualise my studies, I begin with a review of the literature.

Chapter 2 (literature review) provides an analysis, synthesis and integration of relevant themes in the PAL literature. I commence with an introduction to peer learning and its place within educational contexts. I pay attention to why and how PAL programs became formalised and implemented in higher education, then consider theoretical frameworks that underlie many peer learning pedagogies. Finally, I synthesise and frame the dominant characteristics and findings of the PAL literature to contextualise my research.

Chapter 3 (conceptual framework and thesis aims) provides an introduction to the conceptual framework on effective peer learning interactions that guided data collection and analysis of findings in subsequent publications. I use Chapter 3 to characterise the integration and thematic linkages between studies included in this thesis.

Chapters 4 to 8 present five thematically linked publications focused on: (a) developing a conceptual framework for effective PAL interactions (PLR, peer learning relationships framework); (b) applying the PLR framework to the study of student interactions in PAL programs; and (c) developing training strategies for mentors recruited to PAL programs based on the conceptual framework.

Chapter 9 (discussion and conclusion) provides a synthesis of the combined contributions of my work to the implementation and study of PAL programs in higher education.

## **A Note on Definitions and Thesis Structure**

The traditional distinction between peer mentoring and peer tutoring refers to mentoring as the provision of socio-emotional support (e.g. transition to university programs) and tutoring as the provision of academic support and learning acquisition – typically in the context of specific subjects of study in higher education. I acknowledge that learning outcomes encompass both academic/cognitive and social/emotional domains to reconcile peer mentoring and peer tutoring definitions. A review of the PAL literature indicates: (a) the reported extensive and complex benefits of PAL; and (b) socio-psychological outcomes play an important role in academic PAL programs. With a broader learning objective in mind, I use the term Peer Assisted Learning (PAL) to encompass peer mentoring and peer tutoring programs (Olaussen, Reddy, Irvine, & Williams, 2016). From this point, I use peer learning as an umbrella term to refer to pedagogical approaches underpinning PAL programs as recommended by Topping (2005): that is, that peers can support cognitive and socio-psychological development of their fellow students.

Given that this thesis is comprised of thematically linked publications, each publication provides a focused review of the literature relevant to the specific objectives of the study. To avoid repetition, I provide a context to thesis publications in the literature review (Chapter 2). Specifically, I analyse the PAL literature and establish thematic linkages that underpin the various publications.



# Chapter 2. An Overview of the Peer Assisted Learning Literature: Context, Themes, and Gaps

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In this chapter, I review literature on Peer Assisted Learning (PAL) and examine contributions of empirical and theory-driven studies to the development of PAL programs in higher education. Each publication included in this thesis provides a contextualised review of the PAL literature relevant to the topics covered in the paper. To avoid repetition and provide a conceptual basis for these publications that is grounded in the analysis of existing literature, this chapter presents an overarching, thematised analysis of the PAL literature. Chapter 3 provides a summary of thesis objectives and describes how each publication addresses conceptual and research gaps, as well as opportunities for PAL development, outlined in this review chapter. In particular, here I discuss:

- formalisation of PAL strategies in higher education, and their role within academic and university support systems;
- academic and socio-psychological outcomes for students participating in PAL programs;
- PAL research methodologies and objectives, and literature gaps in theory-driven conceptual frameworks of peer learning; and
- calls for process and theory driven research in the PAL literature.

## **2.1. PAL in Context: Changes in Students' Demographics and Learning Needs**

Globally, educational contexts, and universities in particular, are undergoing profound changes. Changing demographics, internationalisation, and policies directed to widening participation in higher education have resulted in a radically different student population (Gibney, Moore, Murphy, & O'Sullivan, 2011). Universities now cater to linguistically, culturally and academically diverse cohorts of students. Students commence and transition through tertiary studies with varying levels of preparedness and engagement (Marr, Nicoll, von Treuer, Kolar, & Palermo, 2013). Moreover, contemporary students' expectations about university have shifted from academic centres to providers of lifelong knowledge and skills relevant to their life and career futures outside university (Nilsson & Ripmeester, 2016). Together, these changes have impacted on student academic preparedness, success and

engagement with their studies. Student success, as measured by persistence, completion and attrition rates, has become an area of concern for universities from both educational and financial perspectives. As a result, universities are increasingly interested in student learning strategies that support students in the successful completion of academic studies whilst enhancing student engagement and a sense of belonging to the university community (Goldingay et al., 2014).

Universities offer support or preparatory programs to assist higher education students to successfully transition and complete tertiary studies. These academic support programs acknowledge that academic tasks at university level demand higher-level thinking and independent learning; however, many students have not acquired or mastered these skills at the time of entering higher education and, consequently, may struggle to meet academic requirements (Atherton, 2014). In addition, innovations in higher education pedagogies have resulted in an increased emphasis on student-centred approaches to learning. As such, students are being asked to engage in independent learning and become more aware of their personal as well as academic development (Beaumont, Moscrop, & Canning, 2016). Yet higher education students, and first year students in particular, may lack the necessary self-regulation and metacognitive skills to fully engage in independent, self-regulated learning. In particular, research shows that students encounter difficulties when analysing tasks, synthesising information from multiple sources, and monitoring their learning skills to reflect upon their learning process (Williamson & Goldsmith, 2013). Moreover, students may possess limited knowledge about academic requirements and what is expected from them as higher education students. Academic support programs aim to assist students in the development of the necessary academic literacy and learning skills to succeed and engage in contemporary higher education learning environments (Leese, 2010).

Williamson and Goldsmith (2013) argue that traditional academic literacy development programs (mainly based on workshops and academic skills consultations) are not only unlikely to address contemporary students' learning needs adequately but also are unsustainable in the long term. Reduced budgets have prompted universities to implement strategies to decrease expenditure and maximise available resources and staff within academic support programs. Individual academic literacy consultations with staff have been reduced at many institutions in favour of strategies that reach larger numbers of students, such as embedding academic literacy in the curriculum through collaboration with subject content academics (McWilliams & Allan, 2014). These strategies aim to address sustainability issues in academic support and maximise opportunities for students to learn and practice academic

skills in context, enhancing skill transferability and applicability. Online academic support has also become commonplace at universities, encompassing online academic literacy and support sessions as well as web-based learning content (Garcia, 2018).

Together, changes in students' academic preparedness and university resourcing of academic development strategies call for responsive programs that not only are financially sustainable, but also account for the diversity of student learning needs. Student-centred approaches to academic support and development have emerged as strategies that complement traditional staff-led programs to diversify opportunities for academic literacy development in higher education (Gunn, Lee, & Steed, 2017). Educational researchers have frequently advocated for educational settings that engage students in problem solving as an example of active learning (Hmelo-Silver, 2004). PAL programs are part of the suite of strategies that situate students at the centre of the academic learning support process. Peer learning strategies not only fit well within a shift towards student-centred learning, as these programs are led by students, but also support the development of the very skills needed to successfully engage in active learning in higher education. In this regard, PAL programs offer opportunities to engage in collaborative problem-solving with other students who act as learning facilitators, allowing for the development of self-regulated and independent learning skills in an open, non-judgmental learning environment (Copeman & Keightley, 2014; Topping, 2005).

PAL strategies in higher education have undergone several changes in their structure and objectives since the first programs were implemented in universities. Recent iterations of PAL approaches seek to address changes in student demographics and their learning needs, as well as in contemporary higher education contexts, in which online and blended learning pedagogies have become essential aspects of teaching and learning. The next section provides an overview of the implementation and development of PAL programs in higher education.

## **2.2. Formalisation of PAL Strategies in Higher Education: A Shift from Traditional Academic Support Programs to Peer-Led Strategies**

Peer groups can be a valuable source of cognitive and social support for students, especially in their first year (Skaniakos, Penttinen, & Lairio, 2014). The beneficial influence of students over their peers' academic success and psychological wellbeing has long been recognised in educational contexts, including higher education (Newcomb & Wilson, 1966). Since peers have such an impact on one another, universities have attempted to formally utilise their positive influence to academically support students. PAL programs have experienced diversification in structure and objectives as a function of rapid changes in students' learning

needs and contemporary higher education settings. In this section, I first provide an overview of the implementation of PAL in higher education and then describe widely implemented and emerging PAL programs in tertiary education contexts.

The formal implementation of PAL programs in tertiary education environments is contextualised within changes in the foundations of academic support and learning development, as described in earlier sections of this chapter. Programs employing peers as sources of academic and/or social support demonstrated a shift in the provision of support to higher education students, whereby students gained increased ownership over academic support and development programs (Hilsdon, 2014). The rapid implementation of peer learning strategies followed approaches to learning and academic skills development that steered away from previous learning deficits approaches (Dawson et al., 2014). Rather than labelling students as *at-risk* and in need of support to achieve academic targets, contemporary conceptualisations of academic literacies emphasise a developmental approach whereby students gradually learn academic literacy skills a part of their acculturation into the higher education context (Lea & Street, 2006). Peer learning strategies represented a paradigm shift within the provision of academic support and development towards student-centred approaches to academic literacy development, student retention, and engagement.

According to Falchikov (2001), Supplemental Instruction (SI) programs implemented in the 70s are the first examples of formal peer learning programs in higher education. Employing senior students (i.e. in their final degree years) as peer support for first year students, SI programs shifted the focus from at-risk students to at-risk subjects, putting the emphasis on supporting students enrolled in subjects or courses with high failure rates (Martin & Arendale, 1993). SI strategies encompass a variety of programs (known as peer tutoring or peer assisted study sessions in other countries where SI has been implemented) that offer students regularly scheduled, out of class, peer-facilitated study sessions. Rather than re-teaching content, SI leaders or mentors – typically high achieving students from the same discipline as mentored students – employ collaborative learning and knowledge co-construction strategies to help students assimilate and consolidate subject concepts (Hizer, Schultz, & Bray, 2017). SI programs are amongst the most widely implemented PAL strategies in higher education, with an extensive body of literature supporting their effectiveness (Dawson et al., 2014). The success of peer learning programs, such as SI, lies in the wealth of knowledge and experiences that mentors pass on to their fellow peers: mentors aid first year students' transition and support them in developing the skills and learning

behaviours to succeed in higher education and, in particular, in the specific subject in which mentors are placed (Arendale, 1994).

Since the first PAL programs were implemented in higher education, a variety of peer learning approaches have followed suit. The diversification of program objectives and student roles within these programs has resulted in a variety of PAL formats beyond traditional cross-age, subject-based programs. Topping (2005) identified 13 organisational dimensions in which methods for peer learning can vary. Amongst these dimensions, differences in participants' ability or educational level characterise many PAL programs. When considering the ability gap – or educational level – between participants, PAL programs can be categorised as either cross-ability or same-ability (also known in the PAL literature as symmetric and asymmetric peer learning, respectively). Moreover, students could belong to the same age group or class (same-age) or different class groups (cross-age). PAL strategies also differ in whether student roles within the program are fixed or dynamic. In fixed-role programs, one student is assigned the peer mentor role, whilst in reciprocal programs, both mentor and mentee alternatively take on the peer mentor role (Topping, 1996). Traditionally, cross-level PAL strategies have been, and remain, the most common format in higher education due to their ability to enhance academic and subject-related skills and knowledge in first year students (Topping, 2005).

In addition to subject or curriculum-based programs, recent iterations of PAL include programs that aim to increase students' general academic literacy and/or numeracy skills, and/or provide students with peer support to transition into tertiary studies and acquire necessary skills to successfully complete their studies (Holt & Berwise, 2012; Leidenfrost, Strassnig, Schabmann, Spiel, & Carbon, 2011). Examples of these programs are peer learning centres and drop-in PAL programs, which provide students the flexibility to attend PAL when they need help, rather than attending scheduled weekly sessions as in traditional SI programs. Drop-in programs aim to increase student engagement in PAL through the provision of a non-judgmental learning space where students can seek individual or group support from peers, usually high achieving students in the final years of their degree (Cooper, 2010; Demeter, 2011; Price, Wallace, Verezub, & Sinchenko, 2019). Peer mentoring and peer advising programs also offer non-curriculum-based support, although their focus is typically social rather than academic. Peer mentors in these programs usually provide assistance related to campus resources, university life, or career development opportunities (Crisp, 2010; Terrion & Leonard, 2007). Other university peer mentoring programs combine both academic and social support, and can be offered to students at the beginning of their course or as on-going

peer mentoring opportunities both through individual and group mentoring program formats (Skaniakos et al., 2014).

Finally, online PAL programs have increased their presence as alternative or complementary to traditional face-to-face PAL strategies. The rapid increase in the number of online programs is a response to changes in students' learning behaviours, aiming to provide students with more flexible opportunities to attend PAL. A recent focus in research has been on assessing the potential of online programs (SI and PASS sessions in particular) to replicate benefits demonstrated in face-to-face programs (Hizer et al., 2017). Current challenges for online PAL programs in higher education relate to low student attendance and engagement, use of technology to enhance collaboration between students in online programs, and the need for diverse online PAL formats to extend benefits to students traditionally under-represented in these programs (Beaumont, Mannion, & Shen, 2012; Gregg et al., 2016)

### **2.3. Outcomes for Participating Students and PAL Effectiveness**

A consistent theme in the PAL literature has been its ability to leverage academic and social outcomes for students. The effectiveness of PAL programs has been extensively researched across disciplines and formats, including curriculum-based programs, such as SI and PASS, and non-subject based peer mentoring programs (Akinla, 2018; Bowman-Perrott et al., 2013; Dawson et al., 2014; Rohatinsky, Harding, & Carriere, 2017). The myriad of benefits associated with PAL has been a major driver behind its wide implementation in recent years, with two major themes characterising research on PAL effectiveness: (a) the ability of these programs to produce outcomes within academic and socio-psychological domains; and (b) the presence of learning and socio-psychological benefits for both the student(s) who provides support and the student(s) who receives it (Topping & Ehly, 2001). Extensive and reciprocal benefits associated with PAL pose a significant advantage over staff-led academic support programs because all participating students, irrespective of their role in the program, can develop valuable skills and knowledge.

The variety of PAL programs has resulted in an equally diverse body of literature, with periodic reviews of the literature aiming to summarise and analyse the impact and value of peer learning interventions in higher education contexts. Such reviews have focused mainly on assessing the effectiveness of peer learning strategies in different educational contexts or within specific disciplines or subjects. Systematic reviews of PAL have demonstrated the positive impact of these programs on students' academic achievement, regardless of program duration, grade level or academic ability of participants (Dawson et al., 2014). Foundational

skills related to success in academic studies and the workplace consistently feature in the peer learning literature: namely, communication, and interpersonal and leadership skills (Andre, Deerin, & Leykum, 2017; Crisp, 2010; Sevenhuysen, Thorpe, Molloy, Keating, & Haines, 2017). Peer mentors, in particular, acquire academic, psychological, and interpersonal skills that result in transformative learning experiences for students providing support (Bunting, Dye, Pinnegar, & Robinson, 2012). Increased academic self-efficacy and self-esteem are the most common psychological benefits for students (Ginsburg-Block et al., 2006). Peer mentors typically experience a sense of accomplishment in helping fellow students, whilst mentees report increased sense of belonging and satisfaction with academic institutions (Falchikov, 2001). All in all, students experience benefits related to improved student engagement with their studies.

For clarity purposes, this section categorises benefits for students as pertaining to the academic, cognitive, or socio-psychological realms. Given the extension of the literature on PAL effectiveness, and with the purpose of conducting a critical review of the literature, I summarise peer learning outcomes through the analysis of reviews of the PAL literature, seminal studies, and recent research studies conducted on PAL programs in higher education.

### **2.3.1. Academic Outcomes**

The study of PAL effectiveness has primarily focused on academic outcomes for participating students, in particular, improvements in academic grades before and after participating in PAL programs. For instance, the effectiveness of Supplemental Instruction (SI) programs has been commonly assessed based on changes in final course grades using pre-post or quasi-experimental research methodologies (Dawson et al., 2014; Stigmar, 2016).

Topping (2005) states that research evidence across disciplines shows that PAL programs have a positive and significant effect on academic results within targeted subjects and disciplines. A recent meta-analysis of literature on peer tutoring in education showed that peer tutoring strategies mostly had a positive impact on academic achievement, with low performing mentors and mentees benefiting from their participation in peer learning (Leung, 2015). The author analysed factors mediating impact and found that reported effect sizes of PAL were moderated by educational level of participants, academic ability levels, and proportion of minority students. The largest effect sizes were found in studies that employed secondary school students as participants, student mentees with high academic ability levels, and low percentages of minority students. The type of program (cross-age, same age, reciprocal or non-reciprocal roles) did not have a significant effect on academic achievement,

whilst gender matching did influence effect sizes (same gender dyads produced larger effect sizes). When researchers have accounted for the number of sessions attended by students, studies consistently show that frequent attendance results in increased academic performance (Batz, Olsen, Dumont, Dastoor, & Smith, 2015). Bruno et al. (2016) compared students' academic performance in an undergraduate course in human anatomy according to the number of PAL sessions they attended during the semester (non-attendees, 1-3 sessions, more than 4 sessions). Multiple regression analyses conducted on final grades for the course showed that frequent attendance (i.e. more than four sessions) was a significant positive predictor of academic performance, suggesting that a minimum number of sessions is needed for students to benefit from PAL. Moreover, PAL participants achieved significantly higher final grades than non-attendees.

Studies that have compared academic performance in PAL participants and non-participants have found significant differences in favour of PAL participants. Comparative studies have typically employed quantitative methodologies to research the effectiveness of curriculum-based PAL programs. In a study of peer mentoring for first year accounting students, Fox, Stevenson, Connelly, Duff, and Dunlop (2010) found that students who participated in the program as mentees achieved a superior level of academic performance compared to non-participants; third year peer mentors, on the other hand, did not perform better than their non-participant third year counterparts when academic performance was compared. Similarly, Comfort (2011) studied the effectiveness of a peer tutoring program for second year undergraduate applied sports science degree students. Results showed that students in the peer tutoring program achieved significantly higher grades than students who did not participate in PAL, demonstrating the ability of the program to support the development of students' practical skills. Arco-Tirado, Fernández-Martín, and Fernández-Balboa (2011) also compared PAL participants and non-participants in their study of the effectiveness of peer assisted study sessions for Engineering students. Results showed differences in favour of PAL participants on grade point average, subject success rates and learning strategies, as well as improvements in peer mentors' learning strategies and social skills.

Studies, such as that by Comfort (2011) on PAL within applied sports science, provide examples of research conducted on the effectiveness of PAL in improving students' clinical skills in health sciences and applied science degrees. Similarly, Weidner and Popp (2007) assessed a PAL program for athletic training students and measured students' performance scores in an orthopaedic evaluation test. Although no significant differences were found



between the students who attended PAL and the control group, PAL participants expressed being less anxious and more confident when practising psychomotor skills with the peer mentor. Nursing education has also been a prolific area of study for the relationship between PAL and improved clinical skills. In a recent review of peer mentoring programs for undergraduate Nursing students, Rohatinsky et al. (2017) found that PAL programs were effective in improving students clinical and laboratory skills. Studies included in the review demonstrated evidence for the positive correlation between PAL attendance and improved clinical, social and academic skills for both mentors and mentees – skills readily transferable to students' future professional lives.

In addition to academic outcomes, academic skills development and student engagement (including student retention) have been of interest to PAL researchers. Amongst PAL formats, peer mentoring programs have been most frequently associated with increased student retention (see Collings, Swanson, & Watkins, 2014; Heirdsfield, Walker, Walsh, & Wilss, 2008; Jacobi, 1991). For instance, Rohatinsky et al. (2017) reported that nursing students participating in peer mentoring programs showed decreased attrition rates from nursing education programs as a result of the academic and social benefits related to their participation in the program. Similarly, van der Meer, Scott, Wass and Kokaua (2017) examined the impact of PAL attendance on three cohorts of first year students and found that attendance had a positive impact not only on academic achievement in the first year, but also on retention and degree completion. The association between PAL and increased student retention is usually explored through the social connections made with peer mentors in these programs, which aid students in their transition to higher education and provide them with social and academic networks that support students throughout their studies (Terrior & Leonard, 2007). The PAL literature indicates that mentoring experiences positively influence students' level of social and academic integration into university life. When students gain support from their mentors, they are more likely to enjoy a better transition experience and become more engaged and committed to their studies (Cornelius, Wood, & Lai, 2016).

Related to academic performance outcomes, although less prominent in PAL effectiveness research, is evidence of improvements in academic skills for students participating in these programs. Despite claims that PAL improves higher education students' academic literacy, few studies specifically provide these outcomes (Dawson et al., 2014). An example of a study that focused on the acquisition of academic skills in PAL participants was by Longfellow, May, Burke, and Marks-Maran (2008), who examined academic writing skills in students participating in an undergraduate peer learning program for first year students.

Their analysis of survey data revealed that students perceived improvements in their writing skills and gained confidence in their academic skills through their participation in the program. These results led the authors to conclude that peer mentors, being fellow students, are better equipped to transmit academic related knowledge to inexperienced students than are academic staff. More examples of a peer's ability to support academic skills development in students can be found in the PAL medical literature. For instance, Sammaraiee et al. (2016) studied students' experiences in a peer learning program for medical students, finding that they acquired valuable learning skills relevant to their degrees through interactions with senior students.

### **2.3.2. Cognitive and Metacognition Related Outcomes**

Also argued within the PAL literature is the existence of improvements in cognitive and metacognitive learning strategies in students participating in PAL programs. Such outcomes are typically studied in conjunction with academic outcomes, or as part of students' experiences and self-perceptions of learning improvements as a result of interacting with peer mentors in these programs.

Research on peer learning has addressed cognitive growth in students (e.g. O'Donnell & King, 1999) and the development of self-reflection and critical thinking (e.g. Rohatinsky et al., 2017). Boud et al. (2000) argued that peer learning allows students to develop critical inquiry and reflection skills through collaboration with peers and role-modelling of effective metacognitive skills based on the status of peer mentors as expert students. The development of self-regulation learning strategies in students has also been attributed to their participation in PAL, especially in first year or novice students (Backer et al., 2011). Furthermore, studies report increased use of critical thinking and creative thinking skills, positive attitudes towards tasks, and increased ability to transfer knowledge (Boud et al., 2000; Pascarella & Terenzini, 2005; Topping, 2005). In relation to knowledge transfer, Tai, Canny, Haines, and Molloy (2016) analysed how peer learning interactions built evaluative judgment in medical students. Through observations of other students' performance, and receiving and discussing feedback on their performance with experienced peers, students developed increased clinical reasoning and judgement skills.

The PAL literature suggests that peer learning contributes to a deeper approach to learning (Falchikov, 2001; Topping, 1996; Weidner & Popp, 2007). King (2002) argues that peers engage in a cognitive partnership whereby thinking is seen as actually distributed between the student who is guiding the participation (peer mentor) and the student in process of acquiring knowledge (peer mentee). In the context of this cognitive interaction, learning is

mediated by the peers themselves and can result in higher level learning and thinking. As peers engage in collaborative inquiry, negotiation and construction of new knowledge and joint problem-solving, they deconstruct and construct the knowledge in cognitive ways that require the use of high-level cognitive orders. For Roscoe and Chi (2007b), knowledge-telling and knowledge-construction processes in which peers engage by questioning and explaining create the context that allows peers to appropriate and transform their subject matter knowledge. Other studies addressing approaches to learning in PAL programs, however, have found contrasting results. In these studies, students who attended PAL developed strategic-oriented or assessment-driven learning approaches rather than meaning-oriented strategies: that is, peer learning interactions focused on understanding course material in order to enhance their ability to successfully pass assessment tasks (Ashwin, 2003; Brown, Nairn, van der Meer, & Scott, 2014; Capstick, 2004). Research findings on the ability of PAL programs to increase or decrease specific approaches to learning are inconclusive, yet researchers suggest that contextual variables (specifically assessment-oriented environments and pressure to finalise assessment tasks) impact on peer learning interactions and subsequent emphasis on strategic approaches to learning in students.

Metacognitive knowledge and awareness have also been studied as outcomes of PAL programs, with studies focusing on the role of mentors in developing metacognitive skills in peer learning programs (De Backer, Van Keer, & Valcke, 2016; Duran, 2017; Roscoe, 2014). These studies have identified mentors' learning behaviours and mentor-mentee interactions associated with positive metacognitive role-modelling: namely, using examples or representations to deepen knowledge, mentors assessing their own knowledge, and checking whether their explanations were understood by mentees. The potential of peer learning to foster students' metacognitive development is typically framed within socially shared cognition frameworks, in which metacognition can be developed through social interactions with others – including peers (Volet, Summers, & Thurman, 2009). Peer learning interactions allow students to ask questions, provide explanations, and compare their thinking with that of their peers (Falchikov, 2001), aiding students in the development of metacognitive knowledge as well as metacognitive regulation processes, such as planning, monitoring and evaluation of their own progress (Glynn, Macfarlane, Kelly, Cantillon, & Murphy, 2006). In particular, reciprocal peer tutoring approaches (whereby students alternate the role of mentor and mentee) show promise as a means to enhance students' metacognitive knowledge and self-regulation (Hodgson, Benson, & Brack, 2013, 2015), probably due to the opportunity given to all participating students to take on the mentor role and engage in knowledge-telling and reciprocal questioning. In their investigation of metacognitive regulation gains for students

participating in a reciprocal peer tutoring program in higher education, De Backer et al. (2016) found that students adopted regulation activities when they engaged in transactive discussions with their peers, allowing them to elaborate on each other's contributions. This finding highlights the importance of quality peer interactions in the development of metacognitive skills for participating students. Accounts of the development of metacognitive regulation or knowledge, however, tend to pay more attention to outcomes for mentors rather than for mentees (e.g. Roscoe & Chi, 2007a; Roscoe & Chi, 2007b).

### **2.3.3. Social and Psychological Outcomes**

Contemporary research on PAL incorporates measurements or evaluations of the impact of peer learning on social and psychological outcomes for students. Studies on peer mentoring programs have typically addressed socio-psychological benefits for students more often than studies on curriculum-based PAL strategies – perhaps due to the dual focus of peer mentoring on academic and social outcomes. A review of peer mentoring programs in education by Ehrich, Hansford, and Tennent (2004) revealed that studies on peer mentoring frequently cited outcomes related to friendship and counselling, support and encouragement, and empathy. Terrion and Leonard (2007) argued that social benefits acquired through participation in peer mentoring programs enhanced students' satisfaction, engagement and persistence. Non-academic outcomes have gained increased relevance in the study of curriculum-based PAL programs in recent times. The importance of social and psychological outcomes, such as students' sense of belonging, personal wellbeing, and social interactions in the education context are now recognised as critical to the value of PAL strategies in education (Ginsburg-Block et al., 2006).

In their meta-review of research on SI programs from 2001 to 2010, Dawson et al. (2014) found that studies reported social and psychological outcomes related to students' general satisfaction with higher education, wellbeing, enhanced social relationships, and engagement. Although some studies did not explicitly elaborate on these outcomes, participants' qualitative responses and accounts of their experiences emphasised the benefits of receiving extra support in a non-judgmental learning environment. Meeting with other students and forming social networks was also an important benefit for students, facilitating their integration in higher education and satisfaction with the academic experience. Satisfaction with the social aspects of the PAL experience are usually highlighted by student participants when qualitative responses are collected. Such positive experiences result in students' improved confidence in their skills and ability to undertake tertiary studies. For

instance, Stone, Meade, and Watling (2012) surveyed students participating in a PAL program within a research and statistics module for undergraduate psychology students. Results showed that PAL attendance positively impacted students' confidence in their ability to understand course content. Similarly, McCullough (2017) found that the experience of being a peer mentor resulted in improvements in students' self-efficacy and confidence in their skills. Peer mentors, female undergraduate students acting as peer instructors for female students in STEM (Science, Technology, Engineering and Mathematics) disciplines, highly benefited from their participation as they gained positive learning, emotional and psychological experiences through interactions with peer mentees. Miranda (2011) measured differences in students' self-efficacy using a self-reported inventory to examine the effectiveness of peer mentoring over student success. Although statistical tests revealed no differences between participant and non-participant groups, qualitative findings suggested positive impacts of the peer mentoring experience that would lead to further academic and socio-psychological benefits in the future.

PAL researchers have also linked psychological wellbeing outcomes to participation in PAL programs (Hanson, Trolan, Paulsen, & Pascarella, 2016). Psychological related outcomes, such as decreased stress and anxiety, are particularly relevant in health sciences disciplines, in which PAL strategies support students in the development of clinical skills in non-threatening learning environments. In turn, students feel less anxious about their academic performance and ability to perform clinical skills in assessment or placement contexts. In their study of PAL strategies for medical students, Bruno et al. (2016) participants also reported decreased anxiety as a result of attending PAL sessions. In their study, students consolidated subject knowledge during PAL sessions and felt more prepared to undertake exams and other assessments – resulting in lower anxiety levels.

#### **2.4. Analysing the PAL Literature: Theory-informed Versus Practitioner-Focused or Evaluative Studies**

The PAL literature encompasses a large number of studies across disciplines, program formats and research methodologies, making it an extensive body of literature mainly focused on the evaluation of the effectiveness of peer learning strategies for students. Perhaps as a result of such focus on effectiveness (typically, the ability of PAL programs to produce significant academic gains in students), the number of studies that have contributed to the development of conceptual and theoretical frameworks is small compared to evaluative studies. Accordingly, most of the PAL literature is practitioner-focused, but limited in its

potential to inform theory. That is, evaluations of effectiveness made by practitioners (e.g. program administrators) contribute to the implementation and expansion of PAL in education through the identification of best practices, but do not fully investigate theoretical underpinnings that would further explain how and why PAL works as an effective pedagogical tool. Limitations in the scope of the PAL literature affect not only the availability of sound conceptual frameworks on which to frame PAL strategies, but also researchers' and practitioners' ability to manipulate variables to maximise PAL effectiveness and success (Dawson et al., 2014). In particular, concerns about students' lack of engagement in PAL, quality of learning outcomes, and potential shortcomings of peer learning remain largely unresolved as a result of limitations in theoretical knowledge on PAL processes and dynamics. In this section, I first provide an overview of the theoretical underpinnings of PAL as discussed in those studies with a focus on peer learning conceptual frameworks, then review key characteristics of empirical studies. In particular, issues around the impact of PAL (i.e. effect size reported in research studies), research methodologies, and the contribution of empirical studies to PAL theoretical frameworks will be examined. This discussion will lead to the analysis of conceptual gaps in the literature and research avenues to maximise engagement and learning outcomes for students participating in PAL.

#### **2.4.1. Theoretical Frameworks Employed to Understand and Research PAL**

Peer learning is grounded in the view of learning and knowledge as socially constructed; in fact, facilitation and co-construction of knowledge are key aspects of peer learning programs, whereby students learn from and with each other (Topping & Ehly, 2001). Peer learning has been the subject of study within a myriad disciplines, and may be considered from the perspectives of developmental psychology, social psychology, sociology, humanistic psychology and cognitive psychology (Falchikov, 2001; Stigmar, 2016). As such, traditional theoretical perspectives on which peer learning researchers have framed their studies lie within social-constructivism and socio-cognitive perspectives of learning. For example, Stigmar (2016) found in a review of peer teaching programs in higher education that Vygotsky's theory of socio-cognitive development was the dominant conceptual framework. In addition to socio-constructivism, self-regulation learning and motivation theories have been employed to explain benefits for students in the academic and motivational domains (Schunk & Mullen, 2013). It is important to note that most theoretical frameworks underpinning peer learning have been employed to describe and research outputs/outcomes rather than processes of peer learning. Many calls have been made for further research on the applications of conceptual

frameworks to peer learning, with relatively little empirical investigations. This section discusses main theoretical frameworks underpinning peer learning.

Vygotsky's social-cognitive theory and, in particular, the zone of proximal development concept, has provided the foundation for researchers and theorists in peer learning. Defined as the distance between the actual development and the level of potential development that can be achieved under adult guidance or peer collaboration, Vygotsky (1962) argued that the zone of proximal development has more significance for the dynamics of intellectual development and the success of instruction than does the actual level of development. For Vygotsky, thus, learning instruction is useful only when it moves ahead of development. An essential feature of learning is that it creates the zone of proximal development: that is, learning awakens a variety of developmental processes that are able to operate only when students interact with people in their environment (Vygotsky, 1978). The connection of the zone of proximal development (ZPD) to peer learning is clear: peers can provide expert scaffolding that enables students to achieve their next level of development. Peer mentors are defined as expert students who can provide the right type and level of scaffolding to advance learning within students' ZPD (Lockspeiser, O'Sullivan, Teherani, & Muller, 2008). In addition to Vygotsky's social-cognitive theory, Lave and Wenger's situated learning theory has been applied to the study of mentoring relationships (Rosenberg & An, 2019). In this regard, mentoring provides students with opportunities to engage in active construction of knowledge as they learn and practice academic skills in context and with the support of experienced students (Lave & Wenger, 1991). Mentoring interactions also support students' acculturation into academic contexts, as they gain critical academic skills and knowledge and become familiar with academic terminology.

Social constructivism assumes that social interactions assist in students' learning acquisition. In addition to socio-constructivism, psychological perspectives provide a more comprehensive way to understanding the peer learning process. In this regard, Ten Cate and Durning (2007) contend that peer assisted learning needs to be analysed using multiple cognitive and psychology theories. For these authors, benefits for students derived from their participation in PAL can be explained using two concepts: cognitive congruence and social congruence. Cognitive congruence relates to Vygotsky's ZPD and explains why peer tutors can act as better cognitive scaffolders than lecturers or tutors. Peer mentors' ZPD is closer to that of their mentees and, as such, they may sense this zone more easily than content experts, who may not always be in the best position to understand the learning difficulties that the student is experiencing. Additionally, peer mentors can provide explanations that are more understandable to the student than those provided by subject experts (Webb & Mastergeorge,

2003), who typically function from differently structured cognitive schemas. Social congruence relates to the social aspects of PAL and explains why students feel more comfortable in PAL programs compared to traditional staff-led academic support programs. Since peer mentors hold no authority position (nor affect assessment), students can disclose learning gaps and ask questions, enabling for correction and learning. Social similarities between students also allow peer mentors to understand and empathise with students' motivations and learning difficulties (Lockspeiser et al., 2008).

PAL mentors act as role models and can be catalysts for adaptive learning behaviours, increased motivation to learn, and interest in academic tasks. A myriad of socio-psychological and educational theories have been applied to the investigation and analysis of specific aspects of learning with peers. For example, social learning theory would explain why and how peers contribute to improvements in students' self-efficacy (e.g. Mackey, Kamphoff, & Armstrong, 2010). Role and motivational theories have contributed to understandings of role expectations and subsequent learning behaviours attached to the role of peer mentors (e.g. Brown et al., 2014; Colvin & Ashman, 2010). Theoretical developments in peer mentoring address the role of self-regulation theory to investigate and explain factors contributing to the development of self-regulated learning skills in students participating in PAL programs (Schunk & Mullen, 2013). Despite the contribution of diverse socio-psychological and social learning theories to PAL research, studies that combine multiple theories or conceptual frameworks are scarce in the peer learning literature, suggesting a focus on individual elements rather than multi-conceptual understandings of peer learning (Falchikov, 2001).

## **2.5. Characteristics of the PAL Literature: Methodological and Definitional Aspects**

In this section, I characterise the PAL literature in relation to methodological considerations, and research contributions to PAL implementation or theory-building. In turn, this discussion reveals conceptual and methodological areas critical to further developing PAL practice and research.

### **2.5.1. Research Methodologies**

An ongoing debate in the literature on PAL refers to the use of qualitative or quantitative methodologies when conducting research on program effectiveness. Whilst some researchers argue for the use of sound quantitative methodologies to isolate the effect of PAL programs on students' learning and other socio-psychological outcomes (Akinla, 2018; Williams & Reddy, 2016), other researchers emphasise the need to increase the number of qualitative studies that provide thick descriptions of peer learning experiences and explore



specific processes and dynamics linked to program success (Glynn et al., 2006). The dichotomy between qualitative and quantitative methodologies likely reflects the variety of program objectives under the PAL umbrella of strategies. The use of quantitative methodologies in curriculum or subject-based programs typically responds to the need to show the value of peer learning in comparison with other support programs, or between students attending PAL and those not participating. Consequently, comparisons between participants and non-participants, or measurements of students' ability before and after participating in the program, became the norm in quantitative research. Qualitative methodologies have typically been employed to explore students' experiences in PAL programs and perceived outcomes, using interviews, reflections, open-ended survey questions, or analysis of mentor-mentee interactions.

Taking the peer learning literature (i.e. including peer tutoring and peer mentoring based programs) as a holistic body of literature, quantitative methodologies have focused on academic skills, grades, retention and other outcomes for students (thus, being outcome-oriented), whilst qualitative methodologies have been employed to capture students' perceptions of effectiveness, satisfaction with the program, role expectations and the nature of mentor-mentee interactions. Most of the recent literature on PAL that employs quantitative methodologies can be characterised as mixed-methods designs through the inclusion of qualitative methods – typically analysis of responses to open-ended survey questions, interviews or focus groups (e.g. Mackey, Kamphoff, & Armstrong, 2010; Byl et al., 2016). Qualitative studies may also incorporate quantitative elements in the form of descriptive statistics that report on closed ended responses (e.g. perceptions of effectiveness of program or perceived improvements in academic skills) (e.g. Van der Meer & Scott, 2009).

Despite PAL having a prolific research tradition, systematic reviews of the literature have identified methodological and definitional issues. The first problematic area in the existing literature is the variety of definitions of peer learning on which studies are based. In some cases, peer learning has been confounded with other collaborative learning strategies, limiting the utility of PAL reviews given the difficulty of ensuring reviewed articles conform with peer learning principles (Leung, 2015). In addition, a considerable number of studies lack appropriate descriptions of PAL programs (e.g. number of studies, type of program) that would provide information about elements associated with effectiveness (Dawson et al., 2014). A second problematic area is in methodological considerations. Reviews of the PAL literature emphasise two concerns associated with research methodologies: lack of adequate descriptions and assessments of methodological choices and methods employed, and potential misalignment between methods and research objectives.

The lack of methodological detail has severely limited reviewers' ability to assess the contribution of PAL to learning. Dawson et al. (2014) argued that the absence of information on student-participants, significance values, mean grades and standard deviations has limited opportunities to provide a comprehensive assessment of PAL literature findings. When adequate methodological information has been included in studies, researchers have pointed to limitations in the ability of some methods to convey peer learning effectiveness (Wong, Stake-Doucet, Lombardo, Sanzone, & Tsimicalis, 2016). Several assumptions limit quantitative methodological choices in PAL. Riese et al. (2012) argue that most studies concentrate on identifying effect and causes for effect, treating PAL as an intervention rather than a pedagogical practice. Similarly, Dawson and colleagues (2014) criticise the employment of binary variables in PAL research, such as attendance/non-attendance or pre-program/post-program academic grades, as simplified proxies for peer learning processes and impact. Concerns about how learning in quantitative studies is measured abound, with researchers criticising the use of proxy variables assumed to represent learning. For instance, studies tend to equate learning to academic grades, and tend to utilise prior academic performance scores to represent student motivation to participate in PAL (Dawson et al., 2014). To overcome simplifications in how PAL effectiveness is understood and measured, researchers have called for studies that include learning and socio-psychological variables related to academic success beyond academic grades (Ginsburg-Block et al., 2006). These studies could include quantitative measurements of students' academic and social gains, controlling for external variables such as previous motivation (Parkinson, 2009).

In addition to concerns about indices of effectiveness, and how these are measured, the very nature of PAL as a learning strategy within a broader educational context calls for research beyond pre-post or between-groups comparisons of achievement. According to Ross and Cameron (2007), the use of randomised controlled trials involving peer learning and control groups would present considerable practical challenges due to the multiplicity of variables affecting learning outcomes and students' motivation to engage in PAL. Even if such variables could be controlled in an experimental or quasi-experimental study, difficulties in ascribing causality to PAL interventions would remain. Moreover, comparing PAL participants with control groups that mirror student participants' features has limited external validity given the diversity in demographic and learning-related variables in higher education student cohorts. These arguments raise concerns about the appropriateness of quantitative methodologies traditionally employed in the PAL literature in capturing the complexity of peer learning, or to demonstrate real impact given the multifaceted nature of peer learning and the influence of numerous confounding variables on students' learning. Inconclusive results

on the impact of PAL on student achievement add further evidence of the methodological limitations of quantitative studies. For example, in the study by Terrior and Leonard (2007) on a group peer-mentoring program that included a supplemental instruction component, students who participated in the program did not receive final grades that were higher than those of non-participants, but they were more likely to persist in their studies. Although this peer mentoring intervention did not have a significant effect on grades, it contributed to the academic and social integration of first-year students. Sanchez, Bauer, and Paronto (2006) also found that students who were peer-mentored reported greater satisfaction with the university experience, however, there was no impact on academic performance indicators, such as final grades or graduation rates. These findings also suggest that the value of PAL lies beyond improved academic results, in line with further calls to avoid binary variables as proxies for effectiveness and learning achievements.

Methodological concerns also apply to qualitative research approaches. Dawson et al. (2014) argue that qualitative studies employing methodologies clearly grounded in learning theory are scarce. The study of students' experiences in PAL focuses mainly on student satisfaction with the program (which could represent satisfaction with the social aspects of the program), rather than a reflection of learning gains (Burgess, McGregor, & Mellis, 2014). In this regard, researchers stress the importance of investigating the nature of PAL programs and how peer learning relationships develop over time (Schunk & Mullen, 2013; Topping, 1996). Some qualitative studies have attempted to examine mentors' behaviour, teaching and learning strategies, and how these affect mentees' performance and cognitive gains. Other studies have focused on the mutual influence of mentor and mentee behaviour, investigating the perceptions of those who participate in PAL formats (Ehrich et al., 2004). An important methodological limitation when researching peer learning processes, however, is the difficulty in obtaining reliable data without interfering in the learning relationship between students (Schunk & Mullen, 2013). For this reason, in most studies, data have been collected after the PAL program had finished to minimise interference with real time interactions, thus increasing the potential impact of memory biases in participants.

All in all, researchers argue that the PAL literature comprises a homogeneous body of research that lacks sound and consistent methodological approaches to the study of processes underpinning peer learning effectiveness, or program evaluation measurement and research procedures (Sevenhuysen et al., 2017). Consequently, more rigorous depictions of program characteristics and program effectiveness measurement are needed in the peer learning literature.

### **2.5.2. Impact of PAL on Students**

In relation to the aforementioned areas of concerns about methodologies and methods employed in PAL, researchers have discussed difficulties in assessing the impact of peer learning on students. Systematic reviews of the PAL literature have been limited in their ability to estimate impact as effect sizes cannot be extracted or compiled from quantitative studies due to insufficient detail about both methodological aspects of the study and results of statistical analyses (Dawson et al., 2014). In studies in which effect sizes have been calculated, they have been in the moderate or low range (Sevenhuysen et al., 2017; Topping, 2005). In the most recent and comprehensive review of SI programs in education, Dawson and colleagues (2014) argued, based on potential publication bias and limited description of study methodologies, that results on SI effectiveness should be interpreted with caution. Although the authors stated that their review provided some indication that “SI worked on some level for some groups of students” (p. 633), further research is needed to clarify the impact of PAL strategies on students’ academic outcomes. Similarly, Sevenhuysen and colleagues (2017) concluded that the effectiveness of PAL on clinical health education remains unclear after reviewing the literature on PAL programs for allied health undergraduate students.

Moderate effect sizes found in the PAL literature could be based on the lack of unified theoretical findings that prevent researchers from conducting holistic assessments of peer learning outcomes due to disparities in frameworks for data analysis, variables included, and definitions of PAL and its impact on students. A second explanation relates to a potential lack of fit between peer learning and measured impact. Thus, variables included in the assessment of PAL effectiveness may lack capacity to capture the learning nature of PAL and outcomes for students, which could be long-term rather than the short-term outcomes typically measured in after-program evaluations (Ginsburg-Block et al., 2006).

### **2.5.3. Evaluation and Theory-building Studies**

Ward and Lee (2005) argue that although the PAL empirical literature has focused on assessing the effectiveness of peer learning, the study of processes and dynamics underlying successful peer learning programs remains under theorised and under-researched. They contend that, since research efforts have mainly been directed to demonstrate PAL effectiveness compared with traditional instruction or academic support strategies, uncovering theoretical elements of PAL has remained a lower priority for researchers.

As a result of limited theoretical developments, researchers have called for a better understanding of the processes underpinning peer learning effectiveness (Riese et al., 2012).

Calls for such a research focus are common across studies into various PAL formats and following various methodologies, including cognate areas such as peer education, which has been described as a “method in search of a theory” (as cited in Southgate & Aggleton, 2017, p. 4). Concerns about the theoretical development of PAL, or lack thereof, date back to the first reviews of the peer learning literature in higher education. Medway (1991), for example, in a review of peer tutoring programs in tertiary education, noted the need to employ social psychological frameworks to study and build knowledge on peer learning processes – a call for research that has been echoed in multiple publications afterwards (e.g. Tamachi et al., 2018). Without such knowledge, opportunities to maximise peer learning effectiveness and advance research on enabling factors for its success remains limited. Amongst key factors potentially underlying peer learning success, researchers have emphasised students’ motivational aspects, expectations, learning styles, and other characteristics of the peer mentoring match or group (Dubois, Holloway, & Cooper, 2002; Eller et al., 2014; Holt & Berwise, 2012). Despite efforts to clarify the role of external and intrapersonal variables in mentoring, the actual dynamics through which peer learning exerts its benefits remain under-theorised. Discussions on peer learning effectiveness are typically restricted to program characteristics (e.g. participants’ age or gender), but do not include critical peer learning processes related to how students interact to produce mutually beneficial outcomes.

With the majority of the literature focused on outcomes, research on PAL has not kept pace with the proliferation of programs in higher education. Most studies on curriculum or subject-based PAL formats have taken an evaluative approach to assess the usefulness and impact of PAL in specific disciplines. The literature abounds with examples of such evaluative studies (e.g. Gaughf & Foster, 2016). Whilst valuable to the development of implementation practices as well as the examination of PAL effectiveness within educational contexts, implementation or evaluation-based studies offer limited potential to contribute to theory building in peer learning for reasons already described in systematic reviews of the literature: definitional issues, limited applications of methodology, and lack of unified conceptual frameworks (in particular, learning theories applicable to peer learning). As a result, PAL research with evaluative purposes forms an extensive yet fragmented body of literature, in which studies are not always conducted by researchers with expertise in peer learning theory. In relation to peer mentoring programs, Gershenfeld (2014) argues that the vast majority of advances in peer mentoring theory come from the study of mentoring relationships in business and organisational environments, rather than in education. Few studies have focused on understanding mentoring relationships and critical determinants of success in higher education

(Cornelius et al., 2016). An exception is Crisp and Cruz (2009) theoretical framework for mentoring college students, which has been applied to the study of peer mentoring by a number of researchers (e.g. Gunn et al., 2017). The framework includes key domains in which mentors provide support in a similar fashion to mentoring functions described by Nora and Crisp (2007), including psychological and emotional support, setting goals, academic subject knowledge, and role-modelling. This conceptual framework, however, has been limited to the study of peer mentoring programs and not extended to other PAL formats. To expand and elaborate on their conceptual framework, Crisp and Cruz called for studies that explore and unpack mentoring strategies and factors influencing mentoring success.

The analysis of the PAL literature reveals a tension between calls for understanding processes and building theory, and calls for sound methodological approaches to demonstrate success in PAL. This thesis aims to reconcile both approaches through the establishment of a conceptual framework of peer learning relationships that can advance both theory and practice – and by extension, the study of effectiveness. The framework applies learning theories to PAL with the aim of establishing a unified framework to design, study and interpret research results, contributing to both the study of student interactions and evaluation of program impact and value. The conceptual framework that guides this thesis draws on the analysis of gaps within the PAL literature and its ability to explain peer learning processes. Such gaps are conceptualised as the theoretical black box of peer learning.

## **2.6. Black Box of Peer Learning**

Conceptual gaps within PAL practice and conceptual frameworks characterise the black box in peer learning (Nora & Crisp, 2007). In educational contexts, the black box metaphor refers to educational practices characterised by limited knowledge of socially mediated learning processes between learners (Southgate & Aggleton, 2017); in PAL programs, the black box concept exemplifies limited knowledge of learning processes between participating peers. For peer learning programs to establish themselves as sound pedagogical tools to enhance student learning, retention, and satisfaction, a better understanding of the *how* of peer learning is required. In the next section, I discuss how areas of concern in the PAL literature relate to knowledge gaps regarding learning processes and mentor-mentee interactions within the peer learning black box.

Whilst the black box is usually referred to in light of limited understanding of mentor-mentee interactions (i.e. learning interactions that result in positive outcomes and gains for the

students, or how mentors work with mentees to enable learning and other outcomes), this thesis expands the black box concept to include processes happening before and after peer learning interactions. The thematically linked papers included in this thesis broaden conceptions of the *inner workings* (i.e. mentor-mentee interactions) to include pre-cursors of engagement in PAL and outcomes for participating students. For instance, a better understanding of why and how students engage in peer learning would facilitate the inclusion of strategies to improve student engagement and attendance. The importance of acknowledging processes outside peer learning interactions lies in its potential to affect these interactions and/or compromise the quality of learning outcomes. A comprehensive understanding of the context and mediators of peer learning interactions is of particular value in light of concerns about students' limited engagement in PAL programs, or moderate effects of PAL on learning outcomes. This section discusses knowledge gaps that contribute to the peer learning black box and integrates relevant literature about the importance of further investigating specific processes within each element: from student engagement to interactions with students during PAL to learning and socio-psychological benefits derived from participation in PAL programs.

#### **2.6.1. Help-seeking Behaviours and Variables Affecting Students' Engagement in Peer Learning**

One of the most pressing issues in the peer learning literature is students' poor engagement in PAL programs (Allen, Tonta, Haywood, Pereira, & Roberts, 2019). Given that many programs are not compulsory within the higher education curriculum, PAL relies on students' help-seeking behaviours to choose and engage in PAL programs available to them. However, research on students' help-seeking behaviours shows that students with lower academic achievement levels generally do not participate in academic support services unless these are compulsory or embedded within the curriculum (Karabenick & Newman, 2006). Thus, engaging students to regularly attend PAL has been shown to be problematic, and many programs report poor attendance numbers or difficulties in encouraging students to attend sessions on a regular basis (Dancer, Morrison, & Smith, 2007). Low or inconsistent attendance is of particular relevance to subject-based PAL programs, as research shows that students benefit more if they attend PAL sessions on a regular basis; in fact, attending only a few sessions may have no effect on student learning outcomes (Lewis, O'Brien, Rogan, & Shorten, 2005). Students' limited use of peer support compromises the potential for peer learning programs to enhance acquisition of long-term learning skills. Students' motivations to engage

in PAL are critical to the success of peer learning initiatives. However, motivation constructs are often ignored in the study of PAL in postsecondary education in general, and the provision of learning assistance at the university level in particular (Arendale, 2014). When motivation is addressed, it typically takes the form of students' self-reported likelihood to attend PAL, rather than the study of motivation variables associated with their actual decision to attend (Dawson et al., 2014).

Researchers argue that students who attend PAL programs share motivational predispositions to academic success, and, hence, to self-select to participate in these programs (Capstick, 2004; Cummings & Sheeran, 2019). In particular, some studies have found that students attending PAL programs show higher levels of self-efficacy, intrinsic motivation, and more developed learning skills (Fox et al., 2010). In a recent study on the relationship between PASS attendance, academic performance and academic motivation, Cummings and Sheeran (2019) found that PASS significantly mediated the relationship between individual characteristics (personality and prior academic achievement) and academic performance, suggesting that PASS may be benefiting those students already predisposed to academic success. Such self-selection suggests that students who would most benefit from peer academic support are less likely to attend these programs (Hill & Reddy, 2007). Peer learning programs, thus, would not be targeting those students in need of support, but rather extending the capabilities of those with a motivational profile attuned to success in academic settings. Many proponents of the bias of self-selection can be found in the peer learning literature, and across different PAL formats. For instance, Stansbury (2001), in a study of students attending SI sessions in general biology and chemistry, found that, although higher SI attendance correlated with higher final course grades, academically weaker students were less likely to attend SI sessions. Students in Stansbury's study also reported high levels of self-efficacy, suggesting that non-participants were less likely to accurately assess their strengths and weaknesses (which may partially explain why they were less likely to engage in SI). Zulu (2003) also found that SI sessions were more effective for students who were better prepared academically, and exhibited the capacity to engage in and benefit from PAL participation. Furthermore, Zulu found that students who chose not to attend SI reported reluctance to expose their weaknesses before students who were more academically prepared. These results suggest that the social nature of learning in PAL contexts would pose barriers to students who are, or perceive themselves as, academically under prepared, resulting in lower participation rates.

The self-selection bias, however, has been contended by researchers who argue that students on the lower end of a spectrum of learning skills/motivation also seek support from peers in particular, and academic support programs in general (McGee, 2005). Similarly, van



der Meer, Wass, Scott and Kokaua (2017) found no significant relationship between students' prior academic achievement and PASS attendance, suggesting that PAL programs do not only attract high-achieving students. Research on self-selection bias in PAL is mainly inconclusive because the motivational variables that could indicate and explain the presence of such bias have rarely been studied on the basis of established motivational theories. Many studies have employed previous academic performance as a proxy for motivation (Hizer et al., 2017; Lundmark, Paradis, Kapp, Lowe, & Tashiro, 2017; van der Meer, Wass, Scott, & Kokaua, 2017). Standardised tests have been employed in research to evaluate motivation (e.g. Gattis, 2002), these have typically measured students' general learning motivations – not specifically directed to their engagement in PAL. Regardless of whether specific groups of students (with more or less developed learning skills and motivations) are more or less likely to participate in PAL, it is evident that more research is needed to clarify what motivations underpin students' decision to seek or avoid help from peers, and what type of students make use of peer support. In the black box of processes happening before peer learning interactions, further knowledge on students' decision-making processes to engage in peer support, as well as their motivations, is needed in order to address attendance and self-selection issues.

One research area rarely considered in PAL, yet closely related to students' learning behaviours, is students' goals when they engage in PAL programs. Students' learning goals when attending PAL rarely feature in the peer learning literature, nor are they accounted for when discussing program effectiveness. Their impact on learning outcomes, however, is evident in those studies that report deviations from intended program objectives. For example, students may engage in PAL programs to fulfil one-off directive requests, rather than to obtain developmental support to increase their independent learning skills (Ashwin, 2003; Brown et al., 2014). Since learning goals are not accounted for in these studies, it is not possible to discern whether students approached mentors with directive requests to fulfil task-oriented goals, mentors were unable to initiate or maintain learning facilitation in their interactions with students, or a combination of both caused mentors to steer away from their role as learning facilitators. Thus, students' learning goals can be potentially disruptive to the development of effective learning interactions between peers. Goals can be driven by external triggers, such as assessment task deadlines, exerting a powerful impact on mentors' ability to maintain role boundaries as learning facilitators (Brown et al., 2014; Christie, 2014). The interaction between PAL programs and the learning environment that surrounds its implementation, thus, can be quite complex and drive programs to success or deviation from intended outcomes. In any case, the influence of students' learning goals and the learning environment in which these originate need to be acknowledged as factors underpinning peer learning interactions. Even

though the role of motivation factors and learning goals has been recognised in the literature, research efforts typically lack a conceptual/theoretical framework to study its impact over peer learning interactions and outcomes for students.

Furthermore, and in relation to students' decision-making process to engage in peer learning (or otherwise), it is important to investigate the role of students' expectations about the type of support they can request or will receive from peers in these programs. Such expectations can have a profound effect on students' requests, their behaviours during peer learning interactions and, eventually, the quality of learning outcomes and skill acquisition (Holt & Berwise, 2012). Students' expectations have long been recognised as potential mediating factors in peer learning processes, with most studies highlighting the existence of expectations that could interfere with peer learning principles of learning facilitation and independent learning (Colvin & Ashman, 2010). When researchers have compared mentors' and mentees' expectations, they have consistently found that participants hold different views on the role of peer learning and the type of academic support that peers can provide (Holt & Berwise, 2012). Students seeking support may expect mentors to provide directive support that is more akin to the type they would receive from academic staff. In addition to expectations of directive support, students often report unclear expectations about the role of peers in formalised support programs (Colvin, 2007). Mentors, on the other hand, can experience conflicts between mentees' expectations of directive support and role descriptions for which they have been trained (Brown et al., 2014). Students' expectations about PAL, however, have not been studied alongside motivation constructs, such as achievement goals, associated with the development and/or enactment of expectations during interactions with mentors. Such an approach would provide valuable information about motivational factors influencing the existence of specific expectations about PAL, and how peer mentors could address potentially challenging role expectations and learning motivations in students to ensure program effectiveness.

#### **2.6.2. Mentoring Relationships, Congruence, and Outcomes for Students**

Strategies employed by students in the role of peer mentors or advisers, and the processes that enable effective interactions between students, are probably the most under researched areas within the peer learning black box. Despite research conducted on the characteristics of effective peer mentors (Holt & Fifer, 2016; Terrion & Leonard, 2007), and the functions that successful mentors accomplish (Ward, Thomas, & Disch, 2014), researchers usually fail to explain the strategies that are associated with effective peer learning and how mentors employ them to create learning partnerships with their fellow students (Schunk & Mullen, 2013). Moreover, the role of mentoring strategies or interactions in enabling specific

learning outcomes remains an area requiring further research in peer learning (Berghmans, Michiels, Salmon, Dochy, & Struyven, 2014; Glynn et al., 2006). Studying mentoring strategies within peer learning relationships would enhance the understanding of researchers and practitioners about why some PAL programs are highly successful, whilst the effectiveness of other initiatives is compromised by the existence of student misconceptions about the role of peer learning, moderate academic gains, limited skill transferability, or mentors adopting excessively directive roles.

A comprehensive study of peer learning interactions would also shed light on mechanisms influencing quality learning outcomes, or otherwise, in PAL. Despite research evidence pointing to the existence of academic and social psychological gains for participating students, researchers have expressed concerns about the nature of learning gains. For instance, Ashwin (2003) found in a study of a university peer learning program that, although students were more likely to succeed in their courses after attending PAL, they had adopted less meaning-oriented approaches to their studies. Ashwin argued that students had developed strategic learning approaches that resulted in effective assessment completion. Rather than developing a better understanding of subject content or critical academic skills, students were more proficient at completing assessment tasks and meeting assessment criteria thanks to mentors' expert contributions. Capstick (2004) reports on studies that show a correlation between attending PAL sessions and a reduction in quality of learning. Students were obtaining better marks, but only through a better understanding of assessment requirements, at the expense of deeper learning or understanding of the subject content. Similarly, Brown et al. (2014) documented how mentor-mentee learning interactions changed over the course of a PAL program, fuelled by student requests to focus on assessment completion rather than skills development. Further research on PAL processes is needed to discern when and how peers engage in interactions conducive to high order learning (rather than surface learning), and students acquire skills and knowledge readily transferable to their learning repertoire.

## **2.7. Summary**

The analysis of the peer learning literature suggests that research and conceptual gaps exist at different stages within the PAL black box: before students engage in programs, during their interactions with mentors, and once students apply learnings acquired in PAL to other learning contexts. The next chapter introduces a conceptual framework to the study of peer learning relationships that seeks to address gaps within each domain. This framework guides the design and analysis of publication research findings, also introduced in the next chapter.

# Chapter 3. Research Aims and Overview of Publications

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In Chapter 2, a critical review of the literature revealed knowledge gaps around key processes underpinning student engagement in PAL and learning outcomes for students participating in these programs. These gaps were ascribed to peer interactions and dynamics within a chronological black box of peer learning that encompassed processes supporting students' decision to attend PAL, mentor-mentee interactions, and subsequent learning and socio-psychological outcomes. This chapter introduces a conceptual framework to study peer learning processes and describes related thesis objectives. The last section of this chapter presents a summary of contributions of thesis publications alongside a discussion of how each paper addresses thesis goals.

## **3.1. Addressing Gaps within the PAL Black Box: A Conceptual Framework**

Any consideration of the peer learning black box would necessarily include mentor-mentee relationships and its influence on mentoring processes and dynamics that underlie positive outcomes for participants. Identifying relationship-level processes amenable to modification holds promise as a means to enhance learning opportunities for students participating in PAL, as well as to extend benefits to non-participants. Researchers from diverse peer learning backgrounds have emphasised the need to conduct research on factors underlying academic and social gains in PAL programs, given the limited attention they have received to date. In particular, peer learning researchers have called for a better understanding of specific dynamics and processes within peer learning interactions, and their impact on learning outcomes for students (Glynn et al., 2006; Riese et al., 2012). A review of the existing literature highlighted the importance of the mentor-mentee relationship as central to the dynamics underpinning effective peer learning (DuBois, Holloway, Valentine, & Cooper, 2002). The relationship established between students participating in PAL programs has been identified as the most important peer learning dynamic, due to its capacity to influence learning outcomes for students (Goldner & Mayseless, 2009). The importance of mentoring relationships is evidenced by the attention this topic has received in recent PAL literature, with an increasing number of PAL studies addressing strategies for successful mentoring relationships (Irby et al., 2017).

A focus on mentor-mentee relationships acknowledges the complexity of interactions in peer learning; such framework could lead to further understanding about what cognitive and social transactions underpin learning outcomes for students. Moreover, an investigation of peer learning relationships involves both parties involved in such relationship, as both mentors and mentees bring their own set of expectations, attitudes, and other motivation constructs to the peer learning relationship. Framing the relationship as the central component to effective peer learning allows for the inclusion of variables related to participants and their learning contexts. This approach could support the categorisation of variables and factors already mentioned in the literature under a conceptual frame that would allow for purposefully designed investigations of peer learning. Thus, a focus on mentoring relationships can provide a unifying and consistent conceptual research framework to study different PAL formats, as it focuses on a key component that enables PAL to function effectively, irrespective of PAL format. Furthermore, an evaluation of the processes happening before and after students engage in peer learning relationships extends knowledge on the decision-making processes before peer support is procured, and the processes that enable students to acquire learning skills and other socio-psychological outcomes as a result of participating in peer learning relationships.

This thesis proposes that thematic linkages with the potential to address gaps in the peer learning black box correspond to internal and external interactions between mentor and mentee, being the relationship established between student participants key to the success of PAL initiatives. It proposes the study of mentor-mentee relationships to understand peer learning processes and dynamics, and establishes peer congruence (Lockspeiser et al., 2008) as the critical element to the success of mentoring relationships and, consequently, a predictor of successful peer learning interactions. As such, the study of the strategies that are employed by mentors to establish and maintain congruence promises to enhance understandings of positive interactions and learning outcomes for students. Through the study of congruence mentoring strategies, researchers can gain a better understanding of how mentors identify learning needs in students, what constitutes successful interactions, and how/whether congruence is associated with specific cognitive and/or socio-psychological outcomes for students.

Peer learning relationships do not exist in a vacuum, however, and the role of external and intrapersonal variables needs to be acknowledged and accounted for in peer learning research. The lack of contextualised approaches to the study of PAL has been criticised in the literature as an oversimplification of peer learning that neglects the impact of individual and

contextual variables (Ashwin, 2003; Dawson et al., 2014). To achieve a deeper understanding of the role and interaction of factors that can impact on peer relationships, this thesis proposes the study of motivation factors related to decision-making processes in which students engage prior to attending PAL programs. Given that students accessing PAL programs are exhibiting help-seeking behaviours (directed to a specific source of support), this thesis proposes the inclusion of help-seeking theory and the motivation constructs embedded in this theory to investigate why and for what tasks students seek help from peers. Synergies between peer learning relationships and help-seeking theory provide a unified theoretical model on peer relationships that accounts for the role of congruence, motivation, and help-seeking behaviours in peer learning. Thus, the conceptual framework on effective peer learning relationships presented in Paper 1 (Chapter 4) is strengthened with the addition of help-seeking theory and embedded motivation variables (Study 2, Chapter 5). Furthermore, the framework addresses researchers' calls to integrate theories in peer learning in order to understand the accumulated effect of variables and their interaction (Falchikov, 2001). It also responds to Crisp and Cruz's (2009) call for theoretical frameworks to reveal and explain additional aspects of peer learning processes.

Table 3-1 provides a summary of synergies between peer learning research and help-seeking theory. The design and interpretation of peer learning research can benefit from the application of help-seeking theory through the inclusion of motivation variables embedded in help-seeking theory and research, extending knowledge on factors underpinning student motivation and help-seeking behaviours when interacting with peers in PAL programs. Moreover, PAL provides a naturalistic context to study and expand help-seeking research directed to peers.

Table 3-1

*Synergies between Peer Learning Research and Help-seeking Theory*

Help-seeking theory	Peer learning research	Synergies
Motivation variables as mediators of help-seeking behaviours	Motivation variables as outcomes of PAL	Use of motivation variables underpinning help-seeking theory to study motivation factors as mediating variables in peer learning and help-seeking behaviours in PAL
Focus on help-seeking directed to teachers	Investigates peer-to-peer interactions	Help-seeking theory and research findings can be extended and tested in a new context: help-seeking directed to peers in PAL programs
Previous focus on help-seeking preferences	Need to investigate and generate process-based understandings	Study of help-seeking in a naturalistic learning context; advancement of knowledge of processes in peer learning

Factors related to students' expectations and the role of the learning environment are also incorporated in this conceptual framework due to its potential to affect help-seeking behaviours, student congruence, and/or motivation. These associations and potential learning implications are described in Paper 1.

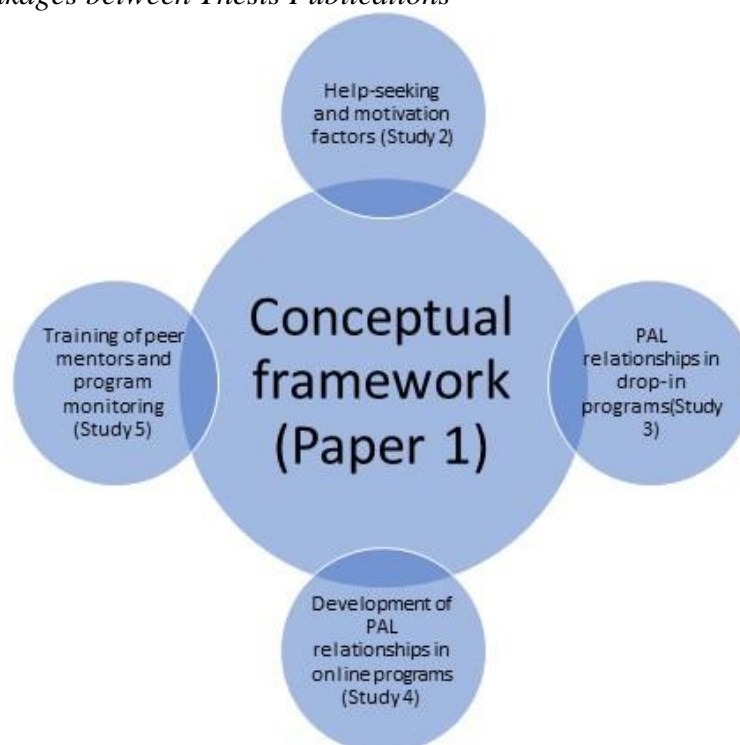
### 3.2. Thesis Aims and Overview of Publications

The aim of this thesis is twofold: (a) to propose a conceptual framework to generate process-based understandings of effectiveness in PAL programs; and (b) to apply this conceptual framework to the study of peer to peer interactions in two PAL programs. Two studies included in this thesis examine the foundations of peer learning through the inclusion of peer-to-peer relationships, social and cognitive congruence, and motivation constructs framed using help-seeking theory. Paper 1 (Chapter 4) establishes a conceptual framework for effective peer learning relationships and identifies internal and external factors that can affect peer learning effectiveness indicators, whilst Study 2 (Chapter 5) extends the conceptual framework to the study of motivational variables based on help-seeking theory. Studies 3 and 4 (Chapters 6 & 7) apply the conceptual framework to two PAL programs (academic drop-in PAL in tertiary education, and cross-institutional online peer mentoring) that show promise in terms of accommodating contemporary students' needs and fostering student engagement in PAL (Hizer et al., 2017; McKenzie, 2013). These PAL formats were specifically chosen as learning environments to apply the conceptual framework with the objective of comparing and

assessing convergences and divergences in how the framework operated in different PAL contexts. Themes of congruence, help-seeking, and relationship building were applied to the study of PAL strategies in a drop-in and an online program, providing an assessment of the feasibility of these programs as well as a more nuanced depiction of how mentors made use of congruence strategies in specific PAL formats. Revised understandings from these studies serve to: (a) test and provide revisions to the conceptual framework; (b) apply congruence and relationship themes to peer learning research and practice; and (c) develop new understandings about the effectiveness and underlying dynamics of emerging PAL formats. Finally, Study 5 (Chapter 8) applies the peer learning conceptual framework to a structured approach to training and ongoing learning strategies for students providing support in PAL programs.

Figure 3-1

*Thematic Linkages between Thesis Publications*



In Paper 1 the theoretical basis of a framework to investigate peer learning relationships is established (Garcia-Melgar, East, & Meyers, 2015). The mentor-mentee relationship is identified to be central to the success of peer learning programs; relationship dynamics and participant interactions would then be central components of the study of processes in the black box of peer learning interactions. The success of peer learning relationships – defined by its capacity to enable positive academic and socio-psychological outcomes for participants – is connected to the establishment and maintenance of congruence between students participating as mentors and mentees. Student congruence, previously



identified in the literature as similarity between participants, serves as a thematic link to explain successful peer learning interactions and mentors' strategies for contributing to student learning and engagement. With two types of congruence identified and linked to processes and outcomes, the peer learning relationships framework incorporates and expands peer learning theories that account for cognitive and social learning interactions. A review of the peer learning literature (Chapter 2) identified factors, external to the mentor-mentee relationship or intrinsic to participants, that could have a positive or negative impact on congruence and, by extension, dynamics and outcomes. Such factors were clustered and identified as pertaining to participants' intrapersonal characteristics (related to motivations, expectations, and learning attributions) or the learning environment in which peer learning interactions are embedded. Finally, this paper predicts variations in learning outcomes and peer learning interactions dependent upon disparities in student congruence through the establishment of four scenarios. The role of external and intrapersonal variables is also accounted for in their potential to positively or negatively affect available congruence, quality of outcomes, and type of interactions established between participants.

Paper 2 is a study into students' help-seeking behaviours in an academic drop-in PAL program (Garcia-Melgar, Meyers, & East, under review). It extends the conceptual framework to include motivational aspects of peer learning and variables influencing students' decision-making processes to attend PAL through the inclusion of help-seeking theory variables. Help-seeking theory, being an established framework to study behaviours directed to seeking support, allowed for the inclusion of motivation constructs relevant to peer learning environments: namely, self-efficacy, attributional dispositions, and goal orientation. In this thesis I employ the term 'attributional dispositions' to refer to students' attributions of academic success/failure to effort vs intelligence, in line with previous research on academic help-seeking. This concept encompasses notions of controllability, which is the aspect of attributional theory that has been applied to help-seeking research: students who attribute academic performance to controllable factors (effort) are more likely to seek help (Magnusson & Perry, 1992). Attributions are closely related to Dweck's (Dweck & Yeager, 2019) implicit theories of intelligence, as students with growth mindsets (i.e. they believe their abilities can be developed over time) are more likely to attribute academic performance to controllable factors (Hong, Chiu, Dweck, Lin, & Wan, 1999). While growth and fixed mindsets are embedded in help-seeking theory through its influence over attributional dispositions, in paper 2, I explore attributions related to effort vs intelligence as previous research shows that these attributions have more predictive value over students' adaptive help-seeking behaviours than implicit theories of intelligence alone (McGee, 2005; Mihlon, 2010). In addition to

establishing theoretical and practical connections between help-seeking theory and PAL (with the aim of expanding the application of help-seeking theory to under researched learning contexts such as peer learning), this study addresses the existence of the self-selection bias in students attending PAL. To achieve these objectives, a quantitative study of students' motivational profile and help-seeking goals when attending PAL (based on their active and current rather than intended help-seeking behaviours) provides further understandings on why and for what purposes students seek support from peers. This study identifies connections between motivation constructs and help-seeking behaviours in peer learning contexts and discusses implications for PAL research and implementation.

Paper 3 is a report of a study into factors underpinning effective peer learning interactions in an academic drop-in PAL program (Garcia-Melgar, East, & Meyers, under review). It applies congruence themes and the peer learning relationship framework to the study of mentors' and mentees' perceptions of effectiveness and strategies within a drop-in PAL program aimed at improving students' academic literacy skills. This paper investigates how mentors establish and enact social and cognitive congruence in a peer learning context that provides general academic support. It also examines mentees' perceptions of effectiveness to ascertain type of support requested and their perceptions about social and cognitive congruence aspects underpinning interactions with mentors. In addition to exploring social and cognitive congruence factors from mentees' perspectives, reported in Paper 3 is a study into factors related to intrapersonal and external factors that could have an impact on congruence: namely, students' expectations (through the comparison of mentor and mentee expectations), university environment, and type of academic tasks for which students seek support. This paper provides a description of mentors' strategies to enhance learning outcomes and serves to further the discussion on the specific dynamics underpinning successful peer-to-peer learning interactions. By choosing to investigate drop-in PAL programs, this paper expands theory and practical knowledge on programs typically underrepresented in the peer learning literature – with potential to address contemporary students' needs and through the provision of flexible opportunities for students to seek academic support.

Paper 4 is a report of a study into online peer mentoring relationships between university students and regional secondary school students (Garcia-Melgar & Meyers, 2020). It extends the application of the peer learning relationship framework to the study of online mentoring programs. The study investigates a cross-age, cross-institutional online peer mentoring program, into which university students mentored high school students in regional and remote areas. Also investigated were mentors' strategies related to the establishment and maintenance of cognitive and social congruence over time, providing a longitudinal depiction

of how the importance and use of such strategies evolved during the mentor-mentee relationship. The effectiveness of online mentoring through the analysis of mentees' engagement and quality of mentoring sessions (as reported by mentors after each session) was investigated and connections between congruence strategies, mentoring dynamics, and student engagement were established. Seeking to expand understandings on the role of intrapersonal and external factors established in Paper 1 (Garcia-Melgar, East, & Meyers, 2015), discussed in Paper 4 are variables that can hinder the development of congruence and effective mentoring relationships in online environments: namely, mentor-mentee cognitive distance, program support, and the role of factors inherent to online mentoring communications (such as technology use). Lastly, Paper 4 contributes to the literature on online mentoring programs. By extending knowledge on these programs, this paper also contributes to the enrichment of the body of knowledge on peer learning, given the potential for online programs to extend mentoring benefits to students traditionally underrepresented in PAL programs.

Finally, Paper 5 is a discussion of implications of the conceptual framework for the recruitment and training of mentors in PAL programs (Garcia-Melgar, 2018). Online learning and peer learning theories are connected with the peer relationships framework established in this thesis to devise online and blended recruitment and training/development strategies for PAL mentors. These training strategies aim to enhance professional development in relationships, congruence, and motivation factors in peer-to-peer learning interactions. This paper focuses on specific recruitment and training/ongoing development approaches to increase peer mentors' use of congruence strategies, understanding of students' motivation and help-seeking behaviours, and use of metacognitive role-modelling adapted to students' learning needs with the objective of developing students' self-regulated learning skills. Table 3-2 summarises contributions of each paper to the conceptual framework.

Table 3-2

*Summary of Paper Contributions and Thematic Linkages*

Paper	Chapter	Contribution to conceptual framework	Aims	Congruence themes explored	Intrapersonal and external factors included
1 (Garcia-Melgar, East, & Meyers, 2015)	4	Establishment of conceptual framework	Review the peer learning literature and establish a conceptual framework of effective peer learning relationships; identify factors enhancing/hindering PAL outcomes and successful peer learning dynamics.	Linkages between types of congruence, dynamics and outcomes; variations in congruence levels due to interpersonal and external factors, and implications to quality of learning.	Motivation and expectations  Metacognitive skills  External variables to mentor-mentee relationships
2 (Garcia-Melgar, Meyers, & East, under review)	5	Extend the framework through the study of help-seeking behaviours directed to peers	Investigate students' motivations, help-seeking goals and type of support requested in PAL; explore associations between motivation constructs, help-	Discusses connections between help-seeking behaviours and mentor-mentee congruence	Achievement goal orientation  Self-efficacy

Paper	Chapter	Contribution to conceptual framework	Aims	Congruence themes explored	Intrapersonal and external factors included
			seeking goals and type of support requested.		Attribution dispositions
3 (Garcia-Melgar, East, & Meyers, under review)	6	Application of the framework to the study of drop-in PAL programs	Explore mentors' and mentees' expectations about type of support provided in PAL; investigate perceptions of factors associated to effective peer learning; analyse strategies employed by mentors to establish successful peer learning interactions.	Social and cognitive congruence strategies employed by mentors in short-term peer learning interactions  Measurement of social and cognitive congruence as perceived by mentees	Students' expectations about PAL  Mentors' metacognitive skills  Assessment tasks/learning environment
4 (Garcia-Melgar & Meyers, 2020)	7	Application of the framework to the study of online PAL programs	Investigate mentors' strategies to develop effective online peer mentoring relationships; explore	Development of social and cognitive congruence over time in online environments; mentors'	Mentors' metacognitive skills

Paper	Chapter	Contribution to conceptual framework	Aims	Congruence themes explored	Intrapersonal and external factors included
5 (Garcia-Melgar, 2018)	8	Application of the framework to recruitment and training of peer mentors in higher education PAL programs	changes to the quality of mentoring relationships over time; identify opportunities to enhance online peer mentoring programs.	ability and strategies to establish and maintain types of congruence	Program support and training
			Propose online and blended strategies to recruit, train and provide further learning opportunities for peer mentors based on conceptual framework.	Development of social and cognitive congruence in initial training and ongoing development opportunities	Technology mediated interactions Mentors' metacognitive skills Students' motivations and help-seeking behaviours

### **3.3. Methodological considerations**

The papers in this thesis represent a thematically linked contribution to the PAL literature. The formulation of the papers required the author to provide an introduction that conveys the context of PAL programs to readers yet to become familiar with the PAL literature. Consequently, the publication format requires introduction to peer learning topics and general learning context at each paper. Likewise, methods and methodological considerations are addressed in each paper, rather than as a separate section in this thesis. To situate the thesis as a holistic inquiry, this section provides an overview of key methodological considerations underpinning sampling, data collection methods, and data analyses approaches across papers.

A pragmatic parallel mixed methods design, whereby qualitative and quantitative data were collected and analysed to address thesis aims, underpins research methodological considerations (Creswell & Plano Clark, 2017). A focus on analysing learning processes and relationship dynamics in PAL calls for methods that account for the complexity of processes underpinning engagement, relationships, and outcomes for PAL participants. In this regard, the complementarity of qualitative and quantitative data provides a powerful tool in mixed methods designs that allows for depth of understanding of complex phenomena, such as peer learning (Hesse-Biber, 2010). Furthermore, a mixed-methods approach aligns with PAL researchers' calls to collect and analyse a variety of data to gain insight into the context in which PAL operates (Ashwin, 2003). Whilst the research aligns with a concurrent mixed-methods design, as data from each sample were first analysed and interpreted in relation to the research questions guiding each publication separately, the discussion chapter of this thesis integrates qualitative and quantitative data from both samples to draw meta-inferences beyond the resolution of each paper (Tashakorri & Teddlie, 2003).

A multilevel sampling approach was used across studies, employing two samples of students and mentors participating in higher education PAL programs (Teddlie & Yu, 2007). An initial sample of higher education mentors and mentees was included to investigate help-seeking behaviours and mentor-mentee interactions in a drop-in academic PAL program. A second sample involved higher education students as mentors and regional secondary school students as mentees, with the objective of assessing the longitudinal development of mentor-mentee relationships in an online learning environment. The use of two samples serves to iteratively build and expand on the conceptual framework introduced in the study reported in Study 1. To this end, each sample was obtained from two purposefully selected PAL programs

that represented a naturalistic context in which to apply the conceptual framework. Thus, the sampling design was adopted with the intent to provide an accurate and realistic account of the phenomenon under study (Collins, Onwuegbuzie, & Jiao, 2007).

Given the focus of this thesis on relationships between variables in the conceptual framework, rather than notions of casualty, methodological decisions align with the objective of exploring peer learning processes and relationship dynamics. As such, the longitudinal assessment of outcomes for students or changes in their learning goals, behaviours and attitudes is beyond the scope of this thesis. Further research studies are recommended with the conceptual framework proposed in this thesis as a basis for testing and establishing predictive models and causal pathways between variable factors expressed in this framework.



## **Chapter 4. Hiding in plain sight: ‘Relationship’ in Peer Assisted Learning in Higher Education**

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A copy of Paper 1 as published in the Journal of Learning Development in Higher Education is included in this chapter. The primary author, Ana Garcia-Melgar, made a significant and leading contribution to the publication of the manuscript presented in this chapter in line with La Trobe University’s Authorship of Research Outputs Policy.

My contribution as first author included reviewing the literature, drafting the conceptual framework, drafting and finalising the manuscript, and ongoing communication with publishers. Professor Noel Meyers and Dr Julianne East provided feedback and suggestions to improve the manuscript.

## **Hiding in plain sight: the 'relationship' in peer assisted learning in higher education**

**Ana Garcia-Melgar**

La Trobe University, Australia

**Julianne East**

La Trobe University, Australia

**Noel Meyers**

La Trobe University, Australia

### ***Abstract***

Relationships underpin peer learning; however, they remain under-researched and under - theorised. We propose a model to identify factors that contribute to relationships in Peer Assisted Learning (PAL). Our model integrates three discrete bodies of knowledge: previous studies of PAL affordances, a synthesis of understandings drawn from learning theories, and studies of peer relationships in business and education. Our model features two components: social and cognitive congruence that deliver sustained PAL improvements. To evaluate the contributions of social and cognitive congruence to successful PAL outcomes, we evaluated four theoretical scenarios based on presence and/or absence of these factors. In each case, variations in social and cognitive congruence and mediating factors can potentially vary the quality of learning outcomes, student interactions, and engagement in PAL. Our scenarios can be employed to evaluate areas of targeted improvement in PAL. We discuss the implications of our model for PAL research and practice.

**Keywords:** Peer Assisted Learning; peer learning relationships; social congruence; cognitive congruence.

## ***Introduction***

The 'relationship' in Peer Assisted Learning (PAL) has the potential to leverage and enrich learning outcomes in higher education. Proposing a theoretically-based conceptual framework for PAL relationships in higher education may guide the development, design, and implementation of programmes. To conceptualise PAL relationships, we integrate theoretical considerations from diverse fields, including business and education. Our work responds to Jacobi (1991), Budge (2006), and Crisp's (2009) calls for a unified conceptual framework and definition of PAL. Our model addresses these opportunities by identifying the central unifying theme in PAL – the relationship. Here we employ the terminology 'mentor' and 'mentee' to refer to the student who provides assistance and the student who receives support, respectively.

To this end, we build on Topping's (1996, p.322) ubiquitous definition of PAL: peers come from 'similar social groupings' and engage in mutually beneficial learning partnerships that build on 'helping each other to learn and learning themselves by teaching'. In ideal circumstances, mentors will concurrently learn about themselves as learners (Boud et al., 2000) and about how to facilitate others to achieve excellent educational outcomes (Backer et al., 2012), and participation in PAL will deliver positive academic and psychological gains for both mentor and mentee (Topping and Ehly, 2001). Socio-cognitive learning theory provides the context for PAL development (Falchikov, 2001; Ten Cate and Durning, 2007). In particular, Vygotsky's zone of proximal development explains how peers can scaffold less academically developed peers (cited O'Donnell and King, 1999). The mentor, having successfully transitioned through the same learning experiences, can anticipate learning difficulties and understand mentees' likely cognitive challenges (Lockspeiser et al., 2008). This ability is defined as cognitive congruence and allows mentors to employ language that is cognitively appropriate to mentees' level of development (Ten Cate and Durning, 2007). In addition to the cognitive partnership established between peers, social congruence ensures the development of successful PAL partnerships (Moust and Schmidt, 1994). Social congruence represents the basis of a relationship where mentees feel comfortable to disclose learning gaps that the mentor helps to resolve (Ten Cate and Durning, 2007, Lockspeiser et al., 2008).

Previous evaluations of PAL sought to identify contributing factors to learning outcomes (Falchikov, 2001). That work demonstrates that PAL produced improvements in academic

success, metacognitive strategies, and self-efficacy (Hilsdon, 2014; Hammond et al., 2010; Fox et al., 2010; Collings et al., 2014; Arco-Tirado et al., 2011; Henning et al., 2006); however, elucidating the sustained benefit of these responses remains elusive. For example, some studies (Capstick, 2004; Ashwin, 2003) have identified an increase in strategic learning approaches (e.g. to complete an assignment), without the acquisition of transferable skills. Furthermore, while the literature shows benefits for students, the effect size of many studies is usually modest (Topping, 2005). We acknowledge the sustained influence on PAL of the learning environment, assessment, curriculum design, and pedagogical initiatives. The other factor – hidden in plain sight – is the interaction between mentor and mentee which can profoundly influence PAL.

Nora and Crisp (2007) recognise the mentor-mentee relationship as the black box of PAL. We join a growing community (e.g. Budge, 2006; Nora and Crisp, 2007; Holt and Berwise, 2012) to suggest that PAL relationships remain under-researched. We propose that the mentor-mentee relationship determines the success of the programme and quality of learning outcomes associated with peer learning. We argue, as do others (e.g. Holt and Berwise, 2012) that the peer relationship remains underexplored. Instead, most researchers focus on identifying the product of the relationship – the learning outcomes (Nora and Crisp, 2007). An extensive consideration of the functioning of the relationship will provide the foundation for improving our understanding of how PAL produces positive outcomes, how both parties in the relationship negotiate learning and, importantly, how we can engineer PAL successes.

This paper will first identify elements of the PAL relationship that facilitate positive learning and psychological outcomes from past research. Secondly, it will discuss personal and environmental factors that may negatively impact peer relationships. Thirdly, a conceptual framework of peer relationships will be presented and it will be discussed in relation to four relationship scenarios. Finally, we conclude with our consideration of the implications of peer relationships for the design, implementation and research of PAL.

### ***Previous research on peer assisted learning relationships***

For this review of PAL relationships, we selected papers on peer learning based on their relevance to relationships. Our review encompassed the disciplines of Business and

Education (Jacobi, 1991). The focus of these studies revolves around the practices in which mentors engage in to elicit mentees' development (Ward et al., 2014; Terrion and Leonard, 2007). In business contexts, research has focused on mentoring relationships in the workplace and their evolution through four stages (Kram and Isabella, 1985). Research on PAL relationships in education has focused on mentor practices that participants perceived to produce positive learning outcomes. These studies show that mentors accomplish three key functions: academic support and goal setting, emotional and psychological support, and role modelling (Nora and Crisp, 2007). From these disciplines, we identified several emergent relationship themes.

## 1. Relationships develop through defined stages

Kram and Isabella's (1985) seminal work on mentoring relationships in the workplace recognises that relationships mature through definable stages. Each stage comprises specific functions accomplished by mentors to facilitate mentees' development and, eventually, their independence. The presence of specific functions fulfilled by mentors, related to the provision of career development and psychosocial support, provide symptomatic representations of different relationship stages.

PAL relationships comprise four distinct phases: initiation, cultivation, separation, and redefinition (Humberd and Rouse, 2015; Hadidi et al., 2013; Mullen 1994). These phases correspond to levels of variation in certainty about the relationship, mentor-mentee interactions, and expectations about the relationship and roles. Uncertainty characterises the **initiation phase**. Roles and expectations become increasingly certain through this phase (Humberd and Rouse, 2015; Hadidi et al., 2013; Mullen 1994). The **cultivation phase** represents growth in trust, mutual respect, and shared aspirations that create the impetus for focused action. With the attainment of mutually agreed goals, an up-skilled mentee will become increasingly independent. During the **redefinition phase**, effective mentoring produces new aspirations and growth in the dyad (Hartmann et al., 2014).

## 2. Mentors provide academic and psychological/emotional support

PAL educational researchers focused on the social skills and interpersonal traits that produce tangible outcomes (Ehrich et al., 2004). Crisp and Cruz (2009) summarise the implicit consensus of mentoring relationships: they are personal and reciprocal (i.e. exerts

benefits for both parties), and include the provision of educational development, emotional support, and role modelling. Nora and Crisp (2009), Christie (2014), and Ward et al. (2014) also recognise distinct functions for mentees: educational/career goal setting and appraisal, emotional and psychological support, academic subject knowledge support, and the presence of a role model. Mentors achieve these functions by establishing frameworks to develop a caring and personal relationship (Eller et al., 2014). To become a successful mentor, several traits remain central: academic knowledge and skills; motivation to become a mentor; communication skills; supportiveness; empathy, enthusiasm and flexibility; empowerment of the mentee; trustworthiness; and willingness to be continuous learners (Terrion and Leonard, 2007). A mentor's ability to respond and adapt to mentees' task-based and emotional requests for help define aspects of successful PAL relationships (Ward et al., 2014). This serves as an overarching construct that overcomes the dichotomy between instrumental (pragmatic, task-oriented) and psychosocial functions (social and emotional support).

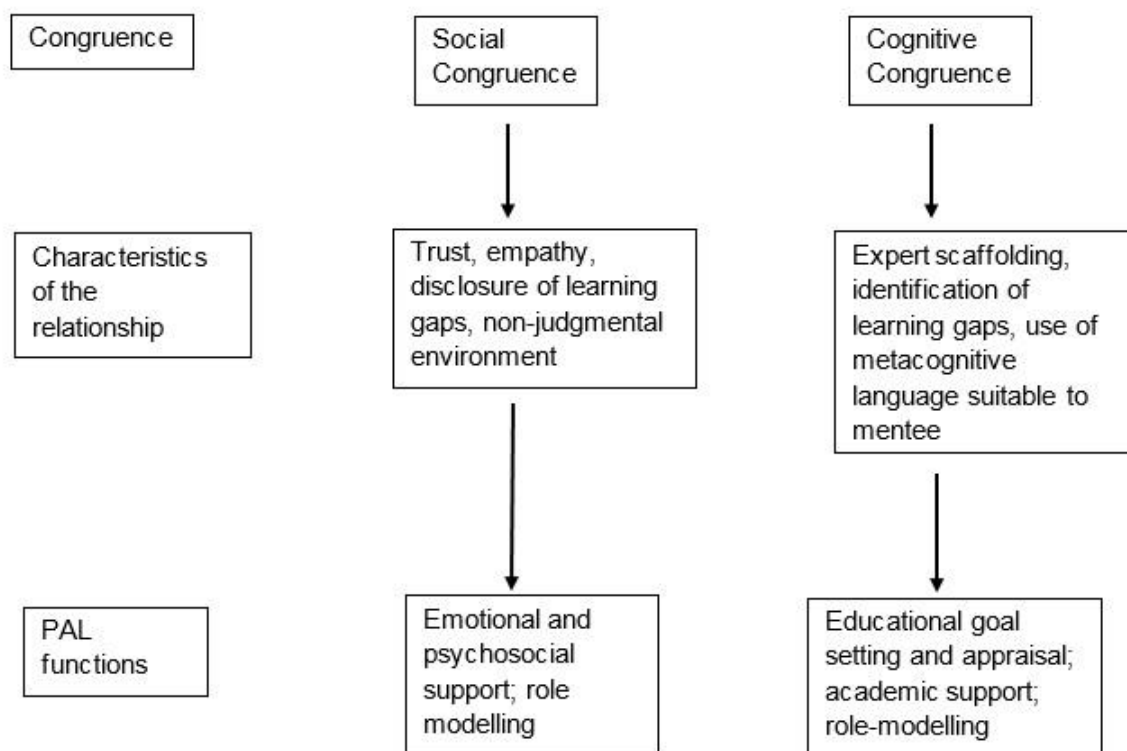
### **3. Social and cognitive congruence as factors that determine the success of PAL programmes**

Establishing caring, respectful, and personal relationships produces implicit cognitive and social psychological elements (Crisp and Cruz, 2009). Ward et al. (2014) explicitly recognise the central role of a mentor in attending to mentees' cognitive and psychological/emotional requests. Longfellow et al. (2008) differentiate the value that mentees place on the relationship, which represents a qualitatively different interaction compared to other helping relationships in education (Capstick, 2004). For mentors to provide cognitive/academic and psychological/emotional support, appropriate levels of cognitive and social congruence – respectively – are needed. Mentees value mentors that are able to scaffold learning, identify learning gaps, and provide explanations that are suitable to their cognitive development (Longfellow et al., 2008), and they value the mentor's social and psychological support (Mackey et al., 2010). Even though both types of congruence are equally important (Chng et al., 2011), mentors' skills and attributes related to psychosocial support may be more important for mentees – especially for young and inexperienced students (Terrion and Leonard, 2007).

## ***Social and cognitive congruence as elements of effective PAL relationships***

To more fully account for the complexity of PAL, we have recognised the need to extend beyond cognitive transactions between peers, and we acknowledge that peer transactions at both the cognitive and social levels are important. For this purpose, we identify two domains – socio-psychological congruence and cognitive congruence (illustrated in Figure 1).

Social congruence, defined as perceived social similarity between mentor and mentee, allows for the development of trust, empathy, and an open, non-judgemental learning experience (Dioso-Henson, 2012). Cognitive congruence represents more than the provision of educational/academic support. It extends to modelling the sophisticated ways that more experienced thinkers conceptualise and solve problems (Bulte et al., 2007). We hypothesise that successful mentoring programmes rely on the balanced presence of social and cognitive congruence because each congruence contributes to the development of psychosocial and cognitive/academic outcomes. We also propose that social congruence may represent a prerequisite for the development of the relationship in its early stages, while cognitive congruence commences after its establishment. Finally, we predict that social and cognitive congruence vary over time, as external and internal factors influence the congruence of the PAL partnership. We discuss these factors next.



**Figure 1. Impact of social and cognitive congruence on mentoring functions, and learning and psychosocial outcomes of PAL.**

### ***Factors that affect the nature and dynamics of PAL relationships***

We have synthesised previous research on detrimental influences of PAL in Table 1, considering those external and internal (student-related) factors that influence the nature of the relationship, quality of learning outcomes, and success of the programme. A number of research studies have investigated mentor and mentee role expectations and motivation, and how these roles change over time in response to environmental pressures, mentees' requests for directive assistance (Brown et al., 2014), and unclear role boundaries (Holt and Berwise, 2012). A second group of research studies considered the influence of the metacognitive skills and language used by mentors. Roscoe and Chi (2007) demonstrated that mentors tend to engage mentees by explaining declarative knowledge, rather than employing questioning techniques to elicit deeper learning outcomes. Finally, the impact of the learning environment in which PAL programmes are contextualised cannot be overlooked (Ashwin, 2003). These factors are likely to include



the university assessment environment (Ashwin, 2003), design of the PAL programme (Ross and Cameron, 2007), and mentor training (Topping and Ehly, 2001).

Accordingly, we can cluster potentially hindering factors into three groupings: 1) Role expectations and motivation; 2) Metacognitive skills and strategies employed by mentors; and 3) Environmental factors (learning environment, design of PAL programme and mentor training). The first two clusters correspond to intrapersonal or student-related factors, and the third group acknowledges the impact of external factors. Integral to these groupings are three points:

- i) The complexity of mentoring relationships.
- ii) The impact on the degree of social and cognitive congruence present in the relationship.
- iii) The capacity to hinder or enhance the quality and effectiveness of the relationship before and during development.

**Table 1. Summary of PAL limitations and conceptualisation of potentially hindering factors.**

<b>PAL limitations</b>	<b>Underlying issue</b>	<b>Conceptualisation as hindering factor</b>	<b>Source</b>
Limited size effects of PAL	Limited transferability of skills, possibly due to poor cognitive scaffolding.	Intrapersonal variables- meta-cognitive skills	Topping (1996) Topping and Ehly (2001) Capstick (2004)
Students' perceptions of PAL as ineffective, low participation	Lack of programme structure, mentors' limited knowledge, role misconceptions.	Environmental variables- programme structure  Intrapersonal variables- role expectations and motivation	Ismail and Alexander (2005) Capstick (2004) Topping (2005) Brown et al. (2014)
Changes in mentors' and mentees' role towards directional and passive role, respectively	Conflicting expectations and misconceptions about their roles.	Intrapersonal variables- role expectations and motivation	Capstick (2004) Ashwin (2003) Mackey et al. (2010)
Inconsistencies in mentors' guidance	Lack of mentors' metacognitive skills, poor training/preparation, role misconceptions.	Intrapersonal- metacognitive skills  Intrapersonal- role expectations and motivation	Brown et al. (2014) Holt and Berwise (2012)
Quality of learning outcomes: correlation PAL and strategic learning	Focus on assessment requirements, impact of assessment-oriented environment, inappropriate mentors' metacognitive skills/facilitation skills, or role misconceptions.	Environmental- assessment-oriented  Environmental- assessment type and design  Intrapersonal- metacognitive skills  Intrapersonal- role expectations and motivations	Ashwin (2003) Ten Cate and Durning (2007) Capstick (2004)
Mentors' knowledge-telling bias	Mentors engage in reproducing knowledge rather than questioning/content elaboration.	Intrapersonal- metacognitive skills	Roscoe and Chi (2007) Roscoe (2014) O'Donnell and King (1999)

## ***Impact of external and internal factors on PAL relationships: social congruence and cognitive congruence***

To examine the influence of cognitive and social congruence in PAL relationships we propose four theoretical scenarios, based on the presence and absence of both types of congruence. We use these scenarios to illustrate how the interaction of role expectations and motivation, metacognitive skills and environmental aspects influence the dynamics and nature of PAL relationships and, consequently, the presence or absence of social and cognitive congruence. Furthermore, we propose outcomes based on social and cognitive congruence when these are: present/present, present/absent absent/present and absent/absent.

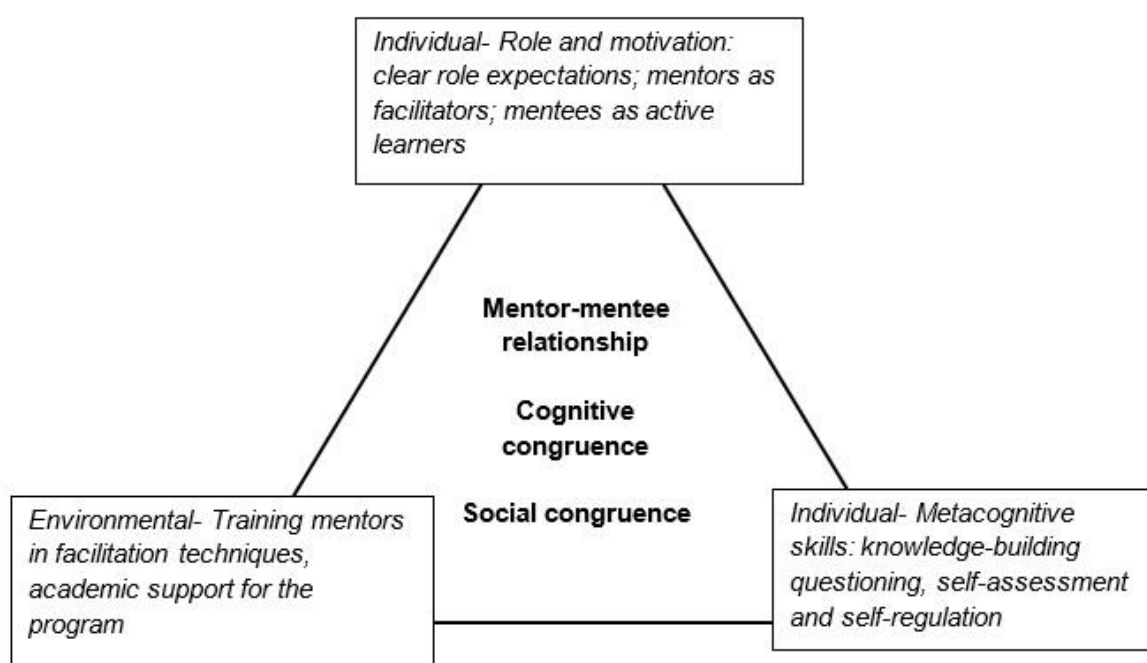
### **Scenario 1: social congruence and cognitive congruence are present**

The presence of social and cognitive congruence creates an environment where participants interact with trust (Bouquillon et al., 2005), inclusiveness, emotional security, and shared learning aspirations (Eller et al., 2014). Mentees feel secure in non-judgemental support so they can close learning gaps (Chng et al., 2011). Social congruence provides the foundation for other holistic aspects of the relationship: counselling, improved self-efficacy, and transition to academic life. Psychological benefits – for example, decreased stress and anxiety – also accrue from social congruence between mentor and mentee (Ginsburg-Block et al., 2006).

Adding cognitive congruence to this environment will do more than allow the mentors to serve as role models for sophisticated learning and problem solving. The proximity of mentors' and mentees' developmental stages provides a unique perspective for mentors to identify learning gaps. Since mentors scaffold the development and application of mentees' academic skills within the context of addressing specific learning outcomes, there exists a greater likelihood that those skills will become transferrable to other contexts. Mentors who move beyond strategic learning approaches and seek deeper learning outcomes will enable mentees to improve subject content knowledge and the ability to apply that understanding to new circumstances. However, the mentors' metacognitive awareness is key to the enactment of positive outcomes ascribed to cognitive congruence. If mentors lack understanding of metacognitive language associated

to learning processes, their ability to elaborate explanations that elicit mentees' metacognitive development may be limited (Roscoe, 2014).

Figure 2 presents our conceptualisation of an effective mentoring relationship, in the presence of social and cognitive congruence. Clearly established role expectations and motivations guide mentor and mentee interactions to create a mutually beneficial, non-hierarchical relationship (Colvin and Ashman, 2010), based on facilitation and development of mentees' skills. This level of connection and mutual contribution requires trained mentors.



**Figure 2. Conceptual framework for effective mentoring relationships.**

In this scenario, mentors and mentees benefit from the programme, including academic and socio-psychological gains. The scene is set for mentees to improve their self-efficacy and reduce their levels of stress and anxiety. Mentors also have the opportunity to build their knowledge as they reflect on their growing expertise, and they construct understandings through inferring and integrating ideas across topics and domains (Longfellow et al., 2008). Perhaps unsurprisingly, much of the literature highlights the gains for mentors in successful relationships (Backer et al., 2012; Topping, 1996; Colvin

and Ashman, 2010). In such cases, mentors have reported improved self-efficacy, leadership and communications skills, combined with a sense of accomplishment (Malm et al., 2012).

This scenario has focused on the outcomes and dynamics of effective relationships. In the remainder of the scenarios, we predict significant shifts that flow from interactions between congruence and dissonance in the social and cognitive realms.

### **Scenario 2: social congruence present in the absence of cognitive congruence**

In establishing social congruence, mentors build a trusting and supportive relationship with mentees (Allen and Eby, 2003). However, interactions involving the presence of social congruence and the absence of cognitive congruence will diminish previously identified benefits. Without cognitive congruence, we predict that a mentor will fail to scaffold the mentee, in turn producing diminished learning. In this scenario, motivations and role expectations will play a critical role in the development of the relationship. If mentees exhibit strategic help-seeking styles (e.g. completion of assessment tasks) driven from external motivations, they may seek assistance to complete a particular task (Brown et al., 2014).

In the absence of cognitive congruence, mentors could adopt highly directive and didactic roles. Information sharing, instead of knowledge building, might characterise the relationship. Mentors may invest more time explaining concepts instead of building on mentees' previous knowledge (Roscoe and Chi, 2007). Mentors may disengage if their expectations clash with mentees', or eventually readjust their expectations to fulfil mentees' requests (Brown et al., 2014). Evaluations of PAL programmes exhibiting the presence of social and absence of cognitive congruence may reveal positive evaluations from mentees – if mentors fulfil requests for strategic support. Mentees may also place higher value on the social aspects of the programme (i.e. they will value the programme as a social experience rather than an academic intervention).

If mentees manifest developmental help-seeking styles, and exhibit strong internal motivation, they are more likely to seek developmental advice from mentors (Alexitch, 2002). When the mentors' focus, and perhaps skill set, relies on didactic approaches, and

use of declarative knowledge, developmental advice may occur rarely. Such disparate expectations and dispositions may produce among mentees disengagement and abandonment of the programme. Mentees may likely apprehend that they will have achieved little, that the programme was ineffective, and failed to meet their needs (Capstick, 2004).

The type of assessment task, as well as the learning environment, will influence mentees' requests of strategic learning rather than developmental advice. In an assessment-oriented environment, mentors are more likely to respond to mentees' requests of help to complete and pass assessment tasks (Ashwin, 2003). However, we predict mentees will develop fewer transferable skills. Moreover, mentors may provide advice beyond their expertise and role boundaries – motivated by the social drive to help the mentee.

### **Scenario 3: cognitive congruence present in the absence of social congruence**

In the absence of social congruence, cognitive congruence may produce reduced engagement. The absence of a non-judgemental learning environment remains likely to detrimentally influence PAL interactions. This scenario reflects how the presence of cognitive congruence per se represents no guarantee that students will develop metacognitive skills. Both parties may focus on delivering the outcomes that address specific assessment tasks, but skills development will barely feature in the learning relationship (Capstick, 2004). Mentors and mentees may initially engage in meaning-oriented learning activities to develop mentees' self-regulated learning skills, however, the absence of social congruence will diminish trust in the relationship. Mentees will be less likely to disclose learning gaps and ask questions, leading to a relationship with closer alignment to a master apprentice model. The possibility of positive metacognitive outcomes diminishes because mentees may be disinclined to question mentors' explanations or seek further clarifications. Cognitive congruence – in the absence of social congruence – may train mentees to focus predominantly on the completion of the assessment tasks. Also, mentees remain unlikely to experience positive psychological outcomes, including decreased anxiety and stress. These outcomes derive from the social aspects of the relationship (Ginsburg-Block et al., 2006) – namely, trust, empathy, and the existence of an open learning environment (Ward et al., 2014).

Role expectations and motivations will also affect the outcomes of this scenario. Mentees who expect direction may pressure mentors to employ didactic models of instruction (Mackey et al., 2010). Mentors may assume this role if it is consistent with their role expectations. Alternatively, mentors may decline mentees' requests if these fall outside mentors' role expectations (in this case, the lack of social congruence may prevent the mentor from changing the nature of their role). Mentees who expect mentors to assume a directive role may still value the benefits of the cognitive transaction and mentors' ability to scaffold learning. However, in the absence of a trusting relationship, mentees remain unlikely to disclose learning gaps. We predict that mentees, in seeking social congruence, may pursue alternative sources of help (e.g. a friend or classmate) or abandon the peer learning programme earlier.

#### **Scenario 4: no cognitive or social congruence**

Without social and cognitive congruence, both PAL partners remain likely to disengage from the PAL programme. Making PAL attendance compulsory will limit students' choices to disengage physically, although they remain likely to mentally abandon PAL. If the relationship develops at all, mentors may dictate rather than guide learning. Mentees are unlikely to feel sufficiently secure in the relationship to risk the shame or fear of disclosing learning gaps. Mentees remain likely to hide the very developmental gaps that they would most benefit from addressing. Mentors may remain distant and unapproachable, and their actions may actively discourage self-efficacy. Such attitudes may undermine students' belief that they can succeed in academic life. In the absence of empathy in the PAL relationship, we anticipate few, if any, psychological benefits.

This scenario would cause most damage for students because of the high risk that mentors may offer inappropriate or wrong advice. Mentors fail to scaffold learning or connect with their mentees – in either the cognitive or social domains. Mentees may seek help only as a last resort and their help-seeking may be limited to very specific questions on assessment tasks. Evaluations of the programme may reflect mentees' dissatisfaction with mentors (wrong advice, ineffective, not worth attending). If mentors offered wrong or inappropriate advice, mentees are more likely to negatively value the programme.

## **Two levels of dissonance**

Based on the discussion of the scenarios, we predict under some circumstances dissonance will occur: between mentor and mentee (i.e. lack of congruence), and between the dyad mentor-mentee and the objectives of the PAL programme. When cognitive and/or social congruence are absent in PAL, mentor and mentee operate from opposite ends of the cognitive/social congruence spectrum. In the absence of social congruence, mentees may perceive mentors as socially different. Consequently, the learning relationship may become aligned to an expert tutor-student interaction instead of producing mutually beneficial outcomes. Without cognitive congruence, the cognitive partnership is negatively affected by mentors' limited ability to scaffold and address learning gaps from an expert student perspective. The relationship may shift towards an expert-student interaction if internal and external factors unduly influence the relationship. In both cases, the actual dynamics and outcomes of PAL deviate from the intended objectives. Moreover, mentor and mentee can be socially and/or cognitively congruent, yet still engage in learning interactions that result in limited learning and social outcomes for both parties (e.g. non-transferable skills).

The dissonance between the mentor-mentee partnership and the intended outcomes of the PAL programme may be caused by motivational factors, lack of appropriate mentor metacognitive knowledge, or external influences. For example, mentor and mentee may achieve cognitive congruence, but their motivational set and role expectations may contrast with PAL objectives (i.e. mentors assume a directive role and mentees assume a passive role). Similarly, mentors who lack appropriate metacognitive awareness and language may possess limited capability to enhance mentees' metacognitive skills – despite their social and cognitive congruence. Finally, even relationships characterised by social and cognitive congruence may become dissonant with intended outcomes if pressured by external factors, such as looming assignment due dates.

## ***Effective relationships: implications for PAL research and implementation***

We recognise that social and cognitive congruence enhance mentors' and mentees' learning outcomes. An effective relationship is characterised by the presence of both types of congruence and the mentors' capacity to align role expectations and motivations with



PAL objectives. However, the effect of internal and external factors to the relationship may influence congruence levels.

We propose that imbalanced levels of congruence may result in asymmetrical relationships that derail the relationship from the original focus on mutual benefit. Lack of cognitive congruence, paired with unrealistic expectations about the mentor's role, may result in asymmetrical relationships where mentors tend to impart knowledge rather than guide learning. Conversely, lack of social congruence may produce relationships where the learning needs of mentees remain poorly addressed. Our model proposes that longitudinal research studies could identify variations in social and cognitive congruence that potentially risk the establishment of effective relationships.

Previous research shows that mentors and mentees may differ in their perceptions of learning and psychosocial support received – and provided (Holt and Berwise, 2012). Mentors tend to positively evaluate the quality of support they provided to mentees, while mentees evaluate the quality of support at lower levels. Eventually, mentees' perceptions are critical to the success of the programme, and congruence needs to be positively perceived by mentees to enhance relationship outcomes. The importance of mentees' perceptions raises the question of whether mentors need to be 'real' cognitive and social partners. Perhaps a mentor's ability to appear as socially and cognitively congruent may be more important than the actual level of cognitive development and social similarity with mentees. Further research could investigate what skills are employed by mentors to be perceived by mentees as socially and cognitively congruent partners. Mentor training could emphasise the importance of developing congruent partnerships. In particular, training could enhance mentors' ability to employ social and metacognitive skills related to mentees' perceptions of congruence. Research on mentoring relationships could also investigate mentors' and mentees' discrepancies in their perceptions of congruence, and analyse potential mediating variables that affect mentees' perceptions of congruence. Ongoing evaluation of congruence – employing longitudinal research methodologies and measured at different stages of the relationship – will ultimately enable timely interventions to restore congruence levels.

Previous literature recognises the central role of developing trust between PAL partners (Mackey et al., 2010; Eller et al., 2014; Bouquillon et al., 2005). In our conceptual framework, we acknowledge trust as a defining characteristic of social congruence.

However, an excessive focus of mentors on developing trust may also carry potential negative consequences. Mentees may become overly dependent, while mentors may cross role boundaries and provide support that exceeds role expectations. Consequently, the focus on enhancement of mentees' independent learning skills may be lost.

Our conceptual model provides a research framework to investigate the development of periodic and continuous social and cognitive congruence in PAL relationships. Without such developmental studies, deviation from intended outcomes over time might not be detected. Furthermore, the causal factors that influence strong levels of congruence would remain undiscerned. In addition to research on varying congruence, there are practical applications for this framework. Our model predicts that mentor selection and training to engage with varying levels of congruence could more effectively communicate the educational and psychosocial functions that define the mentor's role.

Finally, the role of internal and external factors – presented in this conceptual framework – shows potentially mediating variables of relationship outcomes in PAL. Role expectations and motivations mediate mentors' and mentees' engagement, behaviour and, ultimately, PAL outcomes. Specific interactions of motivational variables, role expectations and congruence levels, however, remain unclear. Similarly, environmental variables and mentors' and mentees' metacognitive skills hold promise as predictors and mediators of mentoring relationships and outcomes. Moreover, the interaction of internal and environmental factors on mentoring could provide a comprehensive research framework to investigate the complexity of peer learning processes and outcomes.

## ***Conclusion***

The mentor-mentee relationship is critical to the success of PAL programmes. The nature and dynamics of the relationship influence the support mentors provide and quality of learning outcomes. We defined effective relationships as the balanced presence of social and cognitive congruence between mentor and mentee. Mentors' ability to connect cognitively and socially with mentees – and to be perceived as congruent – provides students with a learning partnership that is qualitatively different from other learning interactions. While balanced mentoring relationships provide mutual benefits, environmental and student-related factors may negatively affect congruence levels and,

consequently, learning and psychosocial outcomes. For PAL programmes to effectively deliver beneficial outcomes for all parties, we require comprehensive support for mentor-mentee relationships.

Our conceptual framework provides a diagnostic tool that acknowledges internal/cognitive and environmental influences on PAL. Longitudinal research methodologies that collect data during various stages of the relationship will aid our understanding of the role of relationships and their impact on PAL outcomes. Factors that may hinder PAL outcomes – like role expectations and motivation, metacognitive skills, and environmental factors – can be included in studies that examine the impact of mediating variables on PAL processes and outcomes. The mentor-mentee relationship, hidden in plain sight within PAL schemes, is critical to the theoretical and practical development of PAL programmes. This paper provides a conceptual framework of effective relationships and hindering factors that can be employed to contribute to the advancement of PAL research and practice.

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### **Author details**

Ana Garcia-Melgar serves to support Student Learning and is part of the Peer Learning Advisers programme at La Trobe, an academic support programme that employs experienced students to provide academic assistance to all students. Ana has developed and delivered training programmes for peer mentors and advisers. Her main research interests include peer assisted learning programmes in higher education, mentor-mentee relationships, academic help-seeking behaviour and motivation to seek help from peers.

Associate Professor Julianne East is Director of Student Learning and Engagement at La Trobe University, Australia. This department is responsible for developing the Peer Learning Advisers programme, in which students work with other students to develop academic skills, library search skills and career readiness. Julianne has contributed to the



literature on student autonomy, the roles of academic language and learning lecturers, and issues of plagiarism and academic integrity.

Professor Noel Meyers is the Professor of Education, Outdoor, and Environmental Studies at La Trobe University. His interests span science, science education, and improving the quality of learning for all. He enjoys the opportunity to raise aspiration and extend opportunity for those least fortunate among us. His contributions to student learning earned international, national, and institutional awards for teaching excellence.

# **Chapter 5. What Motivates Students to Participate in Peer Assisted Learning Programs? An Application of Help-seeking Theory**

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A copy of Paper 2 is included in this chapter. This paper has been submitted to the journal *Mentoring & Tutoring: Partnership in Learning*, and has been accepted with minor revisions. The primary author, Ana Garcia-Melgar, made a significant and leading contribution to the publication of the manuscript presented in this chapter in line with La Trobe University's Authorship of Research Outputs Policy.

My contribution as first author included reviewing the literature on help-seeking, designing data collection instruments, data gathering and analysis, interpretation of findings, drafting and finalising the manuscript, and ongoing communication with publishers. Professor Noel Meyers and Dr Julianne East provided feedback and suggestions to improve the manuscript.

What motivates students to participate in Peer Assisted Learning programs? An application  
of help-seeking theory

Abstract

Encouraging students to seek timely help remains a challenge in higher education. This problem also applies to Peer Assisted Learning (PAL) programs, where experienced students provide academic support to fellow students. Understanding what factors underlie students' motivations to seek help from peers can expand the capacity of PAL to provide effective support. In this paper, we apply help-seeking theory to the study of help-seeking behaviours in a PAL context. Using quantitative measures, we investigated the types of help students sought, their help-seeking goals and underlying motivations. Results support previous findings on the characteristics of active help seekers; however, specific motivational traits characterised and influenced decisions to seek help from peer advisers. Help-seeking behaviour frequencies and the type of assistance requested suggest a dynamic and potentially malleable continuum of behaviours. Implications for help-seeking research and PAL implementation are discussed, in particular, the role of PAL programs in modelling effective help-seeking behaviours in students.

*Keywords:* help-seeking behaviour, peer assisted learning, peer mentoring, academic support

## What Motivates Students to Participate in Peer Assisted Learning Programs? An Application of Help-Seeking Theory

Peer Assisted Learning (PAL) programs, featuring experienced students working collaboratively with less academically developed peers, enrich the understandings of learners needing academic support (Topping, Buchs, & Duran, 2017; Topping & Ehly, 2001). Based on the social and cognitive congruence - or similarity - between peers (Garcia-Melgar, East, & Meyers, 2015; Ten Cate & Durning 2007), PAL strategies embrace core learning principles: a learning relationship that is mutually beneficial (i.e. exerts benefits for the student who helps, and the student who receives support), development of independent learning skills, and the provision of a safe and open learning environment (Topping et al., 2017). PAL participants report academic gains, including heightened academic performance and learning skills (Dioso-Henson, 2012; Leung, 2015). PAL also increases student satisfaction and engagement (Rohatinsky, Harding, & Carriere, 2017; Terrion, 2012), adding value that extends beyond academic gains to include improved self-efficacy (Heirdsfield, Walker, Walsh, & Wilss, 2008), and diminished anxiety and stress (Zentz, Kurtz, & Alverson, 2014).

Despite the academic and socio-psychological benefits that PAL participants report, low participation rates remain an issue for many programs (Allen, Tonta, Haywood, Pereira, & Roberts, 2019; Stone, Meade, & Watling, 2012). In addition to low attendance, researchers have identified two areas that influence the utility and effectiveness of PAL. First, students who access PAL typically share a specific motivational profile and skill set (Dawson, van der Meer, Skalicky, & Cowley, 2014), and students with high self-efficacy, academic skills, and intrinsic motivation tend to self-select to participate in PAL (Capstick, 2004; Hizer, Schultz, & Bray, 2017). Second, even when programs actively emphasise the development of independent learning skills, students may eventually develop strategic help requests (in particular, to pass

assessment tasks) which can limit the development of independent and transferable learning skills (Brown, Nairn, van der Meer, & Scott, 2014).

Students who participate in PAL have made at least three decisions: they recognised and acknowledged that they need help, matched their perceived requirements to the help available, and then chose to seek help (Karabenick & Berger, 2013; Newman, 1998). We and others (e.g. Karabenick & Gonida, 2018; Ryan & Pintrich, 1997) recognise the strong influence motivation plays to guide the decision-making of help-seekers. Yet, little if any PAL research has applied help-seeking theory to the study of motivation and help-seeking behaviours in PAL. Applying help-seeking theory to PAL environments enables predictions about the specific motivational traits that influence students' decisions to seek help, or not. Motivational constructs explain why some students engage or disengage in PAL, and what type of support they can request. Moreover, extending help-seeking theory to PAL contexts will advance the help-seeking literature from its current focus on help-seeking directed to teachers (Shim, Kiefer, & Wang, 2013). Our focus on help-seeking directed to peers is demonstrated in PAL situations. Using enhanced understandings of motivation may inform strategies to engage students who have not, nor currently seek help, as well as to increase students' regular attendance and engagement with PAL.

We embarked on this study in response to calls for further research into students' motivations and behavioural strategies in PAL (e.g. Schunk & Mullen, 2013). The objectives of this paper are: to explore help-seeking behaviours directed to academic peer advisers; to examine the nature of help requested in PAL; and to detect associations between motivational constructs, help-seeking behaviours, and help requests. We first synthesise help-seeking literature to identify relevant motivational constructs useful for the study of help-seeking behaviours in PAL contexts. We present results from a quantitative study conducted with higher education students attending a university drop-in PAL program. Lastly, we consider the

implications of the development of PAL programs that nurture help-seeking behaviours in higher education.

### **Help-seeking Behaviour Theory and Research**

Researchers conceptualise help-seeking behaviour as a self-regulated learning strategy (e.g. Karabenick & Gonida, 2018). Amongst self-regulated learning strategies, help-seeking is characterised by the presence of social engagement aspects, that is, it takes place in social contexts (Karabenick & Dembo, 2011; Ryan & Pintrich, 1997). Using a repertoire of cognitive, behavioural and motivational strategies, self-regulated learners enhance the quality of their understanding through progressive development of learning expertise (Zimmerman & Kitsantas, 1997). Having the capacity to anticipate and identify when help is needed, search and identify sources of help, and adapt/interpret the help received accordingly represent the hallmarks of successful self-regulated learners (Nelson-Le Gall, 1985). To be effective, the help needs to be timely and relevant so that students can reflect on advice and turn it into coherent actions to produce outcomes (Oortwijn, Boekaerts, Vedder, & Strijbos, 2008).

Help-seeking represents an adaptive strategy that improves learning outcomes, however, not all strategies provide equal benefits. Some behaviours may detrimentally impact learning or result in dependence on the helper, a phenomenon that Nelson-Le Gall (1985) delineated into adaptive and executive help-seeking. Adaptive help seekers ask for hints, guidance, and strategies to help them solve problems independently. As a result, self-regulated learning, independence and persistence arise from developing adaptive help-seeking behaviours (Karabenick, 1998). In comparison, executive help-seekers request helpers to resolve tasks for them, with limited concern for how to learn and find solutions independently. In this case, the help-seeker focuses on outcomes rather than learning processes (Ryan & Pintrich, 1997). Help-seeking research has examined factors that inhibit or promote students' decision to seek or avoid help, help-seeking goals, and preferences for specific sources of help

(formal vs informal). Newman (1998) framed help-seeking behaviours within a motivational-affective framework that encompasses achievement goals, perceptions of competence, attributions of success/failure, and attitudes towards help-seeking. We discuss these factors next.

Achievement goal theory has guided research on help-seeking behaviour (Gonida, Karabenick, Makara, & Hatzikyriakou, 2014; Roussel, Elliot, & Feltman, 2011), with the relationship between achievement goals and help-seeking avoidance or approach receiving significant attention (e.g. Karabenick & Knapp, 1991; Vaessen, Prins, & Jeurig, 2014). Students with mastery learning orientations (i.e. focused on mastery and skills development) are more likely to seek adaptive help because they retain responsibility for solving problems and improving their learning skills - with minimal external guidance (Karabenick, 2003). Performance oriented students (i.e. focused on evaluating their performance compared to others) are more likely to avoid seeking help (Gonida et al., 2014). Karabenick (2004) argued that when students' goals focus on outperforming others, they tend to exhibit greater sensitivity to being judged as incompetent by others. Such concerns about negative judgments may encourage help-seeking avoidance (Huet, Escribe, Dupeyrat, & Sakdavong, 2011). In those instances where performance-oriented students seek help, they usually exhibit executive help-seeking (Alexitch, 2002).

Elliot and McGregor (2001) further categorised achievement goals in terms of focus: approach and avoidance (avoiding negative consequences of not achieving the goal). Fewer subsequent studies, however, have included the approach/avoidance distinction. Karabenick (2003) found that college students with performance avoidance goals were more threatened by help-seeking and, thus, more likely to avoid seeking help or to develop executive help-seeking strategies. Karabenick also found an association between students who endorsed mastery avoidance goals and executive help-seeking, suggesting that avoidance goals have a negative

impact on adaptive help-seeking strategies. Research on performance approach goals and help-seeking behaviours, on the other hand, has yielded inconsistent results. Whilst some studies have found a positive relationship between performance approach goal orientations and help-seeking avoidance (Roussel et al., 2011), others have found no significant associations with specific help-seeking behaviours (Gonida et al., 2014).

In addition to the association between achievement goals and help-seeking, researchers have investigated the role of students' perceptions of competence, attributional style, and attitudes towards help-seeking. Students who believe they are not academically competent will feel threatened when asking for help and, consequently, will avoid seeking help (Butler & Shibaz, 2014; Ryan & Pintrich, 1997). Karabenick and Knapp (1991) argue that students with high self-esteem hold little concern about being perceived as incompetent by others and will seek help as required. Self-perceived competence also plays an important role in the formation of help-seeking attitudes. Students with high self-perceptions of competence will perceive help-seeking as a positive and adaptive behaviour, while students with low perceptions of competence will hold negative attitudes as they are more concerned about potential risks associated with help-seeking (Collins & Sims, 2006; Xie & Xie, 2019). Finally, students' attributional style shapes perceptions of the value and usefulness of help-seeking (Ames, 1983) and, consequently, the development of adaptive or non-adaptive help-seeking. Students who attribute their own failure to lack of ability (beyond their control) often adopt passive strategies when difficulties arise, and avoid seeking help or may develop non-adaptive help-seeking strategies if they do seek help. Students who attribute success to effort (controllable) tend to seek help when needed and engage in effective help-seeking strategies (Magnusson & Perry, 1992; Mihlon, 2010).

Help-seeking theory has sought to predict students' preferences for specific sources of help. Karabenick (2004) studied college students' preferences for formal and informal sources



of help (including peers) and their help-seeking behaviours, and argued that executive help-seekers would prefer informal sources of help - often readily available. Karabenick found that adaptive help-seekers showed a preference for formal sources of help, however, executive help-seekers did not show a preference for formal or informal sources of help. That is, both adaptive and executive help-seekers would seek help from informal sources such as classmates. Karabenick concluded that, in order to clarify the association between help-seeking behaviours and sources of help, more research about the characteristics of the helper is needed. In Karabenick's studies, only classmates were included as potential sources of help; other peer-based sources of help such as peer tutors or peer mentors were not considered. To the best of our knowledge, only one study has examined help-seeking directed to peer tutors. Using a sample of students attending Supplemental Instruction (peer-led sessions for high-risk courses), McGee (2005) found that students with lower self-efficacy and beliefs that they were in limited control of their learning were more likely to engage in PAL. These results seem to contradict previous help-seeking research and arguments that high achieving students self-select to attend PAL (Dawson et al., 2014). McGee's work, however, made no distinction between adaptive and executive help-seeking behaviours. In this paper, we investigate adaptive and executive help-seeking behaviours in a drop-in PAL environment to elicit understandings of students' goals when seeking help from peer advisers.

### **Research Aims**

We examine help-seeking directed to peers providing academic support in a higher education PAL program. We draw on help-seeking theory and research to explore students' motivations, help-seeking goals, and help requests in a drop-in PAL program. Help-seeking directed to peer advisers remains an underexplored area, and understanding students' motivations to seek help in PAL can underpin the development of effective PAL strategies.

Specifically, we investigate what behaviours - adaptive/executive - occur in PAL using the following questions:

- How do students attending PAL self-identify their self-efficacy, goal orientation, and attributional style?
- What type of help-seeking behaviour (adaptive/executive) do PAL help-seekers exhibit?
- What is the relationship between motivational constructs and help-seeking in PAL?
- For what tasks do students seek help in PAL, and is there an association between help-seeking behaviours and specific help requests?

We predict that participants, being active help-seekers, will identify themselves as self-efficacious and attribute success/failure to internal and controllable factors - consistent with help-seeking theory and research findings. Since there is limited evidence for the association between specific goal orientations and the preference to seek help from peers, we anticipate that participants may endorse both mastery and performance goal orientations. Given the lack of studies on the types of help-seeking behaviours directed to peer advisers, we predict participants may exhibit adaptive and executive help-seeking behaviours. Behaviours may become malleable in response to participants' perceptions about the source of help (formal vs informal), or the potentially strategic nature of PAL as just in time and readily available support (McKenzie, 2013). Associations between motivation constructs and help-seeking behaviour (adaptive/executive) may reflect patterns found in previous research (i.e. highly self-efficacious, mastery-oriented students will exhibit adaptive help-seeking; low self-efficacious, performance-oriented students will exhibit executive help-seeking). Finally, we anticipate executive help-seekers to report seeking help with assessment-based tasks (e.g. referencing, the essay structure), and adaptive help-seekers to seek skills development support (e.g.

developing critical thinking skills). We predict that students may seek more help with assessment-based tasks overall, again potentially influenced by the strategic nature of PAL.

## **Methodology**

### **Participants and the PAL Program**

We conducted this study at an Australian metropolitan university, where students participated in interviews and a series of quantitative questionnaires after accessing a drop-in PAL program. Ethics approval for the study was obtained from the university's Human Research Ethics Committee. This study is part of a larger investigation on peer assisted learning in higher education. Students accessing the Peer Learning Advisers (PLA) program completed a survey that measured goal orientation, attributional style, self-efficacy, general help-seeking behaviour, help-seeking behaviour directed to PLAs, and help-seeking attitudes. Students also indicated what type of task they had sought help for. The PLA program is a drop-in peer assisted learning program that employs experienced students to provide academic support to their peers. Students can drop-in during advertised hours, and consultations usually last around 30 minutes. The focus of the program is academic and its main objective is to develop students' general learning and study skills. The program offers 'just-in-time' academic support for undergraduate and postgraduate students. It provides a natural context to investigate help-seeking directed to peers as students attend the program on a voluntary basis (i.e. students decide to seek help and choose a specific source of university support from those available).

During two weeks, students were invited by PLAs to complete an online anonymous questionnaire about their experience with the PLAs and their help-seeking behaviours. Students who agreed to participate in the study completed the questionnaire after their consultation with the PLA, and used an individual consultation room to ensure privacy and confidentiality of responses. 111 students completed the online questionnaire. The majority of participants were females (73%) enrolled in undergraduate degrees (77%). Participants were enrolled in Health

Sciences courses (30%); Humanities and Social Sciences (20%); Business, Economics and Law (24%); Science and Engineering (16%); and Education (11%). Almost half the sample (45%) were mature age students (over 25 years old), more than the overall percentage of mature age students (36.71%) in Australia (Australian Government Department of Education and Training, 2016). This paper reports on the quantitative data collected on students' motivational profile and help-seeking behaviours.

### **Measures**

The questionnaire included scales adapted from the help-seeking literature, and was reviewed by a group of learning support academic staff involved in the implementation of the PLA program. We measured goal orientation using items from Elliot and Murayama (2008) Achievement Goal Questionnaire revised (AGQ-R) to identify four goal orientations: mastery approach, mastery avoidance, performance approach, and performance avoidance. We adapted some of the items to a higher education context (e.g. 'My goal is to learn as much as possible at university' versus 'school'). Self-efficacy and attributional style (beliefs effort/intelligence) scales were adapted from Motivated Strategies for Learning Questionnaire (MSLQ) scales (Pintrich, Smith, Garcia, & McKeachie, 1991).

The four scales assessing students' help-seeking goals included one scale measuring students' general academic help-seeking (i.e. 'If you were going to seek help for your studies, what would be your primary goal') and another measuring students' academic help-seeking directed to PLAs (i.e. 'When you talk to a PLA, what is your primary goal?'). The same set of questions was employed to measure general and PLA-specific help-seeking behaviour. Help-seeking scales were adapted from Karabenick and Knapp's (1991) and Karabenick's (2004) studies, and included questions to measure students' adaptive behaviours (e.g. 'My goal is to ask someone who could help me understand general ideas or concepts') and executive behaviours (e.g. 'My goal is to get someone to go through my work and revise it'). A five-

point Likert scale of frequency was employed - from very rarely to frequently - for students to report frequency of help-seeking goals. To assess help-seeking attitudes, three items were adapted from Karabenick and Newman (2006) (e.g. 'I believe that it is normal to seek for help at university at some point').

### **Data Analysis**

Scale items were tallied to provide total scale scores. Reliability analysis (Cronbach's  $\alpha$ ) for motivation related scales showed internal consistency (table 1). General adaptive and executive help-seeking behaviours scales, and executive help-seeking directed to PLAs, showed  $\alpha$  levels in the .6 to .7 range (table 2); however, corrected inter-item correlations were above .4, acceptable for scales with a small number of items (Pedhazur & Schmelkin, 1991). One item was removed from the positive attitudes towards help-seeking scale ('I would not be concerned if my classmates found out that I asked for help') due to low inter-item correlations with the other items. Descriptive statistics were obtained for help-seeking mediators/predictors and help-seeking variables. Goal orientation and adaptive help-seeking scores were reasonably normally distributed, however, they tended to be negatively skewed. Adaptive and executive help-seeking behaviour scores were grouped according to behaviour frequencies (using the five-point scale of frequency) to run comparative analyses between groups of students who endorsed adaptive or executive help-seeking behaviours in varying frequencies.

Correlation analysis was employed to explore the relationship between motivation constructs and help-seeking variables. Spearman's rank correlation coefficient was calculated due to the ordinal nature of data collected. We conducted univariate ANOVAs with post-hoc tests to investigate differences in motivation constructs between help-seeking behaviour frequency groups of students. Chi-square tests for independence were employed to assess potential relationships between help-seeking and types of tasks for which students sought help.

## Results

Students seeking help from PLAs mostly identified themselves as self-efficacious and mastery-oriented. Reporting their beliefs about success/failure, participants attributed more importance to effort rather than fixed personal factors such as intelligence (table 1). Students showed a strong mastery learning oriented profile, in particular, mastery approach goals (e.g. develop my skills). Participants also expressed concerns about failing to achieve learning mastery (mastery avoidance).

Table 1

### *Descriptive Statistics for motivation related scales*

Variable	Items	Mean	SD	$\alpha$
Mastery approach	4	4.47	.49	.71
Performance approach	3	3.51	.9	.86
Mastery avoidance	3	3.79	.9	.75
Performance avoidance	3	3.53	.9	.82
Self-efficacy	7	3.86	.64	.84
Attributional style	4	3.89	.62	.70

*Note.* Higher scores on the attributional style scale indicate more importance given to effort over intelligence.

### Self-reported Help-seeking Behaviours

Participants shared high levels of adaptive help-seeking and reported comparatively lower executive help-seeking behaviours (table 2). Students' help-seeking to PLAs mirrored self-reported general behaviours, and reported seeking adaptive help from PLAs more frequently than executive help. Help-seeking attitudes were highly positive. Overall, students perceived help-seeking as a positive behaviour and reported little concern about negative social consequences.

Students' general help-seeking goals aligned their self-reported purpose for help-seeking to PLAs. Participants who self-reported general adaptive help-seeking also sought adaptive help from PLAs; general executive help-seekers sought executive help from PLAs. The correlation between general adaptive help-seeking and adaptive behaviour to PLAs was significant and positive ( $\rho = .529, p < .01$ ), as well as between general executive help-seeking and executive behaviour to PLAs ( $\rho = .628, p < .01$ ). Adaptive and executive behaviours showed significant positive, yet small, correlations. Significant correlations occurred between adaptive and executive general behaviours ( $\rho = .253, p < .01$ ) and between PLA-specific adaptive and executive behaviours ( $\rho = .281, p < .01$ ). These results suggest that participants were able to identify themselves with both types of behaviours.

Table 2

*Descriptive Statistics for help-seeking related scales*

Variable	Items	Mean	SD	$\alpha$
General adaptive help-seeking	3	4.21	.61	.69
General executive help-seeking	3	3.52	.82	.67
Adaptive help-seeking to PLAs	3	4.21	.72	.86
Executive help-seeking to PLAs	3	3.53	.84	.64
Positive attitudes	2	4.16	.69	.74
Negative attitudes	4	2.35	.96	.83

Help-seeking scales were collapsed into ordinal variables that consisted of three frequency groups: infrequent, occasional, and frequent behaviours (table 3). Students with adaptive behaviours reported higher frequencies of help-seeking than executive help-seekers; few participants reported frequent or occasional adaptive behaviours. Whilst participants who

reported adaptive help-seeking behaviours were predominantly frequent adaptive help-seekers, executive help-seekers varied in the frequency of their help-seeking behaviour. More participants reported frequent executive help-seeking than occasional or infrequent executive behaviours.

Table 3

*Frequency of adaptive and executive help-seeking behaviours*

Variable	Frequent behaviour	Occasional behaviour	Infrequent behaviour
Adaptive help-seeking	n = 95	n = 13	-
Executive help-seeking	n = 62	n = 33	n = 14
Adaptive help-seeking to PLAs	n = 96	n = 7	n = 3
Executive help-seeking to PLAs	n = 57	n = 38	n = 11

**Differences in motivation between groups of help-seekers.** To assess potential differences in motivation variables between groups of help-seekers, we conducted univariate ANOVAs and post hoc tests (Tukey) with  $\alpha = .01$ . Significant differences occurred between frequent and occasional executive help-seekers to PLAs in performance approach goals:  $F(2, 103) = 7.8, p = .001$ ; and between frequent, occasional, and infrequent executive help-seekers in performance avoidance goals:  $F(2, 103) = 8.69, p = .000$ . Frequent executive help-seekers were significantly more motivated by performance goals - both approach and avoidance - than less frequent executive help-seekers. The effect size, calculated using  $\eta^2$ , was medium according to Cohen and Cohen (1983):  $\eta^2 = .13$  for performance approach goals, and  $\eta^2 = .14$  for performance avoidance goals.



### Correlations between Motivation factors and Help-seeking

Table 4 shows correlation coefficients between motivation related factors and help-seeking variables.

Table 4

*Correlations between motivation variables and help-seeking behaviours*

Motivation construct	Adaptive help-seeking	Executive help-seeking	Adaptive help-seeking to PLAs	Executive help-seeking to PLAs
Mastery approach	.31**	.063	.307**	.042
Mastery avoidance	.29**	.010	.261**	.184
Performance approach	.063	.307**	.197*	.360**
Performance avoidance	.124	.332**	.299**	.409**
Self-efficacy	.302**	-.071	.200*	-.162
Attributional style	.314**	-.193*	.026	-.293

*Note.* Spearman correlation coefficients are reported.

\*  $p < .05$ . \*\*  $p < .01$ .

**Self-efficacy and help-seeking behaviour.** A positive correlation existed between self-efficacy and general adaptive help-seeking, and with adaptive help-seeking directed to PLAs. Although correlations correspond with small to medium effect sizes, students with higher levels of self-efficacy were more likely to exhibit adaptive help-seeking in general and, in particular, when attending the PLA program. No correlation occurred between self-efficacy and general executive help-seeking. Self-efficacy did not correlate with executive help-seeking directed to PLAs. Self-efficacy measures correlated more highly with general measures of help-seeking than with PLA-specific behaviour.

**Goal orientation and help-seeking behaviour.** Students who endorsed mastery approach goals were more likely to develop adaptive help-seeking behaviours. Mastery

avoidance also showed a positive correlation with general adaptive help-seeking. Thus, mastery oriented (both approach and avoidance) students tended to seek adaptive help. Performance approach positively correlated with executive help-seeking, both in general and when directed to PLAs. Performance approach was also positively associated with adaptive help-seeking to PLAs. Performance avoidance goals correlated with general executive help-seeking, executive help-seeking to PLAs, and adaptive help-seeking to PLAs. Students motivated to outperform or match the performance of their peers were more likely to seek executive help, however, they also sought adaptive help from PLAs. Performance-avoidance goals were highly correlated with executive help-seeking, but also showed significant correlations with adaptive help-seeking directed to PLAs.

**Attributional style and help-seeking behaviour.** The attributional style scale significantly correlated with all types of help-seeking, except with adaptive help-seeking to PLAs. The strongest correlation occurred between the general measure of adaptive help-seeking and attributional style. Students who attributed success/failure to controllable factors such as effort showed a tendency to seek adaptive help. Attributional style inversely correlated with executive help-seeking to PLAs and general executive help-seeking. Students who attributed success/failure to fixed factors - such as intelligence - were more likely to request executive help in general and when directed to PLAs.

### **Relationship between Type of Help Sought and Help-seeking Goals**

Table 5 illustrates the topics for which students reported seeking help in the PAL program.

Table 5

*Help-seeking requests: type of task*

Type of task	Percentage of participants
Essay structure	52.3%
Academic writing	51.4%
Referencing	51.4%
Understanding assessment task	42.3%
Grammar	38.7%
Critical thinking	30.6%
Searching for resources	25.2%
Checking consistency assessment task	25.2%
Subject content	22.5%
Exams	9%
Numeracy	9%
Speaking	8.1%
Literature reviews	7.2%

*Note.* Participants could choose more than one category, and they did so; hence percentages in this table do not add up to 100%

Most students reported seeking help from PLAs about essay structure, academic writing, and referencing. Forty-two percent of students requested help to understand assessment tasks (i.e. understanding assessment requirements). Thirty percent of participants reported seeking help from PLAs to develop critical thinking skills. Only twenty percent reported seeking help about subject content and topics. Most help requests related to assessment tasks.

We used chi-square for independence tests to discern associations between the type of task students sought help to complete and the frequency of help-seeking behaviours. The number of occasional adaptive help-seekers was too small to conduct comparisons between groups of adaptive help-seekers, thus, we compared groups of frequent and less frequent executive help-seekers. Statistically significant associations occurred between frequent executive behaviours and seeking help for specific assessment-based tasks. Frequent executive help-seekers significantly sought more help with academic writing than ‘moderate’ executive help-seekers and non-frequent help-seekers ( $\chi^2 = 6.382$ ,  $df = 2$ , Cramer’s  $V = .254$ ). Higher

frequencies of executive help-seeking were significantly associated with seeking help with referencing ( $\chi^2 = 6.436$ ,  $df = 2$ , Cramer's  $V = .246$ ). Finally, students who reported high levels of frequent executive help-seeking were more likely to request help with essay structure ( $\chi^2 = 6.268$ ,  $df = 2$ , Cramer's  $V = .253$ ).

### **Discussion**

Help-seeking theory provides a new lens to examine participant motivations and goals in peer assisted learning (PAL). Our study endorses previous research in the help-seeking literature and confirms similar outcomes among help-seekers using PAL programs. In our study, students who sought help in PAL were characterised by high levels of self-efficacy – in line with previous findings in the help-seeking literature that show positive associations between self-efficacy and active help-seeking (Ryan & Pintrich, 1997; Xie & Xie, 2019). Participants also endorsed mastery-oriented goals and reported attributions of success/failure to effort (i.e. they attributed academic success or otherwise to their effort rather than external variables). As students whose goals focused on mastery and skills development, participants in this study appeared to be less concerned with outperforming others and, consequently, more likely to actively seek help (see Karabenick & Dembo, 2011). Similarly, attributions of success/failure to internally controllable factors influenced perceptions about help-seeking as useful and relevant (see Alexitch, 2002).

The motivational profile of the participants in this study suggests that, contrary to the students who access PAL, those students who are the least motivated and the least self-efficacious are less likely to access the PLA service, yet they are the students who have the most to gain from seeking help (Karabenick, 2004). Although students usually perceive peer advisers or mentors as less threatening than academic staff (Longfellow, May, Burke, & Marks-Maran, 2008), students with low self-efficacy may experience concerns about being perceived as incompetent by their peers (Collins & Sims, 2006). Thus, low self-efficacy may remain an

obstacle to effective help-seeking in PAL programs. Despite being socially similar to peer mentors, students with low self-efficacy may still be threatened by the potential negative connotations of seeking help. We suggest that PAL programs could invest in communication strategies that focus on the similarities between students and peers providing support in these programs, namely, the presence of non-judgmental, approachable, socially similar peers who understand learners' difficulties and can provide suitable help (Lockspeiser, O'Sullivan, Teherani, & Muller, 2008; Tamachi, Giles, Dornan, & Hill, 2018).

Applying help-seeking theory to PAL revealed several context specific results that warrant discussion. Research findings reported in the help-seeking literature encourage expectations that students seeking help from peers may identify themselves as executive help-seekers (Karabenick, 2004). Due to limited research on the relationship between help-seeking behaviours and students' preferences for peer support, it was reasonable to predict that students accessing PAL may exhibit adaptive as well as executive behaviours. In fact, adaptive and executive goals occurred among participants in varying frequencies. Whilst adaptive help-seekers reported endorsing adaptive goals very frequently, executive help-seekers varied in behavioural frequency; i.e. they exhibited a less consistent behavioural response. In addition, positive correlations between adaptive and executive help-seeking scales suggest that students exhibited a combination of help-seeking behaviours rather than categorical adaptive/executive traits. We elaborate on Karabenick's (2003) conceptualisations of help-seeking as a dynamic behaviour to suggest two implications about the nature of help-seeking: the existence of a continuum of behaviours (Finney, Barry, Jeanne Horst, & Johnston, 2018); and, consequently, potential malleability of executive behaviours. If help-seeking represents a continuum of behaviours, help-seekers have the potential to progress along the continuum towards increasingly adaptive behaviours. Through training and development, PAL mentors could

increase their ability to role-model adaptive help-seeking, guiding executive help-seekers to become increasingly adaptive help-seekers.

In addition to behaviour frequencies, our study found that goal orientations clearly delineate adaptive and executive help-seekers. Correlations between goal orientation and executive help-seeking aligned with previous research findings: executive help-seekers were motivated by performance-oriented goals both in their general and PAL-specific behaviour. Executive help-seekers drew motivation from external performance standards, whilst adaptive help-seekers drew motivation from mastery and skills development. However, correlations between goal orientation and adaptive help-seeking demonstrated different patterns when we compared general and PAL-specific behaviours. Help-seeking theory predicts that mastery approach goals represent the driving motivations among adaptive help-seekers. For students with performance-oriented goals, self-efficacy and help-seeking attitudes mediate the impact of performance goals on help-seeking behaviours (Alexitch, 2006). That is, students with performance goals, but with high self-efficacy and positive attitudes towards help-seeking, are less likely to engage in executive help-seeking behaviours. Since participants in this study showed high levels of self-efficacy and positive attitudes towards help-seeking, their performance goals would not necessarily translate into executive help-seeking. This prediction was only true in the case of PAL specific help-seeking behaviours. When students were asked about their general help-seeking behaviours, performance-oriented goals only significantly correlated with executive behaviours. Thus, performance goals were only associated with adaptive help-seeking behaviours in a specific context, suggesting that characteristics of PAL contexts influence the relationship between performance goals and help-seeking behaviours.

Discrepancies between general and PAL-specific help-seeking behaviours suggest that, in line with Karabenick's (2004) arguments about the importance of the characteristics of the helper, students may activate different help-seeking behaviours in response to expectations

about the source of help. If students perceive peer advisers as ‘learning coaches’ (Colvin & Ashman, 2010) rather than content experts, they may express help requests using developmental language (e.g. understand and develop academic skills) as they would not expect peer advisers to provide content-related answers. These requests would allow performance-oriented students to develop the necessary learning skills to successfully complete assessment tasks, with the objective of performing better – or avoiding performing worse – than other students. Alternatively, help seekers may possess poorly defined expectations about the role of peer advisers (Colvin & Ashman, 2010) and, without clear goals, students may approach PAL with vague and tentative requests for help. Some help-seekers may misconstrue received help as adaptive, when in actuality the received help was executive. Lastly, a mismatch between students’ actual help seeking and their self-perceptions as help-seekers may explain why their self-identified diverse goal orientations related to adaptive help-seeking. Irrespective of the role of expectations or self-perceptions, PAL programs seem to attract students with diverse achievement goals, as peers are often seen as more accessible and approachable than academic support programs led by university staff (Alexitch, 2006).

Finally, to further typify students’ self-perceived motivations to seek help, we compared help-seeking behaviour frequencies with the types of tasks students sought help for. Participants stated that their help-seeking goals related to helping them to respond to assessment tasks (essay structure, referencing, academic writing). A smaller percentage of participants - around 30% - reported seeking help to understand an assessment task or to develop critical thinking skills. This finding supports previous arguments that assessment-based help requests remain dominant in PAL programs (Brown et al., 2014). Adaptive help-seekers would approach peers, or others, to develop independent skills around assessment-based tasks. Eventually, learners master task-based skills and may initiate concept-based help-requests. Executive help-seekers, on the other hand, risk becoming dependent on the source of

help; their ability to develop self-regulated learning skills, thus, may be limited by the nature of their help-requests (Karabenick & Knapp, 1991). Our analysis of the relationship between type of task and help-seeking revealed that variations within the continuum of help-seeking behaviours were associated with help requests for specific tasks. Since we measured help-seeking behaviour in terms of frequency, rather than presence/absence of adaptive/executive behaviours in one continuum, evaluating potential differences between adaptive and executive help-seekers remains beyond the resolution of this study. Instead, we used variations in behavioural frequencies to explore significant differences between groups of frequent and less frequent executive help-seekers. Further research could usefully assess whether adaptive and executive help-seekers significantly differ in the types of tasks for which they seek help.

Our work demonstrates that frequent executive help-seekers were more likely to seek help with assessment-based tasks. Moreover, frequent executive help-seekers endorsed performance-oriented goals, that is, they were more motivated by external performance standards than their less frequent executive help-seeker counterparts. Hence, executive help-seekers significantly differed in their behaviour and motivations. We suggest that frequent executive help-seekers may have less defined learning strategies and, consequently, seek more help with assessment-based tasks. Frequent executive help-seekers, thus, may be seen as students whose learning strategies remain under-developed, focusing instead on strategic help requests. In this study, executive help-seekers exhibited a combination of frequent executive help-seeking, a marked performance goal orientation, and a focus on assessment-based tasks. Collectively, such motivations represent a challenge for PAL programs. Even though frequent executive help-seekers in this study actively sought help from peer advisers, the type of help they request - and receive - may provide only short-term benefits (Collins & Sims, 2006). We note that PAL programs could educate peer advisers about the characteristics of executive help-seekers and how to model adaptive help-seeking behaviours and learning strategies, including



skills self-assessment, for students who are frequent executive help-seekers to enhance the development of adaptive help-seeking behaviours.

### **Limitations**

While the survey was useful in describing and characterising students' help-seeking goals and behavioural patterns, it relied on students' self-reports of their help-seeking behaviours in academic contexts. Additional quantitative, qualitative, and observational tools may extend the utility of Likert scales to evaluate motivation and help-seeking, allowing for data triangulation. These could include observations of students' help-seeking behaviours in naturalistic PAL contexts, and comparisons of students' and peer support providers' perceptions of the type of help sought. This study has explored relationships between motivation constructs and help-seeking behaviours using a relatively small sample of students accessing a specific drop-in PAL program. Further studies could include help-seekers in a variety of PAL programs, as well as non help-seekers, with the objective of testing findings from this study and extending correlational analyses to create predictive models using regression analyses and structural equation modelling. Quantitative findings could be further corroborated and expanded with the inclusion of qualitative data on students' help-seeking behaviours and their underlying motivations when seeking support in PAL programs.

### **Conclusion**

This study validates and extends the use of help-seeking theory to PAL contexts. We learned that students who voluntarily attend PAL share specific individual characteristics that may predispose them to succeed at university. Students with high self-efficacy, mastery-oriented goals, and attributions of success/failure to controllable internal factors, may be more likely to seek support in PAL programs. Variations in general and PAL-specific help-seeking behaviours suggest that factors specifically related to PAL contexts may affect how students express their need for help from PAL. PAL-specific factors include, but are not restricted to,

expectations about the source of help, and the type and nature of support offered in PAL. Such factors warrant consideration within the realms of translating motivation into concrete help-seeking behaviour.

The findings from this study can be applied to conceptualisations of the nature of help-seeking as a continuum of behaviours that exhibit dynamic traits and show promise for malleability. PAL could become a more effective intervention by demonstrating and modelling effective help-seeking behaviours in executive help-seekers and occasional help-seekers. If students with executive help requests attend PAL programs, we can conceive these behaviours as an initial point of entry to the continuum of help-seeking. PAL programs could also model and facilitate behavioural change in students who have traditionally avoided seeking help by implementing interventions that progressively grow students from the point of entry. Training programs for peer advisers could facilitate modelling of effective help-seeking behaviours, increase peer advisers' awareness about types of help-seekers, and equip them with effective strategies to provide personalised support to students with varying levels of competence, motivations, and help-seeking strategies.

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# **Chapter 6. Peer Assisted Academic Support: A Comparison of Mentors' and Mentees' Experiences of a Drop-in Program**

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A copy of Paper 3 is included in this chapter. This paper has been submitted to the Journal of Further and Higher Education, and has been accepted with minor revisions. The primary author, Ana Garcia- Melgar, made a significant and leading contribution to the publication of the manuscript presented in this chapter in line with La Trobe University's Authorship of Research Outputs Policy.

My contribution as first author included reviewing the literature, designing data collection instruments, data gathering, data analysis and interpretation, drafting and finalising the manuscript, and ongoing communication with publishers. Professor Noel Meyers and Dr Julianne East provided feedback and suggestions to improve the manuscript.

Peer Assisted Academic Support: A Comparison of Mentors' and Mentees'  
Experiences of a Drop-in Program

Abstract

In Peer Assisted Learning (PAL) programs, students provide academic and social support to fellow students. Recent PAL iterations include drop-in programs to improve higher education students' general academic literacy in an open, non-judgmental, learning environment led by experienced students. The majority of the PAL literature, however, focuses on curricular programs, with limited understandings on processes enabling positive outcomes for students. This study contributes to the PAL literature through the investigation of factors and mentoring strategies underpinning effective peer learning in drop-in PAL programs. Participants were students attending an academic drop-in PAL program, and the peer mentors employed by the program. Results suggest that students' expectations about the type of support provided by PAL mentors may jeopardise the learning objectives of the program. The analysis of PAL mentors' experiences reveals how the use of strategies to enhance social and cognitive congruence between peers supports the development of effective peer learning partnerships. Mentors' approachability alongside their ability to provide practical strategies and academic examples tailored to students' learning needs characterised peer learning interactions between students. Mentors also encouraged students to engage in active help-seeking behaviours. This paper discusses strategies to enhance peer learning interactions that support the development of independent and transferable academic skills in students seeking peer support.

*Keywords:* Peer Assisted Learning; higher education; social congruence; cognitive congruence; academic development; learning support

## Introduction

Changing demographics, internationalisation, and the linguistic and cultural diversity of students undertaking higher education have resulted in a radically diverse student cohort with varying levels of academic preparedness (Atherton, 2014; Gibney, Moore, Murphy, & O'Sullivan, 2011; Goldingay et al., 2014; Leese, 2010). Whilst academic support and development programs have traditionally been the domain of academic staff, contemporary approaches situate students as both recipients and providers of support. Peer Assisted Learning (PAL) programs – whereby experienced students provide academic support to less academically developed peers – are increasingly being used to support student learning, engagement and success in tertiary education settings. PAL programs share a number of core principles, based on mutuality of benefits, i.e. both the student who seeks help and the student who provides support benefit from their participation (Topping, 2005); independent learning skills enhancement (Arco-Tirado, Fernandez-Martin, & Fernandez-Balboa, 2011); and the provision of an open, non-judgmental learning environment in which peers often experience social and psychological benefits beyond the academic purposes of the program (Ginsburg-Block, Rohrbeck, & Fantuzzo, 2006; Topping, Buchs, Duran, & van Keer, 2017).

Amongst PAL strategies, drop-in programs aim to support student learning through the provision of peer learning opportunities outside the formal curriculum. These programs are usually based in Library or common learning spaces where students can drop in to seek support from peers – typically senior students recruited and trained by academic staff. As cross-disciplinary, non-subject specific interventions, these programs provide students with the flexibility to drop in when they identify the need for support and for the areas they consider they need such support (Cooper, 2010). Drop-in PAL programs aim to provide 'just in time', 'just for me' support for time-poor students who cannot or choose not to attend PAL timetabled support sessions (Copeman & Keightley, 2014; McKenzie, 2013). With most of

the PAL literature based on curricular PAL programs, there is limited research on the unique characteristics of drop-in PAL programs and how they promote learning and academic skills development.

This study reports on a peer-led drop-in program aimed at improving general academic skills. We investigated students' expectations about peer support, use of the program (type of support requested), and perceptions of factors enabling effective peer learning interactions. By comparing mentors' and mentees' perspectives, we seek to assess convergences and divergences in their views on peer learning as PAL participants. In addition to comparing mentors' and students' perceptions about the program, we examine strategies employed by mentors to effectively engage with students requesting academic support. A focus on PAL strategies aims to address limited understandings on peer learning processes conducive to learning gains for students in previous PAL research (Riese, Samara, & Lillejord, 2012). In order to contextualise this study, a review of factors underpinning effectiveness in PAL is presented next.

### **Literature Review**

Peer learning has its roots in social learning theories and, in particular, Vygotsky's socio-cognitive theory of learning (Hodgson, Benson, & Brack, 2013). The concept of 'expert student' is connected to Vygotsky's zone of proximal development. A more academically advanced peer is an expert at being a student while their relatively close proximity to their peers provides overlaps in cognitive development (Longfellow, May, Burke, & Marks-Maran, 2008). Ten Cate, van de Vorst, and van den Broek (2012) describe developmental overlaps as cognitive congruence. Familiarity with the needs of the mentee allows peer mentors to provide support that addresses the cognitive enrichment of the student receiving academic support (Lockspeiser, O'Sullivan, Teherani, & Muller, 2008). Whilst mentors need

to possess a deeper understanding of the material/content in order to be able to provide advice and support to fellow students (Stigmar, 2016), cognitive congruence allows mentors to employ accessible language and explanations suited to students' level of understanding (Brown, van der Meer, & Scott, 2014; Lockspeiser et al., 2008).

Given that PAL takes place in a social environment, social aspects are also critical to developing an understanding of why and how PAL can be an effective strategy. A second type of congruence between peers, known as social congruence, encompasses social similarities between students helping each other to learn that allow mentors to create egalitarian, non-judgmental learning environments (Brown et al., 2014). Peers, being socially similar to their fellow students, are often seen as more accessible than academic staff (Ross & Cameron, 2007; Zentz, Kurtz, & Alverson, 2014). Social congruence is expressed through mentors' ability to empathise with and understand students' motivations as fellow students (Tamachi, Giles, Dornan, & Hill, 2018).

Social and cognitive congruence are complementary processes that allow for the development of effective peer learning partnerships (Chng et al., 2011). For students to disclose their learning gaps, social congruence provides a prerequisite. Students develop trust in their peers as sources of support because they perceive them as socially similar and, consequently, they feel able to discuss learning gaps and needs (Ten Cate et al., 2012). For peers to provide effective advice and support, cognitive congruence is required. Peer mentors can understand students' learning difficulties and provide suitable advice and strategies because they have overcome similar difficulties in their journey to becoming expert students (Lockspeiser et al., 2008). Thus, the combination of social and cognitive congruence can make peers a valuable and effective source of support in academic contexts.

In addition to social and cognitive congruence, role expectations mediate and influence the development of effective learning interactions between students in PAL programs. Research studies that have considered role expectations about peer assisted support reveal that students' expectations may conflict with PAL objectives of developing independent learning skills in students. For example, Ashwin (2003) found that students expected peer mentors to be highly directive and provide specific advice regarding assessment tasks and exams. Moreover, students attending PAL programs usually have limited conceptions about the purpose of these programs and how peers can support them in academic contexts (Colvin & Ashman, 2010). Similarly, programs that do not establish clear role boundaries can negatively impact peer mentors, who share the uncertainty about their role and the boundaries they should establish when helping fellow students (Brown et al., 2014). Peer interactions characterised by role uncertainty and conflicting expectations negatively affect the development of peer learning relationships and, consequently, outcomes for participating students (Garcia-Melgar, East, & Meyers, 2015).

Research on PAL has traditionally focused on demonstrating its effectiveness through the study of quantitative outcomes derived from participation in PAL programs (Dawson et al., 2014). Berghmans, Michiels, Salmon, Dochy, and Struyven (2014) argue that previous research has concentrated on assessing which schemes work and what outcomes exist for participants, but has neglected the study of the processes that enable such outcomes. These arguments have been echoed by numerous researchers in the PAL literature (Ashwin, 2003; Nora & Crisp, 2007; Ward, Thomas, & Disch, 2014). Collectively, PAL researchers recognise the need for understanding processes and dynamics that produce specific outcomes for PAL participants to maximise learning opportunities for students. In particular, strategies employed by mentors to effectively support their peers in PAL remain under-researched and under-theorised (Riese et al., 2012). When peer learning processes have been considered –

typically through the analysis of participants' qualitative reflections – studies have failed to consistently apply peer learning theoretical frameworks to investigate and interpret results. Given the critical role that social and cognitive congruence play in establishing and sustaining peer learning interactions (Ten Cate et al., 2012), we argue that effective mentors would employ strategies based on their social and cognitive congruence with the students seeking support.

### **Research Aims and Methodology**

This study examines a drop-in PAL program that provides academic support to undergraduate and postgraduate students. The aim of this study is to contribute to the PAL literature by examining how social and congruence aspects are perceived and enacted by PAL participants in drop-in contexts. In particular, we explore the following questions: What expectations do students hold about drop-in PAL?; What type of support do students request in drop-in PAL programs? and; How are social and cognitive congruence enacted in these programs? The study employs a mixed-methods convergent parallel design to collect and compare mentors' and mentees' expectations, type of support requested, and perceptions of factors underpinning successful peer learning interactions. Given the importance of participant expectations about the type of support provided in PAL programs, and their influence over peer learning dynamics, we are particularly interested in comparing participants' views with the objective of assessing potential discrepancies between mentors and mentees. The combined analysis of their experiences can yield valuable insights into mechanisms underpinning effective peer learning interactions in drop-in PAL programs and further avenues to maximise the impact of these programs on student learning and academic development.

### **Setting**



This research was conducted at an Australian multi-campus public research university. With around 36,000 student enrolments, the university attracts non-traditional students (e.g. first in family and from low socio-economic backgrounds). The percentage of low SES (socio-economic status) undergraduate students is 19.6, higher than the national average of 17% (CHEEDR, 2019). The Peer Learning Advisers (PLA) program is a drop-in PAL initiative that provides academic support to undergraduate and postgraduate students. The program is part of the suite of support services provided to all students, and employs second year and above university students to work in drop-in Library locations or central Learning Hubs during semester times. The program is promoted as a general academic skills support program: students can drop in and seek help from Peer Learning Advisers (PLAs) regarding any type of learning or assessment query. PLAs share the Library or Learning Hub space with Library, Student Learning, and Student Services staff, but also have access to individual consultation rooms if requested by students.

The PLA recruitment process comprises three phases: an expression of interest to become a PLA, completion of an online task, and an individual interview. In the first phase, applicants are instructed to provide a resume, up to date academic transcript (only applicants with an overall B average are considered), and short statement describing their motivation to become a PLA. Short-listed applicants receive a sample of student academic writing (typically an essay excerpt) and are asked to explain what type of feedback they would provide to the student. Finally, successful candidates are invited to an individual interview with a Learning Hub staff member and/or senior PLA (i.e. an experienced PLA engaged in the administration of the program). Once employed as PLAs, they undertake online and face to face training led by Student Learning staff and senior PLAs. PLAs receive training on strategies to provide feedback to students, communication skills, how to address common academic queries (e.g. finding resources, referencing, structuring an essay), and referring

students to other support services where needed. PLAs are trained to facilitate independent learning, avoid proofreading or editing student work, and work collaboratively with other academic and support services. During the semester, PLAs have access to an online platform where they can download resources to share with students (e.g. examples of academic writing), and offer support to each other via online discussion boards.

PLAs provide one-on-one consultations up to a maximum of 30 minutes; students can use the PLA program as many times as needed during the semester. PLAs record demographic information about the student (discipline of study, undergraduate/postgraduate) and type of support provided after each consultation. Since students accessing the program are not required to provide a student identification number, we were not able to calculate the total number of individual students using the service during the semester. Based on the number of queries collected in one year, PLAs can respond to up to 6000 queries across all campuses. Students frequently request support with planning and writing assignments, and finding and citing academic sources. The majority of students are enrolled in Health Sciences degrees (37% of total queries in one year), followed by Psychology (20%), Law (25%) and Education/Social Sciences/Business (15%). Only 18% of support queries came from postgraduate students.

### **Participants and Data Collection Activities**

Data collection spanned over two weeks at the end of the second semester, which provided researchers access to a larger sample of students using the PLA program as this is typically the busiest time of the year for PLAs. After each consultation, PLAs invited students to participate in an anonymous online questionnaire about their experiences and perceptions about the program. Participants completed the survey right after their consultation with the PLA. To ensure privacy and confidentiality of responses, participants

were given access to an individual consultation room in order to complete the survey. One hundred and eleven students agreed to participate and completed the questionnaire in full. The majority of participants were females (73%) enrolled in undergraduate degrees (77%). Participants were enrolled in Health Sciences courses (30%); Humanities and Social Sciences (20%); Business, Economics and Law (24%); Science and Engineering (16%); and Education (11%). Almost half the sample (45%) were mature age students (over 25 years old). Seventy per cent of participants reported having attended the PLA program between one and five times during the semester. Based on available user data, the demographic profile of the students who participated in the study was similar to that of those who accessed the service throughout the year (i.e. majority of undergraduate students enrolled in Health Sciences degrees).

All PLAs were invited to participate in the online questionnaire for mentors at the end of the university semester. The program manager forwarded information about the research project together with information about how to complete the online questionnaire to all PLAs who had participated in the program during the semester. No identifying or personal information was collected. Out of forty, thirty-one PLAs completed the anonymous questionnaire that asked them to report on students' expectations when attending the program, type of support requested, and their strategies to build effective learning partnerships with students. The majority of respondents (twenty-one responses) were females. Sixteen participants had been working as PLAs for less than one year. Eight respondents had been employed as PLAs between 1 and 2 years; only six PLAs had been in the role for more than 2 years.

### **Data collection and analysis**

The mentor questionnaire asked PLAs to report on their perceptions of students' expectations and use of the program (i.e. type of support they requested). PLAs were prompted to respond based on their overall experience with students. Respondents were presented with a list of expectations about the program and were asked to rate them by how frequently students held those expectations about the program, followed by an open-ended question for PLAs to leave additional comments. Expectations included statements about the role of PLAs (e.g. proof-readers), their knowledge (academic skills, subject knowledge) and types of tasks for which students expected support (e.g. read and correct references, provide feedback about assessment tasks). PLAs were also asked to report on a recent interaction that they considered successful and described the strategies they had employed to interact with the student and provide appropriate support and advice.

The student survey included multiple choice items about their use of the PLA program and type of help sought; students were asked to report on their last interaction with the PLAs. Students were also presented with ten items related to effectiveness in PAL, and rated the PLA program using a 5-point Likert scale of agreement/disagreement. These items outlined descriptions of social and cognitive congruence between peers as depicted in the PAL literature (see Table 3). Finally, the student survey included a list of common expectations about PLA programs (see Table 2) and students were asked to choose those that best represented their initial expectations about the program.

Descriptive statistics were calculated for quantitative responses, including frequencies expressed in percentages and mean scores for Likert scales. A principal component analysis was conducted on the ten PAL effectiveness items to determine the existence of underlying factors related to social and cognitive congruence. Mentors' descriptions of peer learning interactions were coded as social or cognitive congruence strategies following a qualitative content analysis approach (Schreier, 2012). To do so, the research team coded each

behaviour/action occurred in interaction with students as illustrative of each type of congruence using a coding framework based on social and cognitive congruence descriptions extracted from the PAL literature. For example, the statement “I was empathic in the way that I affirmed the way they were feeling, and that I was very bad with understanding uni assignments when I first started uni as well” was coded as a depiction of how the mentor employed social congruence in their interaction with the student. One team member conducted the coding process, with a second team member double-coding 30% of coded responses to ensure the coding framework was consistently applied. Any coding discrepancies were discussed and resolved by the two coders. Within each main category (social, cognitive) responses were then thematically coded into specific strategies (e.g. use of examples, disclosing learning gaps). Responses that did not fit into the two pre-existing congruence themes were inductively coded into a third emerging category of strategies related to help-seeking strategies. Two staff members of the program revised and provided feedback on the final node structure.

## **Results**

This section provides a summary of participants’ reported type of support requested, followed by expectations about the PLA program, and perceptions of factors underpinning PAL effectiveness. Lastly, we describe strategies employed by PLAs to effectively provide academic support to students.

### **Expectations and Use of the PLA program**

Requests for assessment-based help were more frequent than requests to receive support for subject-content, critical thinking, speaking and numeracy skills development (Table 1). Most participants reported needing help to structure academic essays, improve their academic writing and referencing skills. Participants also requested help from PLAs to

understand assessment tasks (e.g. breaking down questions, understanding assessment requirements).

Table 1

*Percentage of participants who requested assistance with specific academic related tasks*

Type of task	Percentage of participants
Essay structure	52.3%
Academic writing	51.4%
Referencing	51.4%
Understanding assessment task	42.3%
Grammar	38.7%
Critical thinking*	30.6%
Searching for resources	25.2%
Checking consistency task	25.2%
Subject content	22.5%
Exams	9%
Numeracy	9%
Speaking	8.1%
Literature reviews	7.2%

*Note.* Participants could choose more than one category, and they did so; hence percentages in this table do not add up to 100%.

\*Critical analysis of sources, and expressing arguments

PLAs were asked to rate how frequently students asked for their support in the aforementioned areas. The six most frequent areas were: referencing and acknowledging sources (n = 29), understanding assessment tasks (n = 27), essay structure (n = 27), writing (n

= 26), grammar (n = 24), and checking consistency/meaning of assignments (n = 20). PLAs reported receiving requests to help students with assessment-based tasks, in particular, how to reference and acknowledge sources, improve their academic writing style, and respond to assessment questions/guidelines. Grammar was also a main academic area of concern for students.

Percentages of students who reported holding specific expectations about the PLAs are summarised in the table below (Table 2). Students' expectations seemed to match help-seeking behaviours related to skill development (e.g. PLAs would give me feedback). That is, their expectations aligned with students wanting to 'learn how to learn'. A small percentage was unsure about what to expect; most participants, however, held pre-expectations about the PAL program in relation to the provision of academic and assessment support. More students expected PLAs to be knowledgeable about academic writing than to be knowledgeable about subject content.

Table 2

*Mentee Expectations about PLAs: Percentage of participants*

Expectation	Percentage of participants
Helpful with assignments	76.4%
Friendly and approachable	69.8%
PLAs would give me honest feedback	58.5%
PLAs would read assignments	39.6%
Knowledgeable about academic writing	56.6%
Knowledgeable about subject content	44.3%
PLAs would direct me to relevant staff	35.8%
I was unsure of how they could help me	17.9%

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*Note.* Participants could choose more than one category, and they did so; hence percentages in this table do not add up to 100%.

When asked about their experience of students' expectations, the majority of PLAs reported 'Helpful with assignments' ( $n = 26$ ), 'PLAs would read assignments' ( $n = 24$ ) and 'PLAs would be friendly' ( $n = 24$ ) as the most frequent expectations held by students. PLAs' comments in relation to this question indicated that students expected them to proofread assignments and correct references and citations.

### **Factors underpinning PAL effectiveness**

Students agreed that the PLA program had performed well on all PAL effectiveness items, with mean scores indicating agreement/strong agreement. In particular, students valued PLAs' knowledge of academic writing ( $M = 4.23$ ;  $SD = .73$ ), strategies to improve assignments ( $M = 4.15$ ;  $SD = .75$ ) and strategies to succeed at university ( $M = 4.12$ ;  $SD = 7.49$ ). PLAs' ability to explain topics in an easy manner had the lowest mean score across the 10 items ( $M = 3.70$ ;  $SD = .84$ ).

Principal Component Analysis (PCA)<sup>1</sup> conducted on effectiveness items revealed two components that had eigenvalues greater than one. The two-component solution explained 70.79% of the total variance in scores. An Oblimin with Kaiser Normalization rotation was employed to aid interpretability. The rotated solution exhibited simple structure and was consistent with the existence of two congruence domains. The first component encompassed social congruence characteristics such as mentors' approachability, ability to understand social difficulties, and non-judgmental nature. The second component related to cognitive congruence between peers, including mentors being successful students, knowledge and

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<sup>1</sup> Overall Kaiser-Meyer-Olkin measure was .87, deemed as 'meritorious' according to Kaiser. Bartlett's test of sphericity was statistically significant ( $p = .000$ ), indicating that the data was likely factorizable. All items showed correlations greater than .3



strategies to support students' academic literacy development. One item – mentees' perceptions that they could ask any study related question– loaded on both factors. Table 3 below shows loading for each of the two components; major loadings for each item are bolded. Both scales showed high internal consistency measured using Cronbach's  $\alpha$ : .90 and .86 for the cognitive congruence and social congruence scales, respectively.

Table 3

*Pattern and Structure Matrix for PCA with Oblimin Rotation of Social and Cognitive Congruence Items*

Item	Pattern Coefficients		Structure Coefficients		Communalities
	Component 1	Component 2	Component 1	Component 2	
PLA knows strategies to succeed at university	.088	<b>-.817</b>	.597	<b>-.872</b>	.765
PLA's knowledge of subject content	.38	<b>-.834</b>	.559	<b>-.858</b>	.737
PLA's knowledge of academic writing	-.116	<b>-.992</b>	.503	<b>-.920</b>	.855
PLA provides strategies to improve assignments	.047	<b>-.855</b>	.581	<b>-.885</b>	.784
I can ask any study related question	.389	-.517	.711	-.760	.669
PLA's availability	<b>.614</b>	-.172	<b>.722</b>	-.555	.539
PLAs provide easy explanations topics compared to academic staff	<b>.682</b>	-.160	<b>.782</b>	-.586	.627
PLAs are non-judgmental	<b>.811</b>	-.014	<b>.820</b>	-.520	.672
PLAs are easier to approach compared to academic staff	<b>.891</b>	.150	<b>.797</b>	-.405	.650
PLA understands students' difficulties	<b>.852</b>	-.049	<b>.883</b>	-.581	.781

### Use of Social and Cognitive Congruence

PLA reports of successful interactions with students and associated strategies were coded into three domains: cognitive congruence, social congruence, and help-seeking strategies. Table 4 below summarises specific strategies within each category.

Table 4

*Summary of strategies employed by PLAs*

Category	Related strategies
Cognitive congruence	Providing practical strategies to improve assignments, using explanations easy to understand, providing academic examples, providing information about learning processes
Social congruence	Approachability, understanding students' difficulties, sharing their own experiences, disclosing learning gaps, using empathy, provision of psychosocial support
Help-seeking strategies	Encouraging help-seeking behaviour directed to academic staff and peers, encouraging independence from the source of help.

**Social congruence: the importance of being approachable.** PLAs emphasised the importance of social congruence between peers and reported that students sought help from

peers in PAL because mentors are readily available. PLAs' approachability compared to lecturers and tutors was seen as the main reason behind students' decision to approach peer advisers when they need help with their studies. Participant 30 provides an example that illustrates how PLAs were viewed as more approachable than lecturers:

Recently I was talking to a student about meeting up later in the library later on in my shift to assist her with her assignment. A lecturer approached her to ask her if she wanted to meet up to discuss the questions she had previously emailed, and she stated no she would be ok. When the lecturer left she stated that she found it really difficult to talk to the lecturers and felt nervous in all her interactions with them. I had a quick discussion around how lecturers really are in her corner and how they want her to succeed. She looked forward instead to go over her assignment with me later.

In terms of strategies employed to reinforce social congruence aspects, PLAs reported that sharing their own experiences as learners, emphasising that they understand students' learning difficulties, disclosing their learning gaps, and using empathic responses were critical to the development of effective learning interactions between students and PLAs. As Participant 13 states: "as a current student, I have a 'shop floor' understanding and perspective of what the student is going through. This likely differs from how an academic would view the situation".

PLAs disclosed their learning difficulties as a strategy to establish rapport with students and reduce students' stress in relation to their academic skills:

I had a student who had to write a reflective essay recently and I told them that I found it quite confusing each time I had to write a reflective essay because I got so used to writing standard academic essays. I think this helped the student feel better about their uncertainty. When students come to me I generally try to make it clear that

I understand where they are coming from and that I have been there before, so I'll tell them that I too have struggled with something before. (Participant 21)

Once students felt more comfortable as a result of PLAs emphasising social congruence aspects, they were more likely to disclose additional learning gaps and further queries: “when they feel more comfortable, students seem to open up and talk about other things they had been worried about, and perhaps had been too embarrassed to email a lecturer about” (Participant 12).

**Cognitive congruence: the importance of providing practical strategies and examples.**

PLAs reported using examples and practical strategies to help students with their assignments and academic queries. PLAs provided explanations related to students’ current concerns and needs. They also shared learning experiences to enhance cognitive congruence and provided strategies that were helpful and suited to students’ needs. Providing information about their own learning processes also proved to be a helpful strategy, for example, explaining to the student how they would approach specific tasks. PLAs’ approaches were quite directive, helping students break down tasks to understand smaller steps that would lead to successful assignment completion: “let's check the assignment instructions and make a list of things you need to do to complete it” (Participant 23).

After breaking down the bigger task (the assignment) to smaller tasks/steps, PLAs worked together with the student to provide practical examples, even at sentence-level: “she told me that she found our session really helpful because I showed her how to do things by doing them with her, and by giving practical, clear examples of how to adjust her sentence” (Participant 8). PLAs were able to draw on their own experience and perspectives as fellow students dealing with specific content. Participant 14 provided a Health Sciences related example: “they find my explanations help to contextualise anatomical concepts and

principles”.

**Enabling effective help-seeking strategies.** In addition to strategies to enhance social and cognitive congruence, PLAs encouraged effective help-seeking amongst students attending the PLA service. Students sought help from PLAs, instead of academic staff, because they felt less intimidated by fellow students: “quite often students have come to the PLA desk with a question which they did not want to ask a tutor/lecturer as they did not want to be seen as silly for not understanding an aspect of the course” (Participant 19).

Students did not feel encouraged to seek help from academic staff and, hence, sought help from those sources readily available to them: “I have a lot of students that feel like they aren't allowed to contact their lecturers and hence seek PLAs” (Participant 28). As part of their role, PLAs prompted students to seek help when needed: “I encourage them to use the subject forum to seek clarification on subject specific matters and not be afraid to use them” (Participant 28).

PLAs actively encouraged students to seek help from academic staff and classmates, in particular, when they felt students' queries were outside the scope of their expertise or knowledge:

I explained that as I did not know the content (health/sciences) and could not be much help in this instance, that she could see one of the health/science PLAs, but she should speak to the lecturer as they would know how to best address her query. She felt a little braver after this interaction and proceeded to email the lecturer, and post in her LMS forum, just in case her peers knew the answer. (Participant 24)

## Discussion

In this study, we examined participants' expectations, type of support requested, and perceptions of factors underpinning effective learning interactions between peers in an

academic drop-in PAL program for higher education students. Through the analysis of mentors' reported interactions with students, we identified mentoring strategies within the social and cognitive realm that can serve as indicators of quality in drop-in PAL programs. We frame this discussion around the foundational concepts of social and cognitive congruence in PAL, and discuss implications for the implementation of drop-in PAL programs.

PLAs and students reported different views on the type of support that students expected and requested. Whilst students stated that they saw the program as a service to provide feedback on their academic work, suggesting that they intended to seek support to help them improve academic skills, PLAs described that many students expected them to read and proofread their work and assignments. This finding is consistent with previous studies that found that students expect and request strategic support or prescriptive advice (for assessment completion purposes) in PAL programs (Ashwin, 2003; Brown et al., 2014), even expecting PAL mentors to act as personal tutors (Christie, 2014). Findings of this study provide further evidence for the importance of managing student expectations about the role of peers in academic support programs (Colvin & Ashman, 2010). PAL program administrators could invest further resources in training opportunities for peer mentors to help them recognise student expectations, and to work with students by acknowledging their expectations and using these to establish positive peer learning interactions. To that end, PAL mentors could engage in ongoing training opportunities, beyond initial training, to develop the necessary skills to establish and manage role boundaries (Garcia-Melgar, 2018).

In relation to the type of support provided by the PLAs, study findings indicate that academic literacy skills development was usefully framed around assessment tasks. Rather than providing general academic advice, mentors' explanations aimed to provide practical strategies to successfully complete academic tasks. In this regard, peers working in a general

academic skills/ drop- in environment provided academic literacy development within a specific context: students' assessment tasks. We suggest that working collaboratively with peers also adds a second context: working within the perspective of an expert student (Longfellow et al., 2008). Together, working on specific tasks with a peer that can provide strategies drawn from their own student experiences could maximise opportunities to internalise academic skills and learning strategies that are applicable to other learning contexts/subjects. We extend conceptualisations of peer learning as providing situated learning experiences (Tamachi et al., 2018) to suggest that drop-in PAL programs can provide contextualised learning opportunities for students to acquire academic skills using their own assessment tasks – provided that mentors create learning opportunities likely to reinforce transferrable skills.

If PAL programs are to offer long-term learning benefits to students, then mentors need to support the development of metacognitive skills in students, that is, the ability to understand, regulate and reflect upon their cognitive activities during learning (Hodgson, Benson, & Brack, 2015). In this study, mentors provided information about learning processes alongside more pragmatic support aimed to enhance students' capacity to independently complete assessment tasks. We argue – as do others (e.g. Roscoe & Chi, 2007) – that mentors' ability to facilitate knowledge co-construction during mentor-mentee interactions (for instance, through the use of questioning techniques) and to model metacognitive knowledge maximises learning opportunities for students whose help requests focus on assessment task completion. Although students may approach PAL mentors with requests for strategic support, mentors' ability to engage students in responding to the assessment tasks or content (rather than providing prescriptive advice) facilitates the development of deeper learning outcomes for students (Price, Wallace, Verezub, & Sinchenko, 2019). As such, mentors' metacognitive awareness and ability to employ



questioning techniques could be included as a criterion to evaluate the effectiveness – and likely impact – of PAL programs.

The analysis of mentors' and mentees' perceptions of factors underpinning effectiveness in PAL revealed several key findings in relation to how peer congruence is enacted in PAL contexts. Firstly, social and cognitive congruence emerged as two separate constructs. Cognitive congruence encompassed mentors' knowledge and skills as experienced students, consistent with previous descriptions of this type of congruence in the literature (e.g. Ten Cate et al., 2012). Mentors' ability to explain topics in an accessible manner, however, was associated with social rather than cognitive congruence, suggesting that students interpreted this item in terms of mentors' ability to communicate in a social learning environment rather than their ability to adjust their explanations to suit mentees' learning needs. Interestingly, the PLA program performed the lowest on this item – according to students – providing further evidence to suggest that students' interpretation of this item differed from mentors' intent to provide cognitively appropriate explanations. In contrast to cognitive congruence, social congruence was defined by mentors' accessibility as sources of support, ability to empathise and understand students' difficulties, and to communicate concepts/provide explanations in an accessible manner. Thus, whilst cognitive congruence was associated with the academic value of mentors as expert students, social congruence referred to the socio-psychological and communicative skills that underpinned their interactions with students (Tamachi et al., 2018). The ability to ask any study related question formed a bridge between the two distinctive factors, suggesting that students perceived it as an opportunity to obtain both academic and social support (Ward et al., 2014).

Secondly, PLAs employed social congruence strategies to maximise students' perceptions of their approachability and similarity as peers. In turn, these strategies promote disclosure of learning gaps as students would feel safe enough to discuss academic challenges

or concerns in a non-judgmental learning environment (Lockspeiser et al., 2008). PLAs made use of high levels of empathy, and shared their own learning experiences and weaknesses to encourage self-disclosure in mentees and reduce feelings of lack of competency, employing these strategies to also provide socio-emotional support to students (e.g. students' academic related anxiety and stress). Using their own learning experiences and difficulties, PLAs emphasised social similarities with the students they were helping instead of promoting expectations of PLAs as subject content experts. Such emphasis on PLAs being students rather than content experts serves to reinforce their role as guides on the side, or knowledge facilitators (Lockspeiser et al., 2008).

Similarly, cognitive congruence strategies referred to peers' own experiences as expert students. Mentors employed their understanding of students' academic difficulties and their ability to explain concepts in familiar terms to provide support adjusted to mentees' level of understanding (Webb & Mastergeorge, 2003). The use of explanations and examples that address mentees' current learning needs can encourage practical application of the skills acquired during mentor-mentee interactions, that is, peer support would be highly relevant to mentees' learning and developmental needs.

Finally, PLAs deliberately promoted positive academic help-seeking behaviours. PLAs explained the importance of adaptive help-seeking behaviours and encouraged active help-seeking directed to other sources of help at university (e.g. lecturers and peers). In articulating help-seeking strategies, PLAs were able to work with ill-defined and partially formed developed help-seeking strategies that mentees had developed on their own. By virtue of the cognitive and social congruence developed through shared recency of experiences and the developing relationships, mentors say the development of help-seeking becomes concentrated on point of need, although in a transferrable way. We suggest that peer mentors can provide scaffolded and supportive pathways to effective help-seeking, and are able to

foster such help-seeking behaviours because they are perceived as approachable sources of help by students (Eller, Lev, & Feurer, 2014). Peers' ability to promote the development of effective help-seeking strategies is particularly valuable in higher education contexts, where students may avoid seeking help or develop ineffective help-seeking strategies (Alexitch, 2006) with predictable, if unfortunate, consequences. Incorporating role-modelling of help-seeking behaviour as an integral and embedded component of PAL holds promise to establish and foster long-term and sustained influences on students' behaviours and approaches to learning.

Several limitations of this study should be noted. This study was conducted in one particular PAL setting, and results may not be generalisable to other PAL programs. Participants' reports of the type of academic support they requested may have been influenced by the time of the year when data collection happened. Further studies could apply measures of social and cognitive congruence reported in this paper to other drop-in PAL settings, and during different semester times, to examine whether student expectations and requests for support change throughout the academic year. Moreover, students' reports of their use of the program could be expanded to include more specific categories to ascertain students' need for particular help (e.g. understanding when and what to reference in an academic essay).

Participants' expectations about PAL and support requests may be subject to biases related to the use of self-reports. To further understand students' expectations, reports by other parties involved in the program (such as academic support staff) can be an effective strategy to contrast and assess students' underlying expectations when attending PAL programs. In addition to self-reports, observational methodologies could provide rich data on how support requests are expressed by mentees, and how they impact on peer relationship dynamics. Moreover, further studies on students' expectations could explore the development

of expectations over time for students attending PAL programs multiple times during the semester.

Given that the focus of this study was to investigate mentoring strategies and factors underpinning peer learning interactions, we did not collect measures of student learning. Further studies could explore the impact of mentoring strategies, and mentors' use of social and cognitive congruence strategies, on student achievement and engagement.

### **Conclusion**

Drop-in PAL programs have the potential to enhance students' academic literacy skills in an open, non-judgmental, learning environment led by experienced students. This study contributes to the PAL literature by examining students' expectations and experiences of these programs. The findings of this study have several implications for the implementation of drop-in PAL strategies, in particular, training and development opportunities for students providing academic support. Participants' accounts of their expectations about the program suggest that students may expect PAL mentors to act as tutors – or assignment editors – rather than partners in learning, even if mentees claim otherwise. Such expectations can be highly detrimental to the development of PAL, as programs can easily deviate from peer learning to proof reading services for higher education students. Managing and monitoring students' expectations is a critical task for mentors and PAL educators and administrators.

Examining peer mentors' strategies to establish effective learning interactions with students offers a valuable pathway to assessing PAL outcomes. If peers mutually benefit from their learning interactions as a function of their social and cognitive congruence, then measuring peer mentors' ability to utilise congruence can provide a qualitative representation of how and when effective peer learning occurs. Likewise, studies into peer mentors'

strategies to support student learning and peer learning dynamics can close the existing gap in PAL theory and research regarding practices that enable positive learning outcomes for PAL participants.

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## **6.8. Addendum: Predictors of Adaptive and Executive Help-seeking**

This section is an addendum to studies 2 (Chapter 5) and 3 (Chapter 6). Here I present the results of additional quantitative analyses conducted on students' help-seeking behaviours, related motivation constructs (achievement goals, self-efficacy, attributional style), attitudes towards help-seeking, and perceptions of peer congruence. The objective of the analyses reported here is to extend correlational analysis included in study 2 to explore the influence of motivation related constructs, alongside congruence, on students' adaptive and executive help-seeking behaviours. Using the social and cognitive congruence scales employed in study 3, and after assessing their factor structure and reliability as described in the same study, I conducted a path analysis to establish a path or predictive model of students' adaptive and executive help-seeking behaviours in PAL contexts.

In this section, I report on the results of Structural Equation Modelling (SEM) analyses conducted on adaptive and executive help-seeking behaviours reported by students in the drop-in PAL program presented in studies 2 and 3. Structural equation modelling analyses were performed with Amos 26.0 with a twofold objective: (a) explore what factors influence students' reported adaptive and executive help-seeking behaviours directed to peers and; (b) investigate interactions between peer congruence and motivational constructs. Path analysis – a form of SEM – allows for the comparison of predictive models, and is employed to explore direct and indirect effects, including the impact of mediating variables (Randolph & Myers, 2013). These analyses draw and expand on correlational analysis findings from study 2, and factor analysis conducted on congruence items as presented in study 3. It is important to note that, due to the relatively small sample size – popular recommendations range from 100 to 200 subjects, or a minimum of 10 subjects for every parameter that is estimated (Klein, 1998; Tabachnick & Fidell, 2019) – path analysis results reported in this section should be seen as exploratory. In the PAL literature, small sample sizes have been employed to predict students' peer-assisted study session and supplemental instruction attendance intentions, using theory of planned behaviour variables (e.g. Goldstein, Sauer, & O'Donnell, 2014; White, O'Connor, & Hamilton, 2011). Despite limitations in sample size, the paths presented here showed good fit as indicated by non-significant chi-square statistics and the assessment of model fit indices (Bentler & Bonnett, 1980; Browne & Cudeck, 1992).

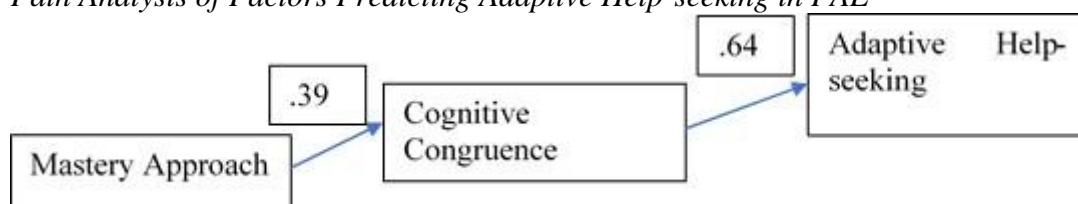
Several models for adaptive and executive help-seeking behaviours were compared. In both cases, the initial model was based on predictions based on help-seeking theory. That is, it was predicted that mastery-oriented goals, positive attitudes towards help-seeking, high self-efficacy, and an effort-oriented attributional style would positively correlate with adaptive help-seeking. Conversely, performance-oriented goals, negative attitudes towards help-seeking, lower self-efficacy, and an intelligence-oriented attributional style would be positively associated with

executive help-seeking. Since there were no initial predictions on the direction or impact of each type of congruence on help-seeking behaviours, both social and cognitive congruence were included in both path analyses (adaptive and executive help-seeking) to explore their predictive value. Initial models tested direct effects on help-seeking, with subsequent models exploring indirect effects.

An initial path analysis of adaptive help-seeking behaviours revealed that only social and cognitive congruence had significant direct effects. When achievement goal orientations were added to the model as mediators of social or cognitive congruence, mastery approach was found to significantly predict cognitive congruence and, hence, had an indirect effect on adaptive help-seeking. However, the assessment of model fit indices revealed partial fit. After removing social congruence, the model, shown below, showed good fit as indicated by a non-significant chi-square and the value of absolute fit and increment fit indices ( $\chi^2(1) = .059, p > .05$ ; RMSEA = .000; RFI = .993; CFI = 1.000).

Figure 6-1

*Path Analysis of Factors Predicting Adaptive Help-seeking in PAL*



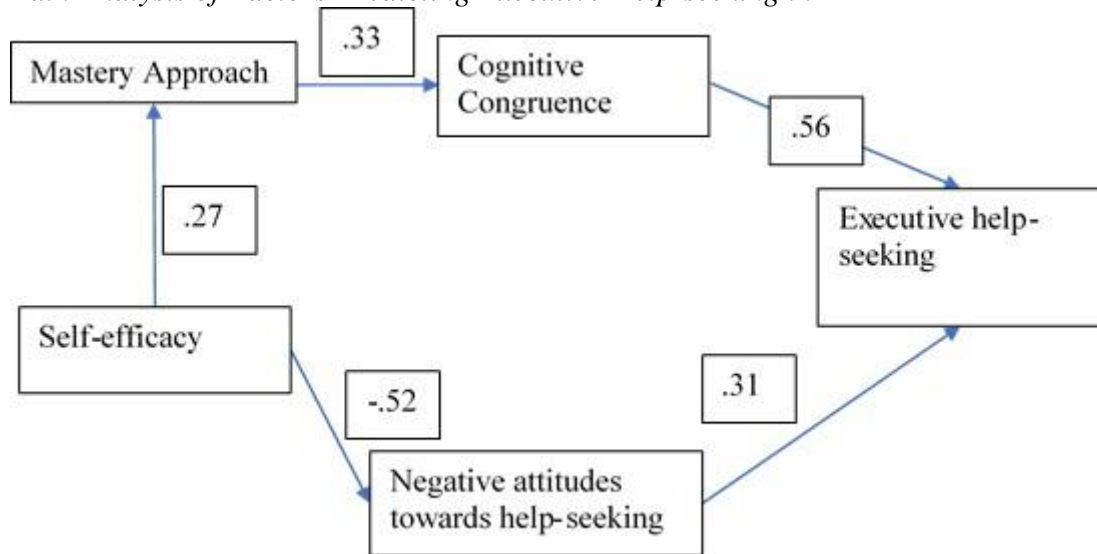
Results indicate that students' adaptive help-seeking behaviours in PAL were positively influenced by perceptions of cognitive congruence ( $\beta = .645, p < .001$ ) between them and the peers providing support. In turn, perceptions of cognitive congruence tended to increase when students held mastery approach achievement goals ( $\beta = .382, p < .01$ ). This model suggests that students' mastery approach to goal achievement has an indirect positive effect over adaptive help-seeking as a mediator of perceptions of cognitive congruence. Students who held mastery achievement goals were more likely to perceive higher levels of cognitive congruence with the peers providing support. In turn, higher perceptions of cognitive congruence were related to adaptive help-seeking behaviours. Thus, results suggest that, when students perceive their peers as knowledgeable students, yet within cognitive reach, they are more likely to seek adaptive support.

The path analysis of executive help-seeking showed several significant paths: both performance and avoidance goal approaches positively correlated with executive help-seeking; negative attitudes towards help-seeking also correlated with executive help-seeking. Self-efficacy negatively correlated with negative attitudes towards help-seeking. Students' attributional style was negatively associated with executive help-seeking, with students who attributed success to intelligence being more likely to request executive help-seeking from peers. When congruence

factors were considered, only cognitive congruence showed a positive association with executive help-seeking. Further inspection of model fit indices indicated that removing performance-oriented achievement goals, as well as attributional style, considerably improved fitness indices. The figure below shows the model that best fitted the data ( $\chi^2(5) = 2.925$ ,  $p > .05$ ; CFI = 1.000; TLI = 1.111; RMSEA = .000). executive help-seeking in PAL

Figure 6-2

*Path Analysis of Factors Predicting Executive Help-seeking in PAL*



Results indicate that cognitive congruence had the most predictive value ( $\beta = .556$ ,  $p < .001$ ) over executive help-seeking, followed by negative attitudes towards help-seeking ( $\beta = .311$ ,  $p < .001$ ). Students with positive perceptions of cognitive congruence with peers providing support, and negative attitudes towards help-seeking, were more likely to exhibit executive help-seeking behaviours. Self-efficacy had the highest indirect effect on executive help-seeking ( $\beta = -.113$ ,  $p < .001$ ). Students with high self-efficacy were less likely to hold negative attitudes towards help-seeking (i.e. perceiving help-seeking as a threat to one's self-esteem) and more likely to exhibit mastery approach goals. This finding supports previous help-seeking studies that have found links between self-efficacy and attitudes towards help-seeking (Xie & Xie, 2019). As seen in the path analysis of adaptive help-seeking behaviours, mastery approach had an indirect significant effect over executive help-seeking through its positive relationship with cognitive congruence.

A further discussion of path analysis findings, linking help-seeking behaviours and congruence, is provided in the Discussion chapter.

## **Chapter 7. STEM Near Peer Mentoring for Secondary School Students: A Case Study of University Mentors' Experiences with Online Mentoring**

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A copy of Paper 4 as published in the Journal for STEM Education Research is included in this chapter. The primary author, Ana Garcia-Melgar, made a significant and leading contribution to the publication of the manuscript presented in this chapter in line with La Trobe University's Authorship of Research Outputs Policy.

My contribution as first author included reviewing the literature on STEM online mentoring, designing data collection instruments, data gathering, data analysis and interpretation, drafting and finalising the manuscript, and ongoing communication with publishers. Professor Noel Meyers provided feedback and suggestions to improve the manuscript.



# STEM Near Peer Mentoring for Secondary School Students: a Case Study of University Mentors' Experiences with Online Mentoring

Ana Garcia-Melgar<sup>1</sup> • Noel Meyers<sup>2</sup>

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## Abstract

The steady decline in secondary students' achievement and interest in science and mathematics is an area of concern for governments, industry, and the education sector. Increasing student engagement in Science, Technology, Engineering, and Mathematics (STEM) disciplines is a top priority if countries are to meet demands for STEM based expertise in the current and future workforce. Amongst strategies to address such concerns, peer mentoring programs have gained increased popularity. Although previous research shows that mentoring can be a successful strategy, the processes that underpin positive outcomes for participants remain largely underexplored. This paper responds to calls for research on mentoring processes linked to effectiveness in STEM peer mentoring programs. We explore the development of mentoring relationships in an online near peer mentoring program between university students and regional secondary school students. We analysed qualitative and quantitative data on mentors' perceptions of relationship quality and mentee engagement, and their use of mentoring strategies, over a 9-week period. Implications for online mentoring are discussed, including a model to facilitate university-to-school mentoring to increase students' engagement in STEM disciplines.

**Keywords** Near peer mentoring · STEM engagement · Peer learning relationships · Online mentoring

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✉ Ana Garcia-Melgar  
[a.garciamelgar@latrobe.edu.au](mailto:a.garciamelgar@latrobe.edu.au)

Noel Meyers  
[n.meyers@latrobe.edu.au](mailto:n.meyers@latrobe.edu.au)

<sup>1</sup> La Trobe Rural Health School, College of Science, Health and Engineering, La Trobe University, Edwards Road, Bendigo, Victoria 3550, Australia

<sup>2</sup> School of Education, College of Arts, Social Sciences and Commerce, La Trobe University, Edwards Road, Bendigo, Victoria 3550, Australia

## Introduction

Online, near peer mentoring holds promise to address the Organization for Economic Cooperation and Development's (OECD 2012) education priority to improve students' engagement and achievement in STEM (Science, Technology, Engineering, and Mathematics). In near peer mentoring, students participating as mentors are one or more years senior to their mentees (Akinla et al. 2018). Newhouse (2017) recognizes the need to create STEM graduates for the current and future workforce. Yet, Osborne and Dillon (2008) and Kennedy et al. (2014) report enduring declines in secondary and university STEM participation. To stop and reverse declines in participation and meet the OECD's objectives, Tytler's (2007) work identifies the necessity for interventions aimed at children under the age of 14 years; then, children have already established their scientific identities.

A suite of interventions offers opportunities to secure STEM engagement and to raise achievement in young students. Rhodes et al. (2011) note the positive influence of mentoring on all students and, in particular, those from low socioeconomic backgrounds who often lack scientific role-models. For those students fortunate to access mentoring opportunities, mentoring scientists engage with students and teachers to act as role models (Sadler et al. 2010; Scogin and Stuessy 2015). To broaden the mentoring pool, recruitment of university students has received endorsement from various quarters in Australia (e.g. Commonwealth of Australia 2015). The literature on peer mentoring recognizes the positive impact of scientific role models on high school students. Benefits of mentoring include improved academic performance (Sharpe et al. 2018; Pluth et al. 2015), enriched attitudes to science (Simpkins et al. 2006; Tenenbaum et al. 2014), and self-confidence (Stoeger et al. 2013). Traditionally, these benefits occur when mentor and mentee can meet face to face. To universalise the benefits attributed to near peer mentoring designed to enhance STEM retention, recruitment strategies require the establishment of connections between university and school students located in different locales. For example, Garrison's (2011) solution recognizes the utility of online communication tools to overcome spatial barriers to extend mentoring benefits to students in regional and rural areas.

Putting aside for the moment, the medium of communication, peer learning researchers (e.g. Riese et al. 2012) note that studies often focus on programmatic outcomes rather than the processes mentors used to achieve the outcomes. For example, DuBois et al. (2002) emphasized the importance of identifying specific process-level factors that can influence mentoring outcomes. Following this recommendation, Goldner and Mayseless (2009) proposed the mentor-mentee relationship represented a causal, and yet under-researched mentoring process. To fill in this gap in mentoring relationships research, Rhodes et al. (2005) call for intensive monitoring of relationships, while Schunk and Mullen (2013) suggest the use of research methodologies that explore how relationships evolve over time. Turning to the online mentoring environment, the added challenges of communicating via multi-media and web-based conferencing, the importance of online mentoring strategies to establish relationships remains underexplored. In particular, Leidenfrost et al. (2011) argue for the need to further investigate what type of online mentoring activities participants engage in. Here we focus on mentors' experiences in a university-to-school synchronous online mentoring program aimed at increasing secondary school students' engagement in STEM. We

measured the frequency and importance of mentoring strategies to enhance mentor-mentee relationships, as well as mentors' perceptions of the quality and development of the relationship with their mentees. To provide a context for this study, we first review mentoring programs in STEM, then explore notions of quality in mentoring relationships, and within online peer mentoring programs in particular.

## Mentoring Programs and STEM

Mentoring initiatives aim to empower students' personal development and compensate for the lack of role-models (Rhodes et al. 2011), in particular, for students from low socioeconomic backgrounds. These programs can vary in delivery format (face-to-face, online, or a combination of both formats), number of participants (one-on-one, one-to-many, many-to-many), scope and purpose, and degree of similarity between mentor and mentee - amongst other factors (Topping and Ehly 2001). Despite the variety of roles that mentors can accomplish, the literature recognizes four distinct functions: psychosocial or emotional support, role model, assistance in goal setting and career paths, and subject-specific expertise (Nora and Crisp 2007). These functions vary across different mentoring programs, with some combining several functions to provide both academic and socio-emotional support to mentees.

Mentoring programs matching students with scientists have become increasingly popular (Scogin and Stuessy 2015). Researchers often report positive outcomes of mentoring programs; in particular, programs directed to STEM high school students can lead to improved student perceptions of science as more relevant and science careers as more interesting (Scogin and Stuessy 2015). Encouraging students to enrol in STEM subjects, and to consider career choices in these disciplines, is typically a main goal of these programs. Amongst STEM mentoring strategies, peer mentoring programs employ current STEM students as mentors to increase other students' engagement and retention in STEM disciplines. Peer mentors can improve students' academic performance in STEM disciplines, content knowledge, attitudes about science and mathematics subjects, and self-confidence (Bowling et al. 2015; Cutucache et al. 2016). Although STEM peer mentoring can be implemented in any educational level, targeting middle school students is of particular importance. Positive STEM experiences in middle years can have long-lasting effects on students' scientific aspirations, as research shows that students have made identity related decisions about their future by the age of fourteen (Tytler 2007). Peer mentors can role-model positive attitudes towards science, helping students consider a career in STEM disciplines. Moreover, peer mentors also benefit from their participation, gaining effective science communication skills and increased confidence (Nelson et al. 2017), and sharing their enthusiasm about science with school students (Pluth et al. 2015). For example, in a qualitative study of a mentoring program between STEM undergraduates and high school students, Tenenbaum et al. (2014) found that mentors obtained personal, educational, and professional benefits, whilst mentees increased their interest and engagement in STEM related disciplines. Similarly, Sharpe et al. (2018) found that senior higher education students' attitudes towards science improved after being mentored by university students over the course of one academic year.



## Quality Indicators of Mentoring Relationships: Social and Cognitive Congruence

Youth mentoring researchers have characterized the quality of mentoring relationships by the frequency of contact mentor-mentee, emotional closeness, and longevity of the relationship (DuBois et al. 2002). Goldner and Mayseless (2009), in their study of a youth mentoring program, demonstrated a clear association between the quality of the relationship and improvements in mentees' academic and social functioning. Dubois and Neville (1997) also found that relationship closeness resulted in increased benefits in a community-based mentoring program between undergraduate students and teenagers. Rhodes et al. (2006) further note that high quality mentoring relationships feature mentor-mentee closeness, authenticity, empathy and empowerment. Research on peer mentoring relationships in educational contexts shows that effective mentors are able to respond to mentees' academic and psychosocial requests (Ward et al. 2014). In order to achieve such level of response, mentors make use of the cognitive and social similarities shared with mentees. Subsequently, we delineate these factors into social and cognitive congruence respectively (Ten Cate and Durning 2007).

Social congruence refers to perceived social similarities between mentor and mentee (e.g. shared educational experiences), and allows for the development of empathy, trust, and self-disclosure (Dioso-Henson 2012). Ten Cate and Durning (2007) situate social congruence within the affective and motivational level of learning, and argue that peer mentors are better placed than academic staff to understand students' motivations due to their status as fellow students. Social congruence is strengthened when mentors share information about their learning experiences and disclose their own learning challenges, past or present (DuBois et al. 2011). In turn, when mentees feel understood by mentors, they are more likely to self-disclose learning gaps, enabling subsequent support from mentors. Complementary to social congruence, cognitive congruence relates to mentors' ability to understand mentees' cognitive and learning challenges, and anticipate learning difficulties. Peer mentors are able to understand and operate at mentees' level of development because they have recently transitioned through that developmental level (Lockspeiser et al. 2008). An emergent property of cognitive congruence occurs when mentors can identify mentees' learning gaps and employ scaffolding and language suitable to mentees' current cognitive development (Ten Cate et al. 2012). When paired with social congruence, mentees perceive their learning difficulties are not only understood but also addressed by mentors through explanations suited to their learning needs.

Successful mentoring relationships are based on both social and cognitive congruence (Garcia-Melgar et al. 2015), however, social congruence is usually established earlier in the relationship than cognitive congruence. According to Rhodes et al. (2005), a strong emotional connection needs to be established before participants can proceed to achieve the objectives of the program or academically support the student. Mentors who manage to establish and maintain quality relationships with their mentees tend to include transformation goals after having worked on relationship quality goals (e.g. by learning about mentees' interests and building trust), and are able to build activities upon mentees' interests. Thus, social congruence needs to be firmly established before mentors can make use of their cognitive congruence to provide academic support.

Not all mentoring relationships, however, are equally effective. Mentors' preconceived and firmly held role expectations can positively or detrimentally

influence the relationship (Capstick 2004). For example, mentors who do not feel efficacious early in the relationship (because they do not perceive their mentor-mentee relationship to be strong, positive, or effective) remain unlikely to persist in the partnership (Karcher et al. 2005). Karcher and colleagues also argue that reasons for volunteering are central to program success and mentor persistence. In their study of adolescent - elementary age mentoring relationships, the authors found that mentors' perceptions of relationship quality were mainly a function of mentees' openness to seeking support from mentors and mentors' initial feelings of self-efficacy. They concluded that it is critically important to continually assess and monitor mentors' motivation and promote their self-efficacy, as the attitudes mentors initially hold about mentoring can potentially threaten the success of the mentoring program.

### Online Mentoring Programs

Online mentoring can take place in synchronous and asynchronous formats. Interactions via text-based media characterize asynchronous programs, while synchronous programs rely on video and audio conferencing tools (Schwartzman 2013). Research on online mentoring demonstrates that the online communication environment provides diverse advantages to participants, compared to face-to-face mentoring programs. Scogin and Stuessy (2015) argue that online mentoring may equalize the status of all participants as interactions are less affected by demographic characteristics. Consequently, mentors and mentees can base their interactions on shared common interests and goals rather than perceived similarities or differences based on demographic factors. Ensher et al. (2003) further contend that online participants have the opportunity to spend more time working on self-presentations and developing positive relationship experiences, compared to face-to-face participants. Furthermore, some mentoring participants may find online technologies less intimidating than face-to-face interactions (Scogin 2016).

Despite the increasing importance of online mentoring, reports on specific mentoring dynamics remain relatively few. Ensher et al. (2003) argue that online mentors accomplish the same functions as traditional mentors. Therefore, effective online mentors can provide educational and psychosocial support, as well as role-modelling of positive attitudes and skills. Although online relationships may take more time to develop (as participants may exchange, on average, less information than in face-to-face mentoring) online participants can develop strong mentoring relationships (Chidambaram 1997). In their study of an online mentoring program that matched scientists and secondary school students, Scogin and Stuessy (2015) found that mentors provided motivational support that increased mentees' engagement in science despite only using text-based communications. In a study on the effectiveness of online Supplemental Instruction sessions (peer-led support sessions that target students in high-risk of failure university subjects), Hizer et al. (2017) found equivalent academic outcomes for students participating in online and face-to-face sessions, suggesting that the online environment did not hinder the effectiveness of the program.

A number of challenges exist for online mentoring programs, however, and these mainly relate to issues around sustaining engagement via online communication platforms - in particular, for programs where mentors and mentees only interact online. Participants' limited digital literacy skills can affect online interactions, as well as

changes in participants' motivation to engage in mentoring, and frequency of communication between participants (Shpigelman and Gill 2013). In a study of online mentoring between scientists and secondary students, Scogin and Stuessy (2015) found that, although mentors provided motivational support, there were differences in the amount and type of support they provided. The authors attributed these variations to challenges inherent to communicating in an online environment and suggested further training for online mentors. Ebby et al. (2010) also found that technology malfunctions, increased miscommunication opportunities, and participants' written communication skills can severely limit the development of mentoring relationships in online platforms. Shpigelman and Gill (2013) studied unsuccessful online mentoring relationships to conclude that these were characterized by mentors' use of a more formal and distant communication style with mentees. Unsuccessful interactions also featured high levels of uncertainty about how best to use an online format, which led the authors to suggest that online mentoring should be built around specific discussion topics. On the contrary, successful mentors employed a conversational style, asked direct questions to their mentees, and provided them with further learning resources.

Finally, asynchronous and synchronous communication tools pose different challenges to online mentoring programs. Asynchronous tools are usually easier to use and technologically reliable (Gregg et al. 2016). Asynchronous tools, such as discussion forums or emails, can provide participants with access to past conversations and can be monitored by program administrators and teachers involved in the mentoring program (Sherman and Camilli 2014). The lack of real time interaction, however, can result in decreased engagement, especially if mentors and mentees do not keep frequent and timely contact (Scogin 2016). On the other hand, synchronous communication tools - such as web-conferencing - aim to address asynchronous tools shortcomings, as participants can employ valuable verbal (e.g. words and tone of voice) and non-verbal information in their mentoring interactions. As a result, these tools can increase participants' sense of connection and reduce psychological distance between participants (Schwartzman 2013). Studies on the effectiveness of synchronous communication tools, however, have found mixed results. Beaumont et al. (2012) studied online peer assisted programs in higher education to find low student uptake to be one of the main challenges. Participants' sense of connection with mentors was also low, despite communications taking place through audio and video conferencing. Hizer et al. (2017) investigated the effectiveness of peer-led review sessions at university, employing synchronous and asynchronous communication tools, and found that students preferred chat-based interactions over real time mentoring sessions. All in all, research on online mentoring programs remains an area to be further developed, with online mentoring researchers calling for further studies on the effectiveness of synchronous communication tools and their potential to overcome challenges present in text-based mentoring programs.

## Current Study: Research Aims

The growing ubiquity of online mentoring programs, and their potential to increase student engagement and interest in STEM disciplines, warrant further research on processes and mentor-mentee dynamics underpinning effective mentoring between

students. The main goal of this study is to investigate mentors' experiences within an online near peer mentoring program between STEM university undergraduates and middle years secondary school students, and to identify strategies to maximize the potential of STEM online mentoring. We follow Leidenfrost et al. (2011), and Zaniewski and Reinholz (2016) recommendations to monitor the development of mentoring relationships and assess the type of activities mentors engage in. The middle years of schooling provide a unique context to investigate STEM mentoring, as mentors can have a positive impact on the development of students' attitudes and interest towards STEM disciplines and STEM related careers. In particular, this study seeks to address the following questions:

- What strategies do mentors employ to engage mentees and develop effective online mentoring relationships?
- What changes to the quality of mentoring relationships do mentors report over the duration of the program?
- What challenges do mentors encounter in online mentoring environments, and what strategies can be put in place to support online mentors in STEM programs?

This study employs mixed-methods to explore how mentors develop and engage in online mentoring relationships, what strategies they use to engage mentees, and how they respond to challenges inherent to online mentoring environments. We employ a convergent parallel design (Creswell and Plano Clark 2017) to collect and combine qualitative and quantitative data on mentors' perceptions of relationship development and weekly post-mentoring reflections, with the objective of illuminating factors contributing to the development of online mentoring relationships. Moreover, the analysis of mentors' experiences and perceptions of relationship development reveal valuable insights into the type of support that mentors may need to successfully engage in online near peer mentoring relationships.

## Methodology and Data Analysis

### Research Setting and Participants

Participants were mentors participating in In2science eMentoring, an online mentoring program that places university undergraduate STEM students as mentors for year 9–10 students (14–15 years old) in regional and rural areas in the state of Victoria, Australia. The purpose of the program is to increase achievement in STEM disciplines, inspire passion for science and mathematics, and increase engagement in further secondary and university STEM education. The program is supported by the Victorian Department of Education and Training, and recruits undergraduate students from four partner universities in the metropolitan area of Melbourne who volunteer to serve as online mentors. The eMentoring program aims to target Victorian schools in regional or remote settings with a higher density of students from low socio-economic backgrounds. The program seeks to address the added disadvantage of distance through the provision of online mentoring opportunities with STEM undergraduates, and follows a developmental mentoring approach (Feldhaus and Bentrem 2015) focused on tailored support and advice to mentees.

Six schools were recruited for the pilot of the program, based on their Index of Community Socio-Educational Advantage (ICSEA), Student Family Occupation (SFO), and regional or remote setting. Once schools agreed to participate, the Science and Mathematics teachers distributed information about the program to their year 9 and 10 students. Teachers discussed program requirements and expectations (i.e. willingness to engage in weekly online mentoring sessions) with interested students, and submitted a list of student/mentees alongside their STEM interests, availability, and preference for one-on-one or group mentoring. The program offered group mentoring (one-to-many) to students working on group projects, with a maximum of three mentees by mentor group (based on a pre-pilot of the program that showed that mentors struggled to communicate online with more than three students). Thirty-nine student/mentees participated in the pilot. Mentees and mentors were matched based on mentees' STEM interests and mentors' discipline areas of study: six mentors had a group of three students, seven mentors had two students, and five mentors had one student. Mentoring sessions took place on a weekly basis for 9 weeks, commencing at the beginning of the second university semester. Participants communicated via a customized online platform that allowed for video conferencing, screen sharing of resources and text-based chat. Session content was agreed upon between participants, including discussions around science career aspirations, science and maths topics covered in mentees' classes, life at university, and effective study strategies. Mentoring sessions typically lasted between 40 and 60 min and took place during school time for mentees. Mentors and mentees used a quiet room at their university or school, respectively, and accessed the online meeting room using laptops or individual iPads.

Eighteen mentors participated in the pilot of the eMentoring program; the majority of mentors (12) were females. Mentors were studying their second or third year of a STEM undergraduate course: the majority of mentors were studying Biochemistry and Chemistry related degrees ( $n = 7$ ), followed by Engineering students ( $n = 5$ ) and Bio-medical Sciences ( $n = 3$ ). The remainder of mentors were studying Physics, Agricultural, and Animal Science. All mentors participated in a 3-h online training session prior to commencing mentoring sessions. The session covered aspects of effective mentoring relationships and mentoring theory, including social and cognitive congruence. Mentors also received training on the online communication tools and resources they could use (screen and video sharing, online activities and quizzes) and strategies to engage students in online environments. Mentors were instructed to discuss science topics (related to topics covered in mentees' classes) as well as students' aspirations and STEM careers and educational pathways. Mentors planned their sessions with classroom teachers' support, who provided information about the content that mentees were covering during the 9-week period, and had access to an online repository of activities and multimedia content organized by areas of the Victorian school curriculum.

## Data Collection

Data collection took place during an extended pilot of the eMentoring program. Mentors were invited to participate at the beginning of their 9-week placements and were asked to complete a pre-placement questionnaire on their motivations to become a mentor, confidence in their mentoring skills (5-point Likert scale), expectations about the type of tasks and discussions they would engage in with their mentees, and foreseen

challenges. After each weekly mentoring session, mentors completed a post-session questionnaire that asked them to provide an account of what was discussed during the session, how it was organized, student engagement and dynamics, and their notes for the next session. To preserve anonymity of responses, a unique personal code was employed to match participants' responses across mentoring weeks. The questionnaire also included a list of strategies that mentors could use to enhance the quality of mentoring relationships as described in the peer mentoring literature, as well as areas of discussion/conversation. These were adapted from the literature on characteristics of effective mentors (e.g. building upon students' interests), and included factors related to social and cognitive congruence aspects (e.g. use of practical examples, self-disclosure). Mentors rated the importance of each strategy after each session (5-point Likert scale) and identified alternative strategies where applicable. The list of strategies is included in section 1 of the supplementary file and encompasses types of topics of discussion/engagement (e.g. science topics, study skills, mentors' university experiences, STEM careers/aspirations), and strategies designed to elicit responses to determine the relative importance of social and cognitive congruence. Finally, mentors reported on the quality of the mentoring relationship using a 5-point Likert scale of agreement/disagreement. Items were adapted from Karcher et al. (2005) mentoring relationship quality scale, and included strength of mentor-mentee bond, satisfaction with the development of the relationship, mentees' willingness to participate in mentoring, mentees benefiting from mentoring (as perceived by mentors), and ease of communication.

## Data Analysis

Data collected on strategy frequencies and relationship indicators were exported into SPSS 26 to derive descriptive statistics. Quantitative data analysis was guided by the assessment of inflexion points in mentors' reported frequencies of strategies and quality of relationship indicators. Qualitative data on mentors' post-session reflections was exported into NVivo 12 to thematically code responses, which were analysed through several coding rounds using a coding frame (Schreier 2012). Each post-mentoring reflection was coded along three dimensions: student engagement (as perceived/reported by mentor), mentors' use of strategies to achieve or maintain social and cognitive congruence, and session content alongside activities employed by mentors.

We first coded evidence of student engagement – or otherwise- reported by mentors. For instance, statements such as 'students were curious to know about how complex numbers are used in electronic coding and how it works' were coded as positive student engagement. We then used the frequency of student engagement to classify each session as successful, partially successful, or unsuccessful in terms of overall mentee engagement, and calculated the percentage of each type of session across mentoring weeks. Sessions were coded as 'successful/positive engagement' when mentors reported consistent engagement in activities/content, for all mentees if in a group, throughout the session. If mentee engagement was inconsistent, or not all mentees were equally engaged, the session was coded as 'partially successful/partial engagement'. Where mentors reported specific factors affecting engagement, these were used to label the session (e.g. technology issues). Finally, if mentors noted consistent indicators of low engagement throughout the session by most participants (e.g. not completing activities, no interaction with mentor) the session was coded as 'low engagement/unsuccessful'.



In a second coding round, we thematically coded mentors' use of strategies to achieve or maintain social and/or cognitive congruence with mentees. To do so, coders assessed strategies against descriptions of each type of congruence. Qualitative data on mentors' reported use of congruence strategies complements quantitative data on frequency/use of mentoring strategies, as it provides detailed descriptions of how mentors employed these strategies – and for what purposes – throughout the mentoring program. In the final round of coding, researchers focused on the content of the sessions and activities/interactions employed by mentors, coding them by session topic (science and mathematics topics, STEM careers and pathways, life at university) and session activity (conversation, presentation, activities). We then calculated frequency of session topics and activities across the total of mentoring sessions. One member of the research team conducted each coding round, with a second researcher coding 25% of randomly selected mentoring reflections to determine inter-coder reliability. Cohen's Kappa was calculated for each variable, ranging from .80 to .90. Coders discussed and reconciled coding differences until a Kappa coefficient of .90 was reached for each variable. The final nodal structure of mentoring strategies and session content was reviewed by In2science staff members. To discern interactions between topics – and between engagement, strategies, and activities – we conducted matrix-coding queries using NVivo.

## Results

Firstly, we present data on mentors' pre-mentoring expectations and self-confidence in their mentoring skills. We then summarize mentors' perceptions of relationship quality, as well as frequency and relevance of specific mentoring strategies over the mentoring placement. Lastly, we present qualitative data results on mentors' session summaries, including mentors' perceptions of mentee engagement.

### Mentors' Pre-mentoring Expectations and Self-Confidence

All mentors ascribed their participation in the program to altruistic motivations to inspire passion for science, with the majority expressing their interest in helping students in regional areas (85.7%). Opportunities to apply their knowledge of science (78.6%) and career development (64.3%) were also important to mentors. Gaining work experience in schools held limited interest (35.7% of mentors). All participants anticipated they would explain science and maths topics and discuss STEM careers with mentees. Helping students with their homework (92%) and talking about life at university (85%) were also common expectations. Only half of the mentors expected to talk about their university studies with mentees.

Mentors expressed confidence in their mentoring skills, especially their ability to maintain mentoring role boundaries ( $M = 4.79$ ,  $SD = .426$ ) and to inspire interest in science in their mentees ( $M = 4.43$ ,  $SD = .646$ ). Overall, mentors felt highly prepared to participate in the program ( $M = 4.14$ ,  $SD = .770$ ). A common concern amongst mentors related to the online mentoring environment. Their reservations were born from questions about their ability to interact and engage with students. Maintaining mentees' interest, encouraging their participation, and establishing rapport without physically meeting them were noted to represent potential constraints. Communicating science at

the students' level was also a potentially challenging aspect of the program, according to mentors.

### Mentors' Perceived Relationship Quality Indicators

Table 1 shows averages for each relationship indicator as reported by mentors. Over the 9 weeks of online mentoring, mentors felt that the relationship grew stronger, and the mentor-mentee bond was strong. Mentors' perceptions of benefits for mentees were the highest amongst all relationship indicators, whilst negative indicators (feeling distant and frustrated) remained low. Mentors' perceptions of communication ease and feelings of frustrations showed high standard deviation coefficients, reflecting variability in their mentoring experiences.

All relationship indicators varied throughout the duration of the mentoring program. The following figure represents variations in how mentors experienced and perceived relationships with their mentees over the 9 weeks of mentoring (Fig. 1).

Although all indicators improved as mentoring placements progressed, there were slight decreases in relationship quality perceptions in specific weeks. Mentors' perceptions of distance increased in weeks six and eight. Likewise, feelings of frustration about mentoring increased in week eight, but remained below neutral levels for all other weeks. Perceived ease of communication with mentees peaked in week five and declined in subsequent weeks. It reached its lowest in week eight, but experienced an increase in the last week of mentoring. Mentors reported that mentees' willingness to learn remained high throughout the program with a marked increase in the last mentoring session. Mentors' perceptions of mentee benefits derived from participation mirrored this pattern. Finally, the strength of the mentor-mentee bond remained neutral except in weeks seven and nine. Mentors' perceptions of the relationship as getting stronger remained the highest in the central weeks of the program and the final week, reaching lower levels in weeks two and six.

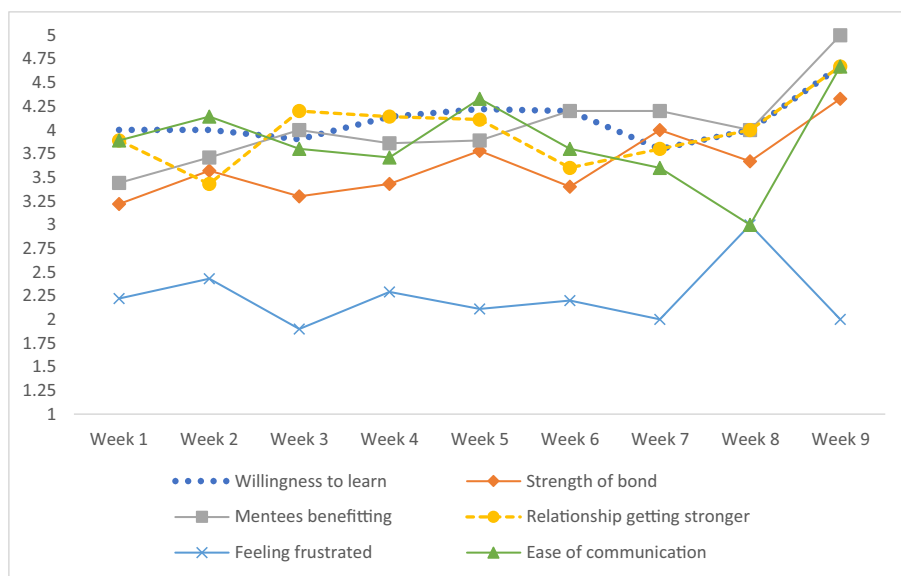
### Strategies Employed by Mentors

Table 2 reports the average importance placed in mentoring strategies throughout the program. Mentors' responses were highly variable, suggesting that individual mentors held different views on the importance of each strategy.

**Table 1** Average scores for relationship quality indicators over 9 weeks of mentoring

Indicator	Mean	Standard Deviation
Relationship getting stronger	M = 3.89	SD = .071
Feeling distant	M = 2.89	SD = 1.02
Feeling frustrated	M = 2.23	SD = 1.147
Strength of bond	M = 3.78	SD = .541
Willingness to learn	M = 3.67	SD = .509
Benefiting from mentoring	M = 4.03	SD = .446
Ease of communication	M = 3.88	SD = .982





**Fig. 1** Mentors' reported relationship quality mean scores over 9-week mentoring period

Overall, mentors reported asking for students' input to plan and conduct their sessions (i.e. asking mentees about what they would like to discuss and do during mentoring sessions), which featured mentors explaining science and mathematics topics, and using practical examples (i.e. applications of science and mathematics). Study strategies rarely featured in terms of importance, nor did mentors report they regularly disclosed their own learning challenges as a frequent strategy. Again, mentors' assessment of the importance of these strategies varied. High variability could also be due to the sample size of this study.

**Table 2** Average importance of mentoring strategies and actions

Indicator	Mean	Standard deviation
Asking for students' input	M = 4.33	SD = .713
Understanding students' science interests	M = 3.77	SD = 1.183
Mentor sharing own school experiences	M = 3.49	SD = 1.422
Mentor sharing university experience	M = 3.33	SD = 1.179
Mentor sharing own interests and aspirations	M = 3.37	SD = 1.266
Mentor providing resources	M = 3.52	SD = 1.463
Mentor explaining science topics	M = 4.22	SD = 1.354
Mentor using practical examples (e.g. real-life applications)	M = 4.33	SD = 1.308
Mentor using examples to raise mentees' interest (e.g. suited to mentees' interests/aspirations)	M = 3.88	SD = 1.341
Showing study strategies	M = 1.86	SD = 1.530
Mentor sharing own learning challenges	M = 2.55	SD = 1.638
Talking about science career opportunities	M = 2.89	SD = 1.671

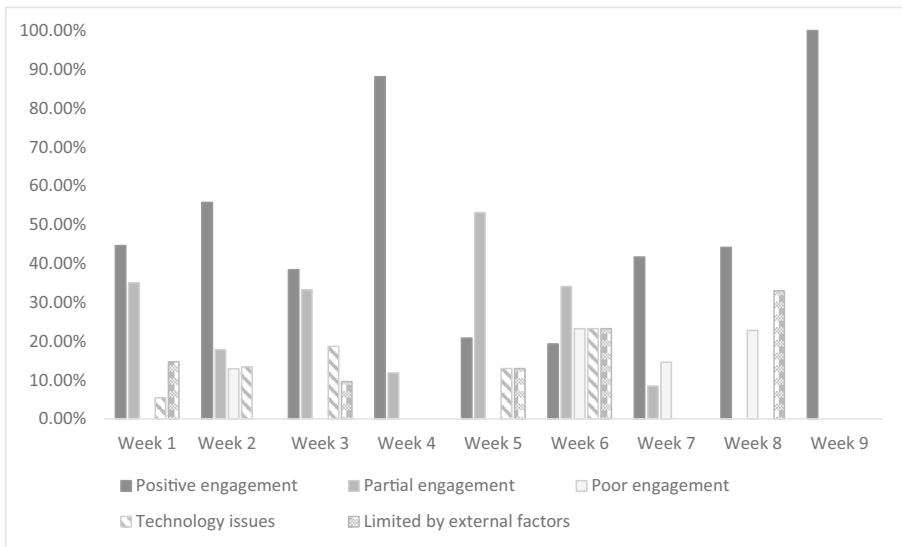
## Mentors' Perceptions of Mentees' Engagement: Changes over Time

Most mentors reported mentees' positive engagement and interest in mentoring sessions, with mentees reportedly expressing interest in session content, participating in activities set up by mentors, asking questions, and engaging with mentors in science discussions. For example, participant 15 described how "students were pretty engaged, and we started talking about astronomy. They both seemed quite engaged and were chatting to me...they were also doing a work sheet and writing a lot as well". 41.2% of mentors' comments noted positive mentee engagement, with 22.2% referring to partial engagement and 28.5% of comments accounting for low engagement in mentoring sessions. Remaining comments referred to mentors' uncertainty regarding mentees' engagement levels.

When sessions were coded by overall mentee engagement (positive, partial, low, or affected by specific factors), most sessions were characterized by positive engagement (46.87%), with 26.56% of sessions representing partial mentee engagement. For instance, participant 2 reported "the students are seemingly participating, but they sometimes talk to each other rather than the mentor". Successful mentoring sessions featured drawing connections between science topics and engagement in further discussions with mentees: "We got into good discussions again, such as the existence of aliens and what discoveries can still be made. I linked in the mathematical aspects of space sciences because we hadn't looked at math much this semester" (Participant 9). Mentors also made explicit connections between science topics and mentees' interests and aspirations: "I also linked it to animals, as one of the girls wants to be a vet, by detailing how bacteria can affect animals differently" (Participant 13).

Mentors only reported 6.25% of sessions as featuring low or negative mentee engagement. In 12.5% of overall sessions, mentors noted that technological issues affected engagement (e.g. slow internet connection, audio or video not working properly); 7.8% of sessions were impacted on by other factors, including disruptions to sessions or scheduling conflicts with class time. Participant 12 describes external factors disrupting their mentoring session: "the class in the next room was very curious to see what was going on, which was distracting but fun", whilst participant 2 refers to clashes with other classroom activities: "session was limited to 20 minutes as students needed the rest of the session time to prepare for their project".

Although most weeks featured positive engagement, partial engagement occurred in weeks one, three, five, and six (Fig. 2). The last week of the mentoring placement was characterized by positive engagement/successful sessions, consistent with mentors' assessments of relationship quality indicators improving towards the end of the 9-week period. Low/negative engagement remained low throughout the mentoring placement, with most unsuccessful mentor-mentee interactions occurring in week eight. Technology issues affecting mentees' engagement were most relevant in week six, whilst external factors (mentoring sessions clashing with other student activities, external disruptions, shorter sessions due to other student activities) had a negative impact on the overall success of sessions in weeks six and eight. In addition to technology issues and external factors, mentors working with groups of students noted that inconsistencies in some students' attendance were also a disruptive factor (e.g. mentors needing to repeat content for students who had not attended a previous session).



**Fig. 2** Mentees' engagement in sessions as reported by mentors – session percentage by weeks

## Social and Cognitive Congruence

Mentors' strategies to build social congruence with mentees focused on finding common scientific interests, getting to know students' interests and aspirations, and disclosing their background and learning experiences. This finding aligns with mentors' reported use of self-disclosure of learning experiences and interests/aspirations. An example of self-disclosure is given by Participant 8: "I told them that when I was younger I wanted to be a chef or a pilot, with the student who wants to be a chef surprised". Mentors appreciated the value of building rapport to subsequently providing meaningful guidance on education themes (e.g. subject choices, changing career aspirations), exemplifying how they used mentees' interests to tailor session content. For example, Participant 1 reports that, upon finding his mentee was interested in medicine or dentistry: "I committed to researching his tertiary options to provide a framework for his aspirations, and asked that he take note of any areas of interest of problems in class to discuss throughout our sessions". Since mentors and mentees did not share similar social/educational roles, mentors deliberately focused on actions to establish social congruence to find common ground in order to better understand their mentees: "Next week I will be talking about what I do at uni as they were interested to learn more about biotechnology" (Participant 13).

Mentors reported more on the products of cognitive congruence (e.g. mentees found presentation engaging) than strategies to build cognitive congruence. When they mentioned strategies, it was usually as part of the challenges they had experienced: "I had completely forgotten the level of science I was dealing with when I was their age... how to present information in a way that keeps attention without being overwhelming" (Participant 10), or strategies to improve future sessions (e.g. finding suitable topics, making presentations more simple, maintaining engagement and interest): "I used my experience from the last presentation to make this one a lot more interesting and interactive for the girls, as I felt they found it boring last time" (Participant 15).

Mentors mostly reported challenges in maintaining cognitive congruence; few mentors expressed issues with the social aspects of the mentoring relationship. Although mentors reported using practical examples during their sessions, their reflections revealed challenges and difficulties in finding suitable topics for their mentees as well as pitching the information at the right level. As Participant 4 reported: “The challenges would be finding suitable topics relevant to their knowledge and making the work as simple and in year 9 standard”. Participant 11 reflected on the challenges associated with introducing more advanced topics in their mentoring discussions: “I wasn’t able to explain them technically how it works as it is above their syllabus, but I think I did a good job relating complex numbers and their use in circuits”. Keeping students engaged throughout the sessions also remained a challenge: “I did find the presentation a little challenging. I feel like I had the level of information right, but it was a little hard to hold their interest” (Participant 9). Most of the reported challenges occurred in week five; finding suitable topics was first mentioned as a difficulty in week three, whilst issues related to presenting information at the appropriate level became relevant in week six.

### Content of Mentoring Sessions

Mentor-mentee groups engaged in three categories of interactions: discussions, mentor presentations, and activities (Table 3). Discussions represented 65% of reported interactions, with educational themes (e.g. subject choices, moving to university) being the most frequent topic of discussion, followed by science topics. For example, participant 13 noted: “we discussed ATAR (Australian Tertiary Admission Rank) and the changing perception by uni, as well as the importance of extracurricular and leadership stuff”. Conversely, science discussions ranged broadly, and included biology, chemistry, physics and maths topics – to name a few. General conversations (e.g. catching up after school break, talking about students’ activities after school) represented topics mentors believed important.

Presentations for mentees represented the second most common interaction (17%), while a close third included diverse activities (16%) such as showing videos, working through worksheets, or engaging in structured activities. The majority of presentations focused on science topics: “I had prepared a short presentation on one of the topics they had come up with last week (yellow fever). I had made it up like lecture notes that we use at university to give them an idea of what a lecture is like” (Participant 5). Amongst activities, online videos followed by activity questions were the most popular type of activity employed by mentors: “This week I was giving the student a head start about the ecosystem, using a video and a range of questions that they can answer from the video” (Participant 16). Most activities occurred within successful/positive engagement sessions. Highly engaging sessions featured diverse and interactive activities, education related discussions and mentors’ presentations on education and science topics. Sessions that were partially successful/ partial engagement featured study skills discussions, teach back activities, and general conversations. Poor/ unsuccessful sessions featured low usage of activities, discussions, and presentations.

Mentors’ strategies to improve subsequent sessions – based on reported challenges – focused on preparing sessions, finding appropriate and engaging content, and providing more interactive content for mentees. Finally, mentors noted that mentees’ unclear

**Table 3** Session content/activities and mentee engagement

Type of session	Positive engagement	Partial engagement	Poor engagement	Technology issues	Limited by external factors
Mentor presenting	57.51%	30.03%	0%	12.46%	0%
Mentor and mentee engaged in discussion	49.08%	23.82%	4.72%	15.15%	7.24%
Mentor and mentee engaged in activities	69.07%	21.03%	0%	7.76%	2.15%

expectations about the mentoring program remained a challenge in the first sessions: “I think the students are a bit unsure of what they can ask me, since they were repeating some of the questions they asked in our last session” (Participant 10).

## Discussion

Secondary school students can benefit from technology-mediated near peer mentoring programs, which have the potential to overcome geographical barriers to reach students traditionally underrepresented in mentoring. This study contributes to the online peer mentoring literature through the investigation of the experiences of STEM university students mentoring secondary school students in regional areas. Results suggest that specific aspects of the mentoring relationship need to be taken into account when designing near peer online mentoring programs to increase STEM engagement. We discuss implications for research and implementation of online STEM peer mentoring initiatives, and propose a university-to-school mentoring model that could overcome difficulties reported by mentors in this study.

Participants enacted characteristics of successful mentors as described in previous studies on online mentoring, namely, enhancing mentees’ participation by asking for their input and feedback on mentoring sessions (Scogin and Stuessy 2015). Providing mentees with opportunities to become active participants, and tailoring sessions to mentees’ science interests and aspirations, were ongoing tasks for mentors over the duration of the program. Most mentor-mentee interactions were conversation based, a factor associated with effective mentoring as it promotes mentees’ active participation and serves to strengthen mentor-mentee rapport (Shpigelman and Gill 2013). In addition to mentors’ strategies to increase mentees’ input, and the use of discussion-based interactions, mentors emphasized the importance of preparing and structuring mentoring sessions – in line with previous arguments around the need to provide specific focus and structure to achieve successful mentoring interactions (Shpigelman and Gill 2013). Mentor-mentee interactions exemplified the provision of academic and social support that characterizes successful mentoring (Ward et al. 2014) through two types of interactions respectively: discussions that supported students’ understanding of science topics; and conversations around pathways to further education. Therefore, mentors aimed not only to increase students’ scientific knowledge but also to inspire educational aspirations in mentees aligned with their scientific interests.

Despite positive increases in relationship quality indicators, the mentor-mentee bond remained at neutral levels, suggesting - as Chidambaram (1997) does - that online mentoring relationships may take longer to develop than face-to-face relationships. Variations in mentor-mentee communication ease point to online communication environments as a potential disruptive factor to relationship development (Shpigelman and Gill 2013). In addition, participants in this study reported a number of challenges that affected their ability to establish and sustain mentee engagement. We discuss these factors and implications for online mentoring next.

### Developing Online Peer Mentoring Relationships Using Web Conferencing Tools

The analysis of mentors' weekly reflections revealed that discussions provided the favoured form of interaction (60% of total), compared to online activities and presentations. Despite the variety of online tools available to mentors (e.g. streamed video, simulations, and other online resources), uses of these technologies represented less than 20% of reported interactions. We suggest that mentors may have chosen to rely on their face-to-face communication strengths and skills in verbally explaining and connecting science topics, rather than using media tools to communicate science, due to their limited experience in using online communication tools for mentoring purposes. Previous studies on online mentoring programs have found that students may opt for the simplest tools of communication (Schwartzman 2013). Fear of technology pitfalls, and limited confidence in digital literacy skills, may have affected mentors' decision to rely on discussion-based interactions. Technological challenges can potentially disrupt mentor-mentee rapport, and require additional investment of time in subsequent sessions to re-establish bond if online communication tools fail. Improving the reliability of online communication tools could enhance mentors' confidence to employ a variety of online tools in mentoring sessions, and has indeed been identified as a potential challenge in previous online mentoring studies (e.g. Ensher et al. 2003).

Online mentoring researchers have typically focused on programs that employ asynchronous communication tools, such as text-based communications (Gregg et al. 2016). In the present study, participants employed synchronous tools and communicated via video conferencing - allowing for real time collaboration through screen sharing. The online medium would allow for subtle verbal and nonverbal language cues that would enable mentors to discern and re-establish variable states of engagement (Brennan and Lockridge 2006). The use of real time communication, including video and audio, could overcome shortcomings identified in online asynchronous mentoring programs, such as participants' disengagement or mentor-mentee miscommunications (Hizer et al. 2017). Mentors in this study, however, seemed to use the video-conferencing platform as an extension of face-to-face mentoring, as they favoured the use of discussions over other online tools available to them (e.g. multimedia or activities). We argue, as do others (e.g. Schwartzman 2013), that online mentoring provides a unique learning environment for participants, rather than simply a translation of face-to-face mentoring to online formats. Encouraging mentors to make use of real-time online activities, other than audio and video-based interactions, could enhance learning opportunities for mentees that would be unique to online mentoring formats. In fact, successful sessions in this study featured a combination of discussions, mentor presentations, and activities such as online videos and screen sharing. We also propose

that online mentoring programs could benefit from the use, and advantages, of both synchronous and asynchronous communication tools. Providing mentors and mentees with tools to establish real time communication and increased rapport, on one hand, and off-line spaces for reflection and knowledge co-construction, on the other, could enhance mentee participation and engagement in online mentoring.

The analysis of mentors' perceptions of mentee engagement, and associated challenges, suggests that cognitive aspects of the mentoring relationship proved more challenging to establish and maintain – compared to social aspects. We discuss mentors' accounts of cognitive and social relationship aspects using mentor-mentee congruence concepts next.

## Two Types of Mentor-Mentee Similarity: Social and Cognitive Congruence

While previous studies have emphasized the importance of mentor-mentee similarity (Stoeger et al. 2013), this study differentiated between two types of similarity or congruence: social and cognitive. Despite congruence being described in the literature as a characteristic of effective peer mentors (e.g. Ten Cate et al. 2012), our study suggests that mentors can struggle to sustain congruence over time. In this section, we discuss challenges related to peer congruence in relation to mentee engagement and mentor-mentee interactions.

Social congruence played an important role in the first weeks of mentoring, as mentors employed strategies to get to know their mentees. In line with previous research on the importance of establishing social congruence at the beginning of mentoring programs (Rhodes et al. 2005), mentors focused on understanding mentees' science interests and aspirations in order to cement the social aspects of the relationship and find engaging content for future sessions. Relationship building, thus, was a priority for mentors in the initial stages of the program, preceding subsequent interactions focused on educational content (Rhodes et al. 2005). Although strategies directed towards establishing social congruence (in particular, getting to know students) varied throughout the duration of the program, these became an ongoing strategy. Social congruence strategies were of particular importance after school holidays (week eight), when mentors needed to re-establish rapport with their mentees.

Interestingly, the use of self-disclosure strategies was mainly restricted to mentors' science aspirations and current and past learning experiences, rather than self-disclosure of their own learning challenges. Even though researchers have argued that self-disclosure of learning challenges is important to the development of social congruence (DuBois et al. 2011), mentors in this study preferred to establish this type of congruence through the discussion of their science learning experiences and aspirations. Mentors' decision to avoid disclosure of past and current learning challenges may be explained by their self-confidence in their mentoring skills, as measured before placements. If mentors were highly confident in their ability to mentor, then they may want to appear to mentees as accomplished students. Alternatively, mentors' past learning experiences may have been different to those of their mentees and, consequently, they struggled to find common learning challenges to share with mentees. Although mentors and mentees were matched based on shared scientific interests, further consideration needs to be paid to other factors that would increase perceived similarity between mentors and mentees (Dubois et al. 2011). For example, mentees could be paired with



STEM university students who share similar learning journeys coming from regional and remote areas.

Compared to social congruence, cognitive congruence proved more challenging for mentors to establish and maintain with younger students. Mentors recognized that, on occasions, they struggled to adjust their explanations or activities to mentees' knowledge level or science interests. In these cases, mentors endeavoured to re-engage students by asking for their input and discussing their science interests. While as little as 5 years may separate the first-year university student from the grade 9 or 10 student, the developmental and cognitive differences may represent a divide, and in some cases we saw challenges amongst mentors' self-reported engagement with their younger peers.

Whilst past studies have found that peer mentors can employ cognitive congruence, or similarity, with their mentees to provide support and explanations suited to mentees' cognitive development (e.g. Ten Cate and Durning 2007), mentors and mentees in this study were in different educational levels and institutions. Consequently, they can be best described as 'near-peers' rather than peers. The lack of shared current educational experiences may have negatively impacted mentors' ability to maintain or establish cognitive congruence. In programs where both mentors and mentees are university students, cognitive congruence is more readily available because senior students (as mentors) have recently experienced the same educational challenges as their mentees (Lockspeiser et al. 2008). Near peers from different educational levels, on the other hand, may have to consciously 'remember' their secondary school years to understand mentees' learning difficulties. In order to overcome the cognitive gap that may exist between near-peers, we propose that university-to-school mentoring programs could benefit from the inclusion of senior school students (e.g. year 12). In this study, university students, as near peers, may be too distant in their cognitive development. Such limitation opens opportunities for nearer peers to undertake an intermediate role in university-to-school mentoring programs in a similar fashion to open triads, where graduate students serve as an intermediary between university staff and undergraduate students (Robnett et al. 2018). Senior secondary school students could work collaboratively with university students to mentor middle-school students, as their cognitive development is closer to that of the mentees. The inclusion of intermediate peers warrants further research consideration as to whether mentees would experience increased learning opportunities. Other strategies to bridge the cognitive distance between mentor and mentee could focus on mentor training, which may include a greater focus on questioning techniques in mentors' initial training or further development opportunities, in order to re-establish congruence with peers.

In addition to considerations about the role of intermediate peers, we argue that peer mentoring programs should take into account whether their main objectives are social or academic, or both, and what type of congruence can enhance intended outcomes. In this study, mentors focused more on academic (e.g. discussing science topics) rather than social outcomes for their mentees (e.g. discussing science careers); thus, they would have benefitted from higher levels of cognitive congruence. Programs that emphasize social objectives may not need the aid of an intermediate peer to restore cognitive congruence levels, as university students could focus on discussing further educational and career opportunities in STEM using their knowledge as senior students.



## Conclusion and Recommendations for the Implementation of STEM Online Peer Mentoring Programs

This study has investigated mentors' experiences as part of a pilot STEM mentoring program that matched university students and secondary school students in regional areas. It sought to contribute to the peer mentoring literature by exploring mentors' strategies – and challenges – when providing STEM mentoring via online communication tools. Our findings suggest that online mentoring programs could be employed to increase students' engagement in STEM if particular aspects of the mentor-mentee relationship are taken into consideration when designing and implementing these programs. Results indicate two areas of particular relevance to the implementation of university-to-school peer mentoring programs: the use of synchronous and asynchronous communication tools, and the role of intermediate peers.

In this study we differentiated two types of similarity or congruence, and found that some mentors struggled to maintain cognitive congruence. This finding raises questions about what degree of mentor-mentee cognitive similarity is needed to enhance academic outcomes for mentees, as well as the importance of monitoring potential fluctuations in congruence levels as mentoring relationships evolve over time. Whilst the literature emphasizes the importance of cognitive congruence as mentors' ability to provide explanations suitable to mentees' cognitive development, it is not clear how mentors recognize this "right level" (Lockspeiser et al. 2008). Further research could investigate what social cognitive mechanisms operate in mentor-mentee interactions, and how mentors employ these to ensure their explanations are appropriate to mentees' cognitive development. Moreover, given that university students are being trained to become scientists, and not educators or science communicators, they may need initial and ongoing support to ensure they engage in conversations suitable to mentees' cognitive development. We suggest that, to overcome cognitive congruence issues identified in this study, peers closer to mentors' and school students' cognitive development could be included in university-to-school mentoring programs. Teachers' support could also alleviate issues derived from potential mentor-mentee gaps in shared educational experiences, as they can provide mentors with information on mentees' learning needs. In the program reported in this paper, mentors were instructed to discuss session topics with teachers; however, we do not know if these interactions happened on a regular basis. STEM online mentoring programs would need to ensure that participating teachers regularly update mentors on relevant science content covered in class.

In this study, communication took place through synchronous online tools that helped mentors establish rapport with mentees. The use of audio and video conferencing tools provided participants with verbal and non-verbal communication cues, not readily accessible in text-based mentoring programs; however, mentors still experienced communication issues that impacted on the development of mentoring relationships. Programs that employ synchronous communication tools need to assess the usage and purpose of the online tools provided to participants, as mentors may lack confidence in the use of more complex tools or may resort back to their face-to-face communication skills strengths. As well as improving opportunities for collaboration, we suggest that a combination of asynchronous and synchronous communication tools may address shortcomings in cognitive congruence establishment, providing mentors

with alternative communication strategies to explain and discuss topics in congruent ways. In this study, we provided initial training on online communication strategies to mentors. We suggest that mentees could also receive training on how to communicate with mentors, with the objective of enhancing mentees' participatory role.

Finally, although technology played a role in the development of the mentor-mentee bond, and affected engagement in specific mentoring weeks, it was not the most challenging aspect for mentors in this study. Rather, difficulties to maintain cognitive congruence between participants, role expectations and external support for the program should be taken into account when designing STEM online mentoring strategies. For instance, mentoring relationships in this study were negatively affected when mentees were not able to attend sessions due to other school commitments, after the school holiday break, or when technological issues made communication difficult. These aspects illustrate the impact of participants' role expectations as well as factors outside the mentor-mentee relationship, such as the timing of mentoring sessions in relation to university and school calendars (e.g. whether mentoring sessions are aligned with school terms). Role-modelling clear expectations is also critical to the success of mentoring relationships and needs to be better integrated into induction programs for mentors and mentees. We argue that mentees may need more guidance before mentoring starts, for instance, by providing them with examples of questions and activities they can do with their mentor.

Further research could extend findings from this study to other online peer mentoring formats, including programs that incorporate face-to-face and online communication tools. In addition, studies that compare the development of online and face-to-face mentoring relationships in comparable programs (or within iterations of the same program) would shed light on whether patterns of relationship development identified in this study are specific to online environments. In this study, data collected on mentors' strategies and mentees' engagement relied on mentors' self-reports. The analysis of mentoring relationships could be further enriched by incorporating mentees' perceptions of relationship development and their views on the efficacy of the strategies employed by mentors, as well as the analysis of video-recordings of synchronous mentoring sessions for data triangulation purposes. The use of additional data sources would also mitigate potential limitations associated with the use of mentors' written reflections (e.g. differences in mentors' ability to express and describe mentee engagement and/or mentoring strategies). Moreover, the effectiveness of mentors' strategies to establish and maintain congruence could be further explored from the mentee's perspective, comparing and contrasting mentors' and mentees' perceptions of congruence levels and their impact on the success of mentoring programs. Further studies could also employ larger samples of mentors and mentees to quantitatively assess changes in relationship quality indicators, engagement, and congruence, and the impact of these factors on mentee outcomes.

Mentors in this study self-identified as highly efficacious in their mentoring skills, resulting in increased persistence to successfully engage students in their mentoring sessions. Studies that incorporate mentors with varying levels of self-efficacy may discern variations in mentors' engagement and perceptions of mentee engagement, with consequences for relationship development. Finally, mentors did not refer to the size of the groups as a challenge in the establishment or maintenance of mentoring relationships, nor did it affect social and cognitive congruence dynamics. Inconsistent

attendance alongside students attending a limited number of sessions, however, were disruptive factors for mentors. Further research studies could investigate group mentoring dynamics in online environments, employing observational and longitudinal methodologies to ascertain the development of online mentoring relationships in group settings and their specific challenges.

## Compliance with Ethical Standards

**Ethics** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee (La Trobe University Human Research Ethics committee, reference number S16–124) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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## **Chapter 8. Online Learning Strategies to Recruit and Train Student Mentors: Opportunities for Development and Integration with Face-to-face Strategies**

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A copy of Paper 5 as published in the Journal of Academic Language & Learning is included in this chapter. As the sole author of this paper, I reviewed the literature on online learning and training strategies for peer mentors, reviewed recruitment and training strategies employed at Victoria University, drafted the manuscript, and finalised the manuscript based on reviewers' feedback.



# Online learning strategies to recruit and train Student Mentors: Opportunities for development and integration with face-to-face strategies

**Ana Garcia-Melgar**

Students Supporting Student Learning Unit, Victoria University, Melbourne, Australia

Email: [ana.garcia-melgar@vu.edu.au](mailto:ana.garcia-melgar@vu.edu.au), [amgmelgar@gmail.com](mailto:amgmelgar@gmail.com)

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Recruitment, training, and ongoing development strategies are critical to the success of peer assisted learning programs (PAL), whereby experienced students provide academic and social support to fellow students. Recent iterations of PAL programs incorporate online learning strategies. Online technologies provide learning and communication tools to overcome time and geographical barriers when recruiting and training students participating in PAL. Online tools, when used in conjunction with face-to-face strategies, offer flexible learning environments that can be adapted to respond to Student Mentors' developmental learning needs. At Victoria University, the Students Supporting Student Learning (SSSL) Unit has implemented blended training and development strategies in their multi campus Student Mentoring programs. The introduction of online recruitment and training processes involved several steps or stages for Student Mentors to complete, following a flipped classroom approach. Initial online training and recruitment processes assessed students' expectations and motivations to become Student Mentors, and scaffolded basic mentoring skills that were further developed in subsequent face-to-face training sessions. Ongoing development opportunities included a blend of face-to-face and online weekly sessions that emphasised active learning using reflective activities, quizzes, and multimedia resources. This paper discusses the theoretical underpinnings of a blended recruitment and learning model for students providing support in PAL programs; in particular, online learning and peer learning theoretical frameworks. It also describes the process for implementing online recruitment and learning strategies for Student Mentors at Victoria University. Recommendations on how online and blended approaches can enhance recruitment and training/development in PAL programs are discussed.

**Key Words:** peer assisted learning, training, recruitment, ongoing development, blended learning, flipped classroom.

## 1. Introduction

Peer Assisted Learning (PAL) programs are increasingly becoming key strategies to provide academic and social support to higher education students. Based on social learning and socio-cognitive theories of learning, PAL programs utilise the beneficial influence of peers – students of equal or similar ability and social standing – to enhance students' academic development, provide social and emotional support, and increase student satisfaction and engagement with their studies (Hilsdon, 2014; Topping, 2005). Strategies that employ peers as a source of support encompass a variety of collaborative learning approaches, including mentoring dyads, group mentoring, and peer-led academic study sessions, to

name a few (Falchikov, 2001). Peer learning strategies share core pedagogical principles: facilitation of knowledge and independent learning skills, mutuality of benefits (i.e. both the student who receives support and the student who provides support benefit from their participation in the program), and the existence of an open, non-judgmental learning environment (Topping & Ehly, 2001). PAL programs seek to enhance students' independent learning skills to become self-regulated learners. A valuable aspect of PAL is the existence of a myriad of cognitive, social and psychological benefits for participating students (Ginsburg-Block, Rohrbeck, & Fantuzzo, 2006). Such beneficial outcomes have attracted interest from researchers and educators, resulting in the implementation of PAL programs for diverse student cohorts. In higher education, PAL programs are frequently employed to aid student transition into tertiary education, and to assist students in the development of academic skills linked to success in tertiary studies (Colvin, 2007; Terrior & Leonard, 2007). The use of peer learning in higher education is happening in a context where universities are seeking alternative strategies to traditional academic support programs (Colvin & Ashman, 2010), and increasing numbers of students report feeling under-prepared to undertake tertiary studies (Hendricks, Andrew, & Fowler, 2014). PAL programs have gradually become central strategies within academic support units due to its cost effectiveness, ability to provide both social and academic benefits to students, and flexibility to adapt program objectives to diverse student cohorts and their needs (Topping, 1996). PAL strategies also provide students with valuable socio-psychological benefits linked to academic success, satisfaction, and retention; namely, sense of belonging, increased self-efficacy, and decreased anxiety and stress (Collings, Swanson, & Watkins, 2014; Zentz, Kurtz, & Alverson, 2014).

Research on peer learning shows that it can be a highly effective pedagogical tool to enhance students' learning and academic achievement (Boud, Cohen, & Sampson, 2000). PAL programs, however, are subject to a number of internal and external factors that can affect the quality of learning outcomes for students. Recent PAL studies have attempted to uncover peer learning processes and dynamics linked to high quality learning outcomes and satisfaction for participants, in an attempt to maximise PAL effectiveness (Arendale, 2014). Being a student-centred learning strategy - based on the establishment of learning partnerships between students - the success of PAL initiatives heavily relies on the skills of the student who provides support. Amongst factors related to learning quality and success in PAL, researchers emphasise the role of training and recruitment strategies (Tredinnick & Menzies, 2017). When PAL is intentionally planned and includes structured training sessions for Student Mentors, both students who provide support and students receiving support can benefit from their participation (Bates, 2014). Recruiting students whose expectations and attitudes towards mentoring are aligned with the objectives of the program, as well as providing them with ongoing development opportunities, is of paramount importance to ensure that PAL programs fulfil peer learning objectives (Ehrich, 2004; Harmon, 2006). In fact, learning outcomes can be diminished if Student Mentors' motivations and role expectations are not accounted for when implementing PAL (Ashwin, 2003). Likewise, PAL initiatives can prove unsuccessful if Student Mentors are not equipped with the necessary skills and knowledge to successfully navigate their roles (Brown, Nairn, van der Meer, & Scott, 2014).

Recruiting and training Student Mentors has traditionally been conducted via face-to-face strategies. These strategies, however, can be constrained by a number of factors; namely, students' increasingly busy schedules (which can prevent students from attending face-to-face sessions on a regular basis) budget limitations, and geographical barriers (of particular relevance to multi-campus or onshore/off-shore programs). Tredinnick and Menzies (2017) also argue that traditional face-to-face training for Student Mentors is usually conducted in intensive or block mode, potentially resulting in diminished opportunities for skill transferability or further development over the semester. Recent iterations of recruitment and training/development strategies for Student Mentors include online and blended learning strategies. This shift towards online training and recruitment is also happening in a context where online and blended learning pedagogies have become essential aspects of the learning experience for higher education students. Online and blended learning strategies can be adapted to respond to the needs of students and staff working within academic support and PAL programs. Online tools provide flexible



modes of delivery that can overcome time and geographical barriers (Hizer, Schultz, & Bray, 2017), as well as learning opportunities for time-poor students and/or staff. Face-to-face initial training and ongoing development strategies can also benefit from the inclusion of online learning strategies in PAL programs. An example of such strategy is the flipped classroom approach, whereby students complete online learning activities before attending face-to-face sessions (Andrade & Coutinho, 2017). PAL programs are increasingly employing online and blended learning strategies, such as the flipped classroom approach, to provide flexible and ongoing learning opportunities for Student Mentors. Online technologies can be particularly relevant for multi-campus or onshore-offshore PAL programs, as they allow staff members to recruit and train peer mentors based in multiple locations.

Current developments in the implementation of online strategies to recruit and train Student Mentors have resulted in an increased interest in researching the role of online pedagogies in peer learning. Recent peer learning publications describe training and development approaches based on online and blended learning pedagogies (for example, Tredinnick & Menzies, 2017). Despite the interest in implementing online strategies within PAL programs, little research has been published on specific online recruitment and training program aspects. Such data is critical to the development of further online learning strategies, enabling discussion on good practices, theoretical underpinnings, and integration with existing face-to-face strategies. This paper aims to advance knowledge on the role of online recruitment and training tools in PAL programs and its integration with face-to-face strategies. To do so, this paper describes the implementation of online strategies to recruit and train Student Mentors at Victoria University, and discusses the rationale behind their implementation based on relevant peer learning and online learning theories. The paper is divided into three sections: online recruitment strategies and the importance of assessing motivations and role expectations; initial online training strategies and activities based on the flipped classroom approach; and ongoing development strategies for Student Mentors using blended learning pedagogies. Examples of learning activities and online learning tools are included in each section. Further recommendations on how online learning technologies can enhance face-to-face recruitment and training strategies in PAL are also discussed. To provide a context for the training and recruitment program discussed in this paper, next section describes PAL programs at Victoria University. For consistency purposes, the term ‘Student Mentor’ is employed in this paper to refer to students providing support in PAL programs.

## **2. Student mentoring programs at Victoria University**

The Students Supporting Student Learning (SSSL) unit oversees the implementation and management of academic peer assisted learning programs at Victoria University, known as Student Mentoring programs. Currently, the SSSL unit administers five programs: Peer Assisted Study Sessions (PASS), Peer Assisted Tutorials (PATs), Student Writing Mentors, Trident for Engineers, and Student Rovers (based at the Library/university Learning Commons). Whilst some programs are subject-based and provide further academic support to students in specific units (e.g. PASS), other programs (such as the Student Writing Mentors or Student Rovers) aim to develop general academic literacy skills and do not operate within specific subjects. An important aspect of the work undertaken at the SSSL unit is the emphasis on connecting embedded (or curriculum-based) and stand-alone programs to maximise student engagement in PAL. An example of such interaction is the Trident program, which comprises aspects of embedded PAL programs (i.e. Student Mentors working within specific subjects and attending tutorials) and stand-alone schemes such as the provision of numeracy support in open study spaces. This approach allows Student Mentors to create connections with students when attending tutorials and encourage them to seek further support outside class time. Programs operate at five campuses in the metropolitan area of Melbourne. The SSSL unit employs between 40-50 Student Mentors each semester within the ‘Students as Staff’ scheme. The Student Mentor role is considered inherently developmental and, as such, all Student Mentors are required to participate in regular learning and ongoing development activities.

SSSL lecturers are in charge of recruiting, training, and providing ongoing learning opportunities for Student Mentors participating in all five programs. Student Mentors are recruited based on their academic record, ability to communicate with other students, and peer mentoring attributes (e.g. empathy, understanding of students' learning needs). All Student Mentors attend a compulsory initial training day, and participate in weekly development workshops during the semester to further enhance their peer mentoring skills. Initial training and ongoing development sessions are tailored to the specific needs and role responsibilities inherent to each Student Mentoring program. In semester one of 2017, the SSSL unit implemented a blended recruitment and training model, incorporating online strategies to recruit Student Mentors, design initial training activities, and engage mentors in weekly learning activities. The introduction of this blended approach served to unify mentoring learning resources, provided flexible and student-centred learning opportunities for Student Mentors, maximising staffing and time resources. The blended Student Mentor recruitment and training model developed by the SSSL unit consisted of the following four stages:

Stage 1. *Online recruitment phase*: aimed to ascertain students' motivations to become a mentor, basic understandings of peer learning, communication skills, and other requirements as per role (e.g. academic grades in specific subjects). Students completed an online application form which included uploading video responses to recruitment questions. Successful candidates were invited to participate in initial online training.

Stage 2. *Initial online training*: developed students' understandings of peer learning theories and their role as Student Mentors, as well as basic peer mentoring skills related to the establishment of peer learning relationships and interpersonal/communication skills. Students' responses to online activities included in initial online training were employed to further determine students' suitability for Student Mentoring roles, and to inform face-to-face initial training activities. Successful candidates were invited to participate in face-to-face initial training.

Stage 3. *Face-to-face initial training*: last stage of the recruitment process, and second stage of initial training. It aimed to further develop peer mentoring skills introduced in the previous stage, with an emphasis on role boundaries, enquiry-based and hands-on activities (e.g. role-plays).

Stage 4. *Ongoing learning and development (blended model)*: weekly development workshops conducted online and face-to-face.

The next sections describe and discuss the development of the online components of the recruitment and training program summarised above.

### **3. Online recruitment strategies: Student Mentors' motivations and expectations**

Students engage in PAL programs as Student Mentors for a variety of reasons, including intrinsic and extrinsic motivation factors. Recruiting students whose role expectations, attitudes towards peer learning, and motivations to become a mentor align with peer learning principles is a foundational aspect of successful PAL programs (Rodrigo et al., 2014). Moreover, recruiting students who can understand and adapt to the varying demands and complexity of the Student Mentor role is key to the success of training and ongoing learning strategies for Student Mentors. Even though the peer learning literature often cites successful outcomes for PAL programs, it cannot be assumed that Student Mentors will always display learning behaviours associated to effective peer learning (Ashwin, 2003). This section discusses the impact of students' motivations and role expectations on peer learning dynamics and outcomes, as well as strategies to recruit students whose motivations and expectations align with the pedagogical principles of peer learning.

Students' role expectations may clash with peer learning program objectives, acting as a barrier to further developing students' peer mentoring skills (Mackey, Kamphoff, & Armstrong, 2010). Previous research studies show that students participating in PAL programs as Student Mentors may hold con-

flicting expectations about their role; in particular, regarding role boundaries around helping and supporting students (Capstick, 2004). Holt and Berwise (2012) argue that, despite the increasing presence of peer learning schemes in higher education, students' knowledge of peer learning pedagogical principles can be quite limited – partly due to students' inexperience as active participants in peer support programs or unrealistic representations of the Student Mentor role (Holt & Berwise, 2012). In some cases, role expectations may be unclear or non-explicit, an issue related to difficulties to define the Student Mentor role within specific role boundaries (Brown et al., 2014). Students' role expectations may also clash with peer learning principles and pedagogical foundations. For example, Christie (2014) found that peer mentors can hold expectations of themselves as context experts, resulting in content reteaching rather than knowledge facilitation in PAL programs.

In addition to role expectations, students' attitudes towards peer learning and motivations to become a mentor can also influence peer learning dynamics and outcomes. A number of motivational factors underpin students' decision to participate in PAL: personal gain and educational improvement (opportunity to improve their knowledge on subject areas) would be examples of intrinsic motivation factors, whereas money or time retributions (e.g. in the form of study credit) would illustrate extrinsic factors that motivate students to become Student Mentors (Pariser, 2012). The peer learning literature has examined the role of motivation in voluntary and paid PAL programs, assessing differences in Student Mentors' behaviours based on intrinsic and extrinsic motivation factors. PAL programs that reward Student Mentors with money or study credit can attract students with extrinsic motivations that may not always align with peer support principles. Voluntary programs, on the other hand, can be more successful in attracting students with internal motivations related to learning development and skill acquisition, albeit less successful in engaging students in long-term Student Mentoring programs (mainly due to students' other work or personal commitments). Motivation factors can affect Student Mentors' attitudes towards mentoring, choice of learning activities in PAL, persistence and program retention. For instance, Karcher, Nakkula, and Harris (2005) found that Student Mentors who hold extrinsic motivations are more likely to discontinue their participation in peer mentoring relationships.

Assessing students' motivations and role expectations prior to engaging in peer learning is a crucial aspect of the recruitment stage. This data can be used not only for recruitment purposes (e.g. to select students with specific attributes and motivations), but can also inform initial training and ongoing development opportunities. For instance, if Student Mentors share specific beliefs about the peer mentor role (or related role boundaries), PAL educators can implement activities to help Student Mentors develop role expectations better aligned with program objectives and role boundaries, or to reinforce behaviours and skills needed to maintain role boundaries within peer learning principles in complex situations. The online recruitment program described in this paper aimed to assess students' peer mentoring qualities, role expectations, attitudes, and basic understandings of peer learning. Table 1 summarises tasks included in the online recruitment stage, their connection to peer learning effectiveness, and further links to initial training and ongoing development opportunities. In assessing students' motivations and role expectations about peer learning, the online recruitment process aimed to ascertain peer mentoring affective dimensions (Ten Cate & Durning, 2007). That is, students were asked to reflect on their own reasons for embarking on peer learning. Students also learned about the basic principles and pedagogical foundations of peer learning, and were asked to elaborate on their understandings of the responsibilities and tasks inherent to Student Mentoring roles. A crucial aspect of the online recruitment process was the assessment of students' video presentations. As part of their online recruitment application, students uploaded a short video presentation of themselves, and were asked to describe previous situations when they helped someone with a learning task. These videos helped the SSSL team assess not only candidates' communication skills, but also their ability to help others and reflect on effective strategies when supporting other learners.

**Table 1.** Online recruitment tasks for Student Mentors.

Task description	Peer learning aspect	Connection to training and ongoing development
Watch videos on peer learning programs: philosophy and underlying principles	Set up initial expectations and understandings of peer learning	Informs training on Student Mentors' motivation and expectations
Reflect on first year students' learning needs	Understanding of students' needs and ability to establish peer mentoring relationships	Expanded in initial training and ongoing development
Describe understandings on peer learning: what makes a good Student Mentor	Assess students' role expectations and understandings of peer learning principles	Expanded in initial training and ongoing development
Student to upload video on reasons for becoming a mentor, and description of a situation when student helped others	Ascertain intrinsic/extrinsic motivations to embark on peer learning	Intrinsic motivations are role-modelled in initial training and ongoing development
	Help-seeking behaviours: ascertain students' understanding of processes involved in supporting others	Help-seeking behaviours are further developed in ongoing development activities
Student to upload video on reasons for becoming a mentor, and description of a situation when student helped others	Assess students' communication skills relevant to interpersonal communication in peer learning contexts	Interpersonal communication skills are role-played in initial face to face training, and further developed in ongoing development workshops
	Assess metacognitive awareness in student through description of processes involved in supporting others	

#### 4. Initial training: The flipped classroom approach

Peer learning researchers and educators identify initial training as critical to the success of PAL programs (Bates, 2014). Training provides Student Mentors with the skills, strategies and self-confidence to address students' learning needs, as well as the ability to adapt learning/mentoring strategies according to students' changing needs. Moreover, training can address specific peer mentors' expectations and attitudes that could potentially have a negative impact on learning dynamics and outcomes for students. Since many students participating as Student Mentors may have limited experiences or knowledge of peer learning, providing them with accurate depictions of the role of peer learning within academic support strategies is typically one of the main objectives for initial training programs. Most PAL schemes described in the peer learning literature emphasise the importance of training peer mentors prior to engaging in peer learning interactions; fewer studies, however, have described specific content and activities included in initial training programs. The diversity of programs that employ peer learning and peer support mechanisms has resulted in a variety of initial training programs for Student Mentors. Despite content differences in training programs, dependent upon PAL program structures, most training strategies aim to educate students in peer learning educational objectives and pedagogical principles, developing students' communication skills, ability to establish effective learning interactions with students, and techniques to facilitate knowledge acquisition rather than content reteaching (Lundmark, Paradis, Kapp, Lowe, & Tashiro, 2017).

Initial training activities directed to the enhancement of Students Mentors' knowledge of the pedagogical principles of peer learning serve as a foundation for role expectations, identity, mentoring relationships, and mentoring/ learning interactions within PAL. The peer learning literature emphasises the need for clear role expectations for both student/mentees and Student Mentors participating in PAL programs (Brown et al., 2014). In particular, Student Mentors need to develop clear understandings on how effective learning interactions with students look like, and what role expectations and role boundaries underpin successful peer learning dynamics (Holt & Berwise, 2012). In addition to role expectations and peer learning principles, Student Mentors need to develop specific skills to build effective peer mentoring relationships and engage with students in fruitful learning collaborations. Such skillset includes knowledge on students' learning needs, how to encourage independent learning skills, and role modelling of study skills and learning behaviours linked to deep learning outcomes (Garcia-Melgar, East, & Meyers, 2015).

The initial training program described in this paper followed a constructivist approach, in line with peer learning principles. Accordingly, learning activities focused on co-construction of knowledge and shared understandings of peer learning and how to effectively work with students to support their academic development. The main objective of the online initial training module was to scaffold initial peer mentoring skills, and further develop students' knowledge on the pedagogical foundations of peer learning. In addition to role expectations and boundaries (topics that were further expanded in ongoing learning development strategies), content included in the online component of the initial training program was selected based on factors related to peer learning effectiveness - as described in the peer learning literature. In particular, concepts of congruence or similarity between students (Student Mentors and students/mentees) were employed to inform online training topics and activities (Lockspeiser, O'Sullivan, Teherani, & Muller, 2008).

Congruence between students participating in PAL programs is a defining characteristic of effective peer learning relationships (Ten Cate, van de Vorst, & van den Broek, 2012). Initial training (and ongoing development strategies by extension) aimed to develop Student Mentors' skills to establish and maintain two types of congruence with students: social and cognitive. Whilst social congruence refers to perceived similarities between students - and allows for the development of trust and empathy when students learn together - cognitive congruence represents Student Mentors' ability to work within cognitive reach of students and employ language and explanations suitable to students' current cognitive development (Lockspeiser et al., 2008). Cognitive congruence relates to Vygotsky's zone of proximal development, as cognitive and developmental similarities between students allow experienced students (acting as peer mentors) to identify learning gaps in students/mentees and provide expert scaffolding - as defined by Vygotsky (Ten Cate & Durning, 2007). In this online training program, social congruence skills were enacted through interpersonal and communication skills related to the provision of empathy and a non-judgmental learning environment. Both types of congruence were developed through activities included in initial online training, namely: activities to develop students' understanding of the zone of proximal development and its application to peer learning contexts; and role modelling of interpersonal communication skills, with an emphasis on the development of trust, rapport and empathy with students.

Our initial training program for Student Mentors included two components: a generic online module for all Student Mentors, and a face-to-face training day specific to each Student Mentoring program. In training Student Mentors prior to commencing their roles, we followed a flipped classroom approach. Flipped learning is one of the most commonly used blended learning strategies in higher education, connecting online and face-to-face learning strategies with the objective of helping students acquire foundational knowledge and reinforce concepts through online learning activities to be completed prior to attending face-to-face sessions. Flipped learning approaches allow students to engage in more active and student-centred learning activities in face-to-face sessions, while online strategies are typically employed to establish or reinforce concepts needed to fully participate in face-to-face activities (Cheng, Ka Ho Lee, Chang, & Yang, 2017; Lyons, Limniou, Schermbrucker, Hands, & Downes, 2017).

The initial online training module – which took students approximately 3 hours to complete - further developed content previously introduced in the online recruitment stage, and aimed to equip Student Mentors with preliminary understandings of social cognitive theories underpinning peer learning, basic peer mentoring relationship skills, and the extent and boundaries of their role within academic support services in particular and the university context in general. Face-to-face training allowed Student Mentors to put into practice those skills learned during online training, develop nuanced understandings of their role and expected learning interactions, and further discuss role boundaries with fellow peer mentors. Table 2 describes content and activities included in the online component of the initial training stage, as well as activities to develop and consolidate students' knowledge, skills, and attitudes. Connections between online and face-to-face learning strategies contributed not only to the development students' peer learning knowledge (through a flipped classroom approach), but also informed content and activities to be included in face-to-face training through the analysis of Student Mentors' responses to online learning activities. For instance, we analysed students' shared expectations and beliefs about the role of peer mentors, and designed face-to-face activities that dealt with common role misrepresentations - or reinforced positive peer mentoring attributes through role-modelling and group practice. Likewise, students' responses to online activities on the applications of the zone of proximal development to peer learning (one foundational educational theory in PAL) informed face-to-face activities that employed such understandings to put peer learning theory into practice. Thus, face to face initial training activities provided Student Mentors with opportunities to practise and expand skills and knowledge covered in online initial training, or to reconsider their understandings of the peer mentor role.

**Table 2.** Content areas and examples of activities included in online initial training.

Content area	Peer learning aspect	Activity example
Facilitating knowledge: zone of proximal development	Cognitive congruence	Watch video and relate to examples of applications of the zone of proximal development to students' life/previous learning experiences
Building relationships and engaging with students	Peer mentoring relationships	Written responses to peer learning scenarios: how would they build relationships with students in different contexts? What strategies would they use in each context?
Communication skills in peer learning contexts	Social congruence	Watch video on questioning techniques; complete interactive quiz on uses of questioning in different Student Mentoring scenarios
Peer learning and practices of empowerment	Peer learning pedagogical principles	Read journal article and reflect on the role of peer assisted learning programs in higher education

## 5. Ongoing development strategies: A blended learning approach

Peer learning roles are inherently developmental; that is, Student Mentors need to develop and refine peer mentoring skills as they gain experience in constant interaction with students. The complex nature of peer mentoring also has implications for role boundaries, which may need to be defined and redefined as Student Mentors work with students. Colvin and Ashman (2010) argue that even in programs with established training programs, assumptions about how Student Mentors will enact their roles cannot be

made. Hence the need to provide Student Mentors with ongoing learning opportunities. Student/mentees' requests can also influence peer learning dynamics and, consequently, learning quality and outcomes. Such requests can be influenced by factors external to the PAL program environment, such as assessment due dates (Ashwin, 2003). As peer mentoring relationships evolve and change over time, Student Mentors are exposed to different challenges that can compromise their ability to maintain successful peer learning partnerships with students (Garcia-Melgar et al., 2015). Previous research on PAL programs shows that program deviations from learning objectives (or diminished results such as low quality learning outcomes for students) cannot be overlooked (Mackey et al., 2010). A valuable strategy to monitor and implement program changes as challenges arise is to equip Student Mentors with advanced mentoring skills to respond to such challenges. In order to provide ongoing development opportunities to accommodate Student Mentors' changing developmental needs, the SSSL unit grouped online and face-to-face ongoing learning activities into categories, following a similar approach to that described in the initial training stage. We first divided ongoing development content for Student Mentors into generic and program-specific skills. A second categorisation involved assessing content suitability to online and/or face-to-face delivery. A constructive alignment approach underpinned this process (Lueg, Lueg, & Lauridsen, 2016). Firstly, we assessed whether learning objectives would be best achieved through online or face-to-face learning activities. A second step implied considering how assessment of learning objectives would be conducted, based on students' demonstrations of skill and knowledge acquisition through practical and problem-based activities. Again, we assessed the suitability of online and face-to-face strategies in relation to Student Mentors' learning acquisition; that is, we considered what learning environment (online or face-to-face) could be employed to evaluate learning outcomes in Student Mentors.

Content included in ongoing learning activities aimed to develop Student Mentors' skills to provide shared learning guidance when interacting with students and, eventually, enhance independent learning. In a shared learning guidance context, students retain responsibility for their own learning as they progressively develop more complex skills with the support of the Student Mentor (Ten Cate, Snell, Mann, & Vermunt, 2004). A shared learning guidance model can prevent situations where Student Mentors may re-teach concepts or become too directive when providing support, diminishing opportunities for self-regulation and independent skills acquisition in students receiving support. Shared guidance, however, can fluctuate during peer learning relationships as challenges arise, and student requests change due to external pressures such as looming assessment dates. Student Mentors need to be skilful in detecting variations in the shared guidance/facilitation of knowledge continuum, and address deviations that could result in learning behaviours less conducive to deep learning outcomes in student/mentees. In order to enhance Student Mentors' ability to develop and maintain shared learning guidance environments, weekly development workshops (conducted both face-to-face and online) focused on developing skills to assess students' previous knowledge, employ a myriad of questioning techniques, and build role boundaries around knowledge facilitation. In addition to strategy-building, blended learning workshops developed Student Mentors' skills to support students within affective (e.g. enhancing students' intrinsic motivation to learn) and metacognitive domains (role-modelling effective study and learning skills). For example, some online workshops taught Student Mentors about motivation theories and how different motivation factors can affect students' attitudes towards learning. Student Mentors then had the opportunity to practise strategies to support students with different learning motivations in subsequent face-to-face sessions.

Face-to-face and online learning activities included in weekly development workshops were based on active learning principles and co-construction of knowledge. Problem-based and enquiry-based learning were foundational to most activities. For instance, Student mentors were presented with real situations or challenges present in peer learning contexts, and were asked to role-play or provide reflections on how they would react through the application of skills and knowledge learned in face-to-face and online workshops. Enquiry and problem-based learning approaches enhanced opportunities to apply communication and pedagogical skills, and maximised opportunities for knowledge transfer and application to

other learning situations by Student Mentors. Online learning strategies included in weekly workshops also emphasised the creation of online communities of learning and knowledge sharing, together with students' individual reflection processes. In this regard, Student Mentors shared their experiences in weekly online discussion forums (relevant to the topic covered each week; for example, learning styles), or were asked to submit individual reflections on their experiences with students that demonstrated how they had applied skills learned in developmental workshops.

Table 3 describes examples of content and activities included in this blended learning approach to further developing students' skills and knowledge, indicating relations to peer learning theories or PAL effectiveness and examples of activities.

**Table 3.** Content areas and examples of activities included in online development workshops.

Content area	Relationship to effectiveness/ peer learning theories	Online activity example(s)
Interpersonal and communication skills	Social congruence	Students complete interactive module on communication skills based on person-centred approach to teaching and learning. Students then upload video role-playing communication skills learned in workshop
Learning theories	Cognitive congruence, facilitation	Students assess own learning styles (as a concept to understand students' learning needs and potential preferences) using multi-response quiz, reflect on how to adapt peer learning strategies to students' needs and preferences
Understanding students' learning needs	Social congruence, empathy, development of peer learning relationships	Students read article on low SES students and respond to short answer questions on impediments to learning and how PAL can enhance student achievement and engagement
Motivation and help-seeking behaviours	Motivations to participate in PAL	In groups, students develop strategies to encourage help-seeking in specific student cohorts (either face to face, or using online discussion forums)
Role boundaries	Student-mentees' role-expectations, challenges	Students are presented with different scenarios that can compromise role boundaries, and asked to provide strategies (synchronous or asynchronous task). Scenarios are presented as mini-workshops.
Facilitating knowledge and questioning techniques	Cognitive congruence and shared learning guidance	Students watch video on questioning techniques used in the classroom, and develop their own questioning techniques to respond to peer learning scenarios. Students then evaluate/provide feedback on other students' strategies.
Metacognitive awareness	Role-modelling	Students complete an online module on motivation to learn, and attributional styles and beliefs. Students then use discussion forum to report on motivation factors and styles observed when interacting with students.
Peer learning theories	Understanding importance of role	Students find and read journal articles on peer learning in higher education.
Career development	Transferability of skills, further opportunities, student satisfaction	Students read examples of key selection criteria responses, identify skills developed in Student Mentoring role to draft cover letter and key selection criteria responses



An important aspect underpinning the design of blended developmental learning strategies for Student Mentors was the need to respond to students' varying needs over the course of each PAL program. Consequently, content was scaffolded and adapted to Student Mentors' needs in specific weeks of the semester, as mentoring relationships evolved or student/mentees' requests changed in response to the university learning environment (assessment tasks being a clear example). Such scaffolding contributed to the integration of generic and program-specific skills, as well as online and face-to-face activities. This blended learning approach provided the necessary flexibility to adapt learning activities to Student Mentors' busy study schedules, allowing SSSL staff to select content topics and activities based on what peer learning skills would be most necessary during specific semester times. Generic peer learning skills were particularly relevant during the first weeks of the semester, whilst program-specific skills suited Student Mentors' learning needs during central weeks of the semester (once Student Mentors had developed clear understandings of their role). Later in the semester, online learning strategies provided the flexibility that mentors needed when they became busier with their own academic studies.

## 6. Conclusion and further recommendations

Online learning strategies and online communication tools have the potential to enrich and transform PAL programs. In addition to breaking down time and distance barriers when training and recruiting Student Mentors, online technologies offer PAL educators new opportunities to develop valuable skills and knowledge in students providing peer support. This paper has described the process of implementing online learning strategies to recruit and train/develop Student Mentors at Victoria University, discussing links to relevant online learning and peer learning theories. Online recruitment strategies aimed to assess students' motivations to become a peer mentor and their understandings of the Student Mentor role; as such, the online recruitment stage also established initial expectations in Student Mentors and helped develop basic understandings on the role of peer learning within academic support units in higher education. Initial training strategies were based on a flipped classroom approach, allowing more practice time in face-to-face sessions as the initial online training module introduced content on communication skills, peer learning theories, and other relevant aspects of the Student Mentoring role. In this regard, online initial training served to alleviate time constraints during initial face-to-face training, and allowed Student Mentors to develop basic skills to fully participate in the face-to-face component of their initial training. Weekly development workshops followed a blended learning approach, and provided the flexibility to adapt content to Student Mentors' developmental needs over the semester. Encouraging students' active participation was a key element of the online development workshops described in this paper, as students participated in enquiry-based activities that required the application of problem-solving skills specific to peer learning contexts.

This paper has discussed how peer learning and online learning theories can be integrated to provide Student Mentors with a cohesive online training and recruitment program. A central element of this program was the connection between recruitment and training/development stages (e.g. recruitment responses were used to inform training activities) and the progressive scaffolding of peer learning skills as Student Mentors gained experience in the role. Suggested areas of improvement relate to student engagement with online learning and the integration of online strategies with face-to-face learning activities. To improve students' engagement in the online components of training and recruitment programs, PAL educators and researchers could employ synchronous online learning technologies to provide Student Mentors with real-time hands-on activities based on peer learning scenarios. As for the integration of online and face-to-face learning strategies, PAL educators could experiment with the implementation of diverse online and face-to-face learning pathways. For example, Student Mentors could complete an online interactive module, then attend a face to face session to practice relevant skills and, finally, post an online reflection on how they had applied or planned to apply those skills to actual peer learning contexts. Such approach could also increase Student Mentors' engagement with the online component of the training program, allowing for more opportunities to learn and practise core skills in online and face-to-face environments. Further research on online recruitment and training/development

strategies could document how Student Mentors engage in online and face-to-face activities, how these contribute to achieving differential learning outcomes, and what program elements contribute to Student Mentors' engagement in online learning.

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## Chapter 9. Discussion and Conclusions

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Peer learning based pedagogies in part owe their existence to an underlying assumption that peer learning works. Yet the processes that enable success remain under-theorised and under-researched. Researchers have argued that previous peer learning research has focused on identifying and evaluating learning outcomes for students, overlooking processes underpinning such outcomes. Although many researchers have attempted to provide evidence of the effectiveness of Peer Assisted Learning (PAL), less attention has been paid to the nature of learning within PAL and how it promotes student learning (Tamachi et al., 2018). Within PAL literature, the term *black box* has been used to reflect the limited knowledge about PAL processes and, in particular, interactions between students and how they confer learning benefits (Nora & Crisp, 2007). My review of the literature (Chapter 2) revealed knowledge gaps in the development and maintenance of peer learning relationships and associated student outcomes: (a) factors underpinning and affecting student engagement in PAL, (b) interactions between students within PAL programs; and (c) peer learning processes enabling academic and social gains for participating students. Such gaps in PAL knowledge – referred to as the PAL black box – were expanded to include more than the inner workings (i.e. interactions between students) to consider mediating and interrelated factors. Addressing such gaps to gain process-based understandings of PAL is needed in order to advance peer learning theory and practice.

This thesis comprises five papers that cumulatively propose, apply, and refine a framework of effective peer learning relationships in PAL. This work addresses calls from peer learning researchers for greater understandings of ‘how’ and ‘why’ PAL works (Nora & Crisp, 2007; Riese et al., 2012). In this thesis, I have introduced and applied a conceptual framework to study peer learning relationships that integrates peer learning and help-seeking theory to generate process-based understandings of PAL functioning. I use this discussion to enhance the focus on peer learning dynamics – which I have referred to as the PAL relationship. My thematically linked papers map mentor-mentee relationship qualities and interactions that underpin effectiveness in peer learning. Here, I highlight thematic linkages between papers to explain PAL dynamics and the underlying relationship between participants. This discussion contributes to revealing the inner and outer workings of the peer learning black box.

In this discussion, the conceptual model developed in Chapter 4 (Paper 1) and expanded in Chapter 5 (Study 2) provides the framework I use to examine outcomes from Chapters 5, 6 and 7 (Studies 2, 3 and 4, respectively), with Chapter 8 (Study 5) presenting a practical application of the

conceptual framework to the recruitment and training of mentors in PAL programs. I continue with a revision of the framework for effective peer learning relationships, from this point referred to as the PLR framework, to consider the cumulative influences that oblige amendment to the original framework. In the final sections of this chapter, I use the revised framework to highlight processes and dynamics that underpin academic and social gains for participating students. I conclude with a discussion of implications for the implementation of PAL programs in higher education and further research avenues to expand process-based understandings of peer learning. To begin, a summary of main findings from publications contextualises this discussion.

### **9.1. Summary of Key Findings**

Paper 1 (Garcia-Melgar, East, & Meyers, 2015; Chapter 4) introduced the PLR framework, in which it was proposed that the relationship between peers (or mentor and mentee) represents the foundation of peer learning processes and dynamics. I used the review of the PAL literature to identify the theoretical frameworks underpinning the conceptual framework. Within mentor-mentee relationships, congruence between participants defined characteristics of successful mentoring relationships. Differentiating between social and cognitive congruence provided the impetus to investigate and validate their effects on relationship dynamics and, consequently, on academic and social outcomes. Four scenarios that depicted variations in social and cognitive congruence, and their impact on outcomes and mediating variables, were presented. In Paper 1, variables were discussed at the intrapersonal (motivation, metacognition) and interpersonal levels (variables external to the peer learning relationship, such as those associated with learning or institutional environments), and their influence on peer learning dynamics.

In Study 2 (Garcia-Melgar, Meyers, & East, under review; Chapter 5), the theoretical foundations of peer learning examined in Paper 1 (Garcia-Melgar, East, & Meyers, 2015) were expanded to include the role of motivation constructs – based on the importance ascribed to motivational variables in the PLR framework. Help-seeking theory was applied to frame students' motivation for seeking academic support from peers in PAL. Motivation constructs employed in help-seeking research (such as self-efficacy, goal orientation, attributional style) and help-seeking behaviours were measured in students seeking support in a drop-in PAL program. This study was the first to differentiate between adaptive and executive help-seeking behaviours in students participating in PAL programs, with the aim of better understanding motivations and behaviours when seeking help from fellow students. Most students participating in the drop-in PAL program reported adaptive help-seeking behaviours, and their motivational profile matched that of adaptive help-seekers (i.e. high self-efficacy, mastery goals, and positive attitudes towards the role of effort and help-seeking in academic success). These findings suggest that students who attend PAL share

motivational profiles that may already predispose them to succeed at university. Students who self-identified as executive help-seekers, on the other hand, were more inclined to endorse performance goals and focused on lower level academic tasks – mainly related to assessment completion. Overall, students who participated in this study reported often engaging in adaptive help-seeking behaviours. A proportion of students, however, identified themselves with a combination of executive help-seeking behaviours and a motivational set that could interfere with the acquisition of independent and transferable learning skills in PAL learning environments. On the basis of findings from this study, it was proposed that peers could support students in their transition from executive to adaptive help-seeking behaviours through metacognitive role-modelling and scaffolding.

Study 3 (Garcia-Melgar, East, & Meyers, under review; Chapter 6) investigated peer congruence and mentoring strategies within a drop-in PAL format with the aim of improving higher education students' academic literacy. This study explored a more recent iteration of PAL that was designed to provide students with more flexibility when seeking academic support, compared to curricular PAL programs, through drop-in sessions. This study compared mentors' and mentees' perceptions of factors underpinning congruence, expectations about PAL and support requested, as well as mentoring strategies reported by mentors. Mentors and mentees held different perceptions about the type of support students requested, with mentors depicting mentees as expecting the program to be an assignment editing service – contrary to students' self-reported expectations more aligned with independent skills development. I argued that students' expectations and requests for prescriptive advice can jeopardise objectives and intended outcomes of PAL programs. In addition to documenting mentors' strategies to establish and maintain social and cognitive congruence in their mentoring relationships, findings of this study suggested that modelling effective help-seeking behaviours for students was an important aspect of the peer mentors' role. Cognitive congruence was depicted in mentors' ability to present information in accessible ways and their understanding of students' academic difficulties. Students' perceptions of mentors' accessibility, compared to that of university and academic staff, played a major role in students' decisions to seek help from peers over academic staff. The analysis of students' perceptions of factors underpinning effective interactions with mentors revealed the existence of two constructs aligned with social and cognitive congruence, and provided further detail about how students perceive and understand congruence in PAL.

In order to extend the analysis and findings of Studies 2 (Chapter 5) and 3 (Chapter 6), I conducted a path analysis to investigate the relationship between motivation constructs, help-seeking behaviours directed to PAL, and student perceptions of congruence with PAL mentors<sup>1</sup>. The aim of

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<sup>1</sup> The results of this analysis have been included as an addendum to chapters 5 and 6

this analysis was to determine the predictive value of motivation and congruence perceptions over students' adaptive and executive help-seeking behaviours. Results showed that congruence had the most predictive value, over and beyond motivation constructs: in particular, cognitive congruence perceptions were related to both adaptive and executive help-seeking behaviours. A further exploration and discussion of the outcomes of this path analysis is included later in this chapter.

Study 4 (Garcia-Melgar & Meyers, 2020; Chapter 7) examined the development of peer learning relationships within an online peer mentoring program between university and secondary school students with the objective of increasing students' interest and engagement in Science, Technology, Engineering, and Mathematics (STEM) disciplines. This study contributed to research on online PAL formats as strategies to extend peer learning benefits to students who may not be able to participate in face-to-face programs. The aim of this study was to monitor and investigate the development and use of social and cognitive congruence building strategies through mentors' accounts of their interactions with mentees. In addition to applying the PLR framework to a cross-age and cross-institutional program, an aim of this study was to evaluate the influence of technology on the quality of learning outcomes. Findings showed that mentors struggled to establish and maintain mentor-mentee cognitive congruence, suggesting that peers and near peers (i.e. students who are one or more years senior to their mentees) differ in their ability to employ this type of congruence. Whilst university mentors managed to build social congruence with their secondary school mentees using an online communication platform, cognitive congruence proved more difficult to maintain. The online mentoring environment presented in this paper, which included synchronous audio and video communication between participants, allowed mentors to establish rapport with their mentees to enhance student engagement in science topics. Mentors reported that they employed strategies to seek mentees' active input and feedback, highlighting the participatory nature of the online peer mentoring program investigated in this paper.

Study 5 (Garcia-Melgar, 2018; Chapter 8) draws together thematically linked papers via examination of processes required to enact learnings from this thesis to recruit and train mentors in the ways of congruence. This study described an online and blended recruitment and training program for peer mentors in higher education. The program aim was to provide training and further learning opportunities to mentors using variables associated with effective peer learning relationships – as described in the proposed PLR framework. To do so, online and blended learning approaches were employed to recruit and train students to participate as peer mentors in a variety of higher education PAL formats. In particular, peer mentors were trained before and during their participation in the programs in the use of social and cognitive congruence, managing students' motivations and help-seeking behaviours, and employing metacognitive skills and language



appropriate to the objectives of the PAL program in which they were participating. This study illustrated how the proposed PLR framework discussed herein can guide recruitment of peer mentors to create and align their expectations and motivations with peer learning pedagogical principles. Training and ongoing development strategies described in this study exemplify how PAL educators can provide peer mentors with the necessary skills and knowledge to build and maintain effective peer learning relationships with students and maximise learning outcomes for all participants.

## **9.2. Revised Conceptual Framework for Peer Learning Relationships**

In this section, I synthesise understandings of the proposed framework applied to PAL and consider the inter-relationships between variables and concepts included in the framework. Specifically, the twofold objective is to (1) revise and refine the conceptual framework; and (2) suggest opportunities to increase effectiveness when implementing and researching PAL programs in higher education. Three themes guide the revision of the model:

1. enacting social and cognitive congruence in PAL,
2. interactions between students' help-seeking behaviours and peer congruence, and
3. factors influencing quality of learning in PAL.

I start with a discussion of study findings that lead to revisions in the conceptual framework, in particular, revised understandings of the role of congruence and interactions between help-seeking and congruence. I then use the revised framework to highlight processes and dynamics underpinning quality of learning outcomes for PAL participants.

### **9.2.1. PAL Relationships: Enacting Social and Cognitive Congruence**

Previous research acknowledges the pivotal role of mentor-mentee similarity in peer learning, referred to as the similarity/attraction paradigm (Ensher & Murphy, 1997; Terrion & Leonard, 2007). The proposed PAL framework situates social and cognitive congruence as central elements of effective peer learning relationships. Despite the importance ascribed to congruence in the literature, attempts to operationalise these concepts have been scarce. This thesis contributes further understandings on the nature of peer congruence through the analysis of mentors' and mentees' perceptions and experiences of congruence in PAL. Applying social and cognitive congruence concepts to the study of peer learning interactions in two PAL programs illuminated several mechanisms through which congruence is enacted in peer interactions. Furthermore, applying the study of congruence to two PAL program formats allowed for the analysis of differences in the establishment of congruence between cross-age and same or similar age participants. Role and synergies between each type of congruence are discussed next, followed by discussion of differences

observed in congruence establishment between the two cohorts of peer mentors I studied. I use this discussion to clarify congruence concepts and define them through mentors' and mentees' experiences of congruence in peer learning relationships.

#### 9.2.1.1. *Social and Cognitive Congruence: Role and Synergies*

References to social and cognitive congruence in the peer learning literature suggest that these are conceptualised as parallel processes associated with specific learning dynamics and outcomes: that is, each type of congruence accomplishes specific functions within peer learning. Social congruence relates to the social/psychological exchange between peers, and its presence in the mentoring relationship produces feelings of attachment, empathy, trust, and socio-emotional support (Chng, Yew, & Schmidt, 2011). Cognitive congruence refers to the achievement of cognitive tasks and program educational objectives (Dioso-Henson, 2012), such as the transaction of knowledge and skills needed to succeed at tertiary level in the drop-in program presented in Study 3. Social and cognitive congruence would thereby represent parallel processes that allow peers to achieve socio-psychological and educational outcomes as distinctive functions, respectively, with role-modelling being the third mentoring function by product of both the social and cognitive domains (Crisp & Cruz, 2009). In fact, social and cognitive congruence processes likely reflect a dichotomy between instrumental and psychosocial goals described in the peer learning literature (Terrior & Leonard, 2007), and the two levels of interaction within peer relationships: cognitive exchange and social-psychological.

Evidence from Studies 3 and 4 (Chapters 6 and 7), however, suggests that social and cognitive congruence may represent a continuum, rather than occur discretely or as individual processes, as originally proposed in the PLR framework. Whilst initial findings of the factor analysis conducted with data from congruence items point to the existence of two distinct constructs, mentors' accounts of strategies to establish and maintain learning partnerships with their mentees revealed overlaps between the two types of congruence. Social and cognitive congruence would function as interconnected processes, in a similar fashion to Wentzel's conceptualisations of social and academic goals in educational contexts (Hancock, 2004; Wentzel, 1991). Synergies between social and cognitive congruence strategies extend Wentzel's arguments that relate social and academic goals as intertwined processes that facilitate student learning. In Wentzel's hierarchical goal model, social goals would foster academic goals while, concurrently, academic goals would positively impact on social goals. Likewise, mentors' strategies directed towards the establishment of one type of congruence would also enhance the other type of congruence.

Synergies between types of congruence were particularly observable in the development of online peer learning relationships in Study 4 (Garcia-Melgar, & Meyers, 2020), perhaps due to

characteristics inherent to online communication environments. Online peer mentors may have found opportunities to establish interpersonal warmth and enhance similarity with mentees through shared cognitive and educational interests, compensating for the lack of face-to-face interaction. Mentors reported strategies to get to know their mentees (both their personal and scientific interests) as highly important. These strategies built social and cognitive congruence, as mentors were able to establish rapport and develop trust with their mentees, but also gained in-depth knowledge about their mentees' scientific interests and current level of knowledge. The use of strategies to ascertain mentees' scientific and personal interests, thereby, provided mentors with a pathway to both social and cognitive congruence. In this scenario, since mentors were based at different education institutions and were at different education levels, feedback gathered on mentees' current knowledge and interests allowed mentors to gain a better understanding of knowledge gaps for mentees, and use those opportunities to extend and enrich students' scientific knowledge and interests that existed.

Table 9-1 below summarises synergies between social and cognitive congruence that mentors reported in both Studies 3 and 4 (Chapters 6 & 7).

Table 9-1

*Proposed synergies between social and cognitive congruence*

Strategy	Function (overlap between social and cognitive domains)
Asking for mentees' input	Adjust content and explanations to mentees' social and academic interests/needs
Understanding mentees' scientific interests	Establish rapport with mentees (social) and adjust content and explanations to students' interests (cognitive)
Understanding mentees' learning difficulties	Establish rapport, trust and empathy with students (social); provide adequate explanations and resources (cognitive)
Being approachable	Establish open, non-judgmental learning environment (social); disclose learning gaps which are then addressed by mentor (cognitive)

### 9.2.2. Peers and Near-Peers: Differences in the Establishment and Maintenance of Congruence

Diverse definitions of the term *peer* abound in the PAL literature, but the existence of shared learning and social experiences between students seems to underpin many of the definitions found in the literature. For some PAL researchers, peer mentors need to have the same educational status as the student-mentee, whilst other researchers acknowledge that more academically experienced or senior (i.e. in the last years of their degree) students can still be classified as peers, given that they have recently experienced the same educational experiences as their student-mentees (Latino & Unite, 2012; Topping & Ehly, 2001). Senior students, however, may be best described as near peers: although they share or have shared similar experiences, their current status as students is not that of an equal. The two groups of mentors included in this thesis represent variations in the degree of *peeriness*. Mentors in Study 3 (Chapter 6), who were senior students sharing the same educational institution as their mentees, would be considered to be closer peers than mentors in Study 4 (Chapter 7), who not only were advanced students, but also studying in a higher education institution (compared to their mentees, who were at high school level).

The cross-educational level nature of the two PAL programs presented in this thesis was shown to affect mentors' capacity to establish, nurture, and retain social and cognitive congruence. In Study 3 (Chapter 6), mentors shared similar educational experiences as their mentees, given their status as current university students, which enhanced the likelihood of congruence. Mentor reports of congruence in Study 4 (Chapter 7) suggest that they built social congruence naturally with mentees, which was independent of the actual similarities in age and experiences of mentor and mentee. Conversely, cognitive congruence was not present consistently in situations of a significant age/experience gap between mentor and mentee. University peer mentors in Study 4 described difficulties in working within the cognitive reach of their mentees, who were secondary students in middle years. Mentors experienced difficulties in pitching the information to their mentees' educational level, finding topics suitable to mentees' knowledge of science topics, and maintaining mentee interest and engagement. Although most mentors who participated in Study 4 were skilled in monitoring students' interest and engagement, not all possessed the cognitive flexibility necessary to adapt their explanations to mentees' learning needs and cognitive development, quite possibly due to the gap in knowledge and development between them and the students (Lockspeiser et al., 2008). Although cognitive congruence is considered a defining characteristic of peer learning (Ten Cate & Durning, 2007), distant peer mentors (i.e. in relation to mentees from a cognitive and learning experiential point of view) may experience challenges in achieving cognitive congruence. Accordingly, it is important to consider whether students participating in PAL are peers or may more accurately be considered as near peers.

The combined analysis of mentors' experiences in Studies 3 and 4 suggests that the peeriness quality is based on the existence of current shared educational environments and experiences (or the recentness of these experiences) rather than students' age or past experiences. Shared learning experiences and environments would provide an advantage to peer mentors (Topping, 2005), such as those who participated in Study 3, as they would trigger and maintain perceptions of peer congruence throughout peer learning interactions. This group of mentors was able to relate to mentees' learning difficulties and needs, exemplifying mentoring by more academically developed peers in the same institution. Although mentors who participated in Study 4 were selected based on their ability to relate to students' experiences and promote science interest and academic achievement, their comparatively more advanced cognitive development may have posed barriers to establishing and maintaining effective cognitive congruence. It is argued in this thesis that peers need to be within congruence reach of each other, reflecting Vygotsky's concept of the zone of proximal developmental (Ross & Cameron, 2007). Congruence would allow students to establish relationships based on mutual respect and trust (thereby maintaining peer learning principles in relation to egalitarian relationships), but also for the development of high-level order skills, based on mentors' higher cognitive development (Stigmar, 2016). I have also proposed that a new peer category in PAL— *distant* peers – reflects the characteristics of more academically developed students (often in cross-institutional programs) who are still within cognitive reach of their mentees, provided they are able to effectively employ social and cognitive congruence strategies.

To this point, I have discussed revised understandings on the role and nature of social and cognitive congruence within PAL relationships. In the next section, I establish links between congruence and help-seeking theory that serve to further refine the PLR conceptual framework.

### 9.2.3. Links Between Help-seeking and Congruence: Predictors of Adaptive and Executive Help-seeking

Throughout this thesis, I have employed help-seeking theory and peer congruence constructs as the basis of the proposed conceptual framework on peer learning relationships. When applied to the two PAL programs I investigated, these constructs were analysed independently in relation to the specific research questions guiding each study included in this thesis. I use this discussion to explore interactions between students' perceptions of peer congruence and their reported help-seeking goals, with the objective of strengthening links between key concepts included in the PLR framework. To that end, I explore factors – including peer congruence – that predict each type of help-seeking behaviour. I discuss the implications of the results of Structural Equation Modelling (SEM) analyses conducted with data on adaptive and executive help-seeking behaviours reported by students in the drop-in PAL program presented in Studies 2 and 3.

Collectively, both path analyses (adaptive and executive help-seeking) suggest two key findings in relation to the relationship between congruence and help-seeking behaviours: (1) students' behaviours seem to respond to specific characteristics of the PAL environment, beyond the influence of achievement goal orientations; and (2) the presence of cognitive congruence in PAL relationships does not necessarily correspond with students pursuing adaptive help-seeking goals. Congruence (and cognitive congruence in particular) were found to be better predictors of help-seeking behaviours than any other motivation-related factor. This finding suggests that students' help-seeking goals in PAL are more influenced by perceptions of the characteristics of the students providing support than by their achievement goal orientations. Although social congruence was not included in the final path analysis model due to variations in model fit indices, this type of congruence also showed a strong correlation with adaptive help-seeking. Thus, the presence of expert students who can understand learning difficulties, and are accessible and non-judgmental, would facilitate help-seeking requests that allow students to solve problems independently. This finding provides further evidence of the influence that the characteristics of the source of support – namely, peer congruence – can have over students' goals when seeking help in PAL.

In addition to being a predictor of adaptive help-seeking, cognitive congruence was also found to be a strong predictor of executive help-seeking behaviours. The positive relationship between these two concepts may be partially explained by the nature of the items included in the cognitive congruence scale, as revealed through factor analysis. Since items related to mentors' quality of explanations (adapted to mentees' needs) did not load onto the cognitive congruence factor, the resulting cognitive congruence scale is more focused on mentees' status as expert students and the type of support that they can offer (writing, assessments, succeeding at university). Such characterisation of cognitive congruence may appeal to executive help-seekers, as they would be

able to obtain specific answers from an expert and knowledgeable student. An additional and complementary explanation is that the presence of cognitive congruence does not guarantee that peer learning relationships would revolve around achieving adaptive learning goals. My initial conceptualisation of congruence in the PLR framework assumed that the presence of cognitive congruence is associated with students' adaptive help-seeking behaviours; this assumption is implicit in the conceptual framework as well as in the literature. Whilst the presence of congruence (cognitive in particular) means that mentors are better placed to understand and respond to students' learning difficulties, having mentors and mentees working on the development of independent learning skills guided by adaptive help-seeking goals does not necessarily follow. Rather, peers can be congruent whilst working on more or less adaptive goals, depending on the influence of other motivational factors. This argument is supported by the finding of a relationship between negative attitudes and help-seeking, and the mediating influence of self-efficacy, in the executive help-seeking model.

#### **9.2.4. Revised PLR Conceptual Framework**

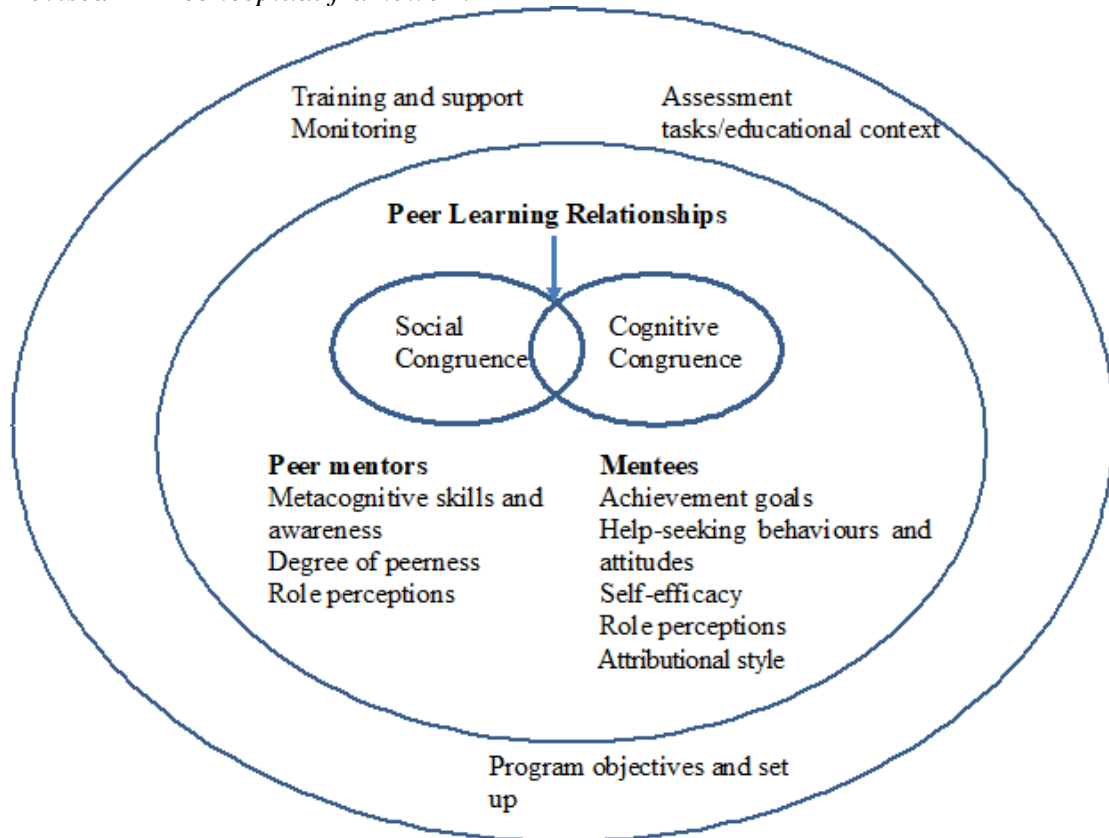
In this section, I summarise revisions to the PLR conceptual framework based on its application to the two PAL programs included in this thesis. I pay particular attention to conceptualisations of social and cognitive congruence within peer learning relationships, interactions between factors included in the model, and their impact on congruence. Figure 9-1 depicts the revised conceptual framework. Moreover, I have chosen to update its format to better reflect processes and characteristics specific to mentors and mentees that influence peer learning relationships and congruence. An outer circle is used to visually represent the influence of external factors over peer learning relationships.

Social and cognitive congruence are represented as overlapping concepts in Figure 9-1, influencing the quality of peer learning relationships. Rather than being inherent characteristics of peers providing support, congruence (cognitive in particular) is influenced by the context of the PAL program, including program objectives, the educational environment in which PAL is situated, and training/support offered to mentors. The degree of peerness, which influences cognitive congruence, is in turn impacted by environmental or external factors. Interactions between mentor and mentee factors and congruence can affect the quality of peer learning relationships. For instance, performance-oriented goals, low academic self-efficacy and negative attitudes towards help-seeking within a learning relationship marked by high cognitive congruence would be associated with students' executive help-seeking behaviours. In contrast, high self-efficacy and mastery-oriented goals in a learning relationship with high social and cognitive congruence would be associated with adaptive help-seeking behaviours. Role expectations are influenced by student perceptions about the source of support – as well as environmental factors, such as support/training provided to the PAL

program – and assessment-oriented environments in which PAL programs operate. Interactions between framework elements and their predicted influence on outcomes for participating students are discussed later in this chapter.

Figure 9-1

*Revised PRL conceptual framework*



A further element of the framework for consideration is mentors' metacognitive skills and its influence on congruence. In the literature, conceptualisations of the nature of cognitive congruence seem to reflect an assumption that it is not only that mentors are cognitively congruent with their mentees, but also that they have the ability to employ such cognitive similarities to positively affect student learning. The positive impact of cognitive congruence, however, needs to be framed within mentors' metacognitive skills and awareness. I argue that cognitive congruence and mentors' metacognitive role-modelling skills are two distinct, yet related, processes. Whilst the degree of peerness seems to act as a precursor to cognitive congruence, based on existing cognitive similarities between PAL participants, mentors need to be able to employ appropriate metacognitive skills to model behaviours and attributes conducive to self-regulation, high learning outcomes, and independent learning in their mentees. Hodgson et al. (2015) argued that PAL interactions have a greater chance to contribute to students' long-term learning development if mentors model metacognitive abilities and students can perceive how these interactions support their learning. Such role-modelling would include the development of metacognitive knowledge and metacognitive



regulation processes linked to self-regulation and higher cognitive learning development (Glynn et al., 2006). When mentors act as role-models in demonstrating metacognitive skills, they promote student questioning, discussion and reflection on learning heuristics, and provide examples of successful learning strategies based on their academic experiences. Metacognitive knowledge is thereby developed through rich interactions with mentors who not only share their experiences, but also actively discuss learning strategies and encourage students to manage their own learning processes (Backer, Keer, & Valcke, 2012; Hodgson, Bearman, & Schneider-Kolsky, 2012).

Despite peer mentors' value as metacognitive role-models (Falchikov, 2011), research shows that mentors do not always engage in learning interactions conducive to metacognitive role-modelling, such as questioning, scaffolding, reflective modelling and feedback (Backer et al., 2011). A known shortcoming in mentors' ability to role-model metacognitive knowledge/skills refers to mentors' limited use of knowledge-building questioning in comparison to knowledge-telling strategies (Roscoe & Chi, 2007). This knowledge-telling bias – that is, mentors' tendency to summarise didactic content rather than engage in content questioning and scaffolding – would result in a decrease in deep learning outcomes for students. In further research, Roscoe (2014) found that mentors' difficulties in engaging in knowledge-building interactions were related to limitations in their ability to self-regulate knowledge-building aspects (i.e. providing appropriate responses to student learning gaps). Therefore, according to the research literature, cognitive congruence between peers may not always translate into the effective use of metacognitive role-modelling. With cognitive congruence, it becomes possible, although not always probable, that mentors will employ effective metacognitive skills and role-modelling that will produce deep and long-term learning outcomes for students. Cognitive congruence would be a characteristic inherent in near peers, but the use of metacognitive regulation and role-modelling may be restricted by peers' limited metacognitive skills. Consequently, if mentors are not able to make metacognitive role-modelling visible in their discourse, such role-modelling can be diminished. Thus, in addition to strategies employed by mentors to establish congruence (i.e. to emphasise similarities in cognitive aspects with students), effective mentors would need to employ cognitive congruence to role-model cognitive skills (King, 1998). To do so, mentors need to be aware of metacognitive language and processes underpinning effective role-modelling to: (a) support the development in students of metacognitive knowledge (methods for achieving specific learning goals and most useful strategies dependent upon learning conditions); and (b) metacognitive regulation of use of learning strategies and academic performance (Hurme, Palonen, & Jarvela, 2006).

To this point, I have discussed how findings from the studies in the thesis can be employed to revise and refine inter-relationships between factors in the PLR framework. I now use the revised

framework to explore how the quality of PAL learning outcomes can be enhanced. Given the process-oriented focus of this thesis, discussion about the quality of learning reflect predicted dynamics based on the framework: that is, how the presence or absence of specific factors can be used to predict expected outcomes. I explicitly focus the discussion on quality of learning on approaches to learning as debates over the potentially strategic nature of learning in PAL still pervade the literature.

### **9.3. Processes Underpinning Quality of Learning Outcomes**

This section provides a discussion of peer learning interactions that result in high quality learning outcomes within peer learning pedagogical principles. Further, there is an examination of how elements of the PLR framework interact to explain peer learning dynamics linked to superior benefits for students.

The first aspect of the conceptual framework to consider is the degree of peerness between peer mentor and student/mentee. As discussed previously, cognitive congruence may not always be available to mentors in PAL. Peer mentors in Study 4 (Chapter 7) exemplified such a scenario, which was attributed to students being distant, rather than near or real peers. Consequently, it was suggested that cognitive congruence may need to be bridged for students to fully benefit from their participation in PAL (Garcia-Melgar & Meyers, 2020).

In addition to cognitive congruence, a second domain of factors with a potentially negative impact on learning outcomes encompasses role expectations, motivations, and factors external to PAL programs, as described in the revised PLR framework. The role of potentially disruptive student expectations about PAL has been extensively examined in the literature, highlighting once again the fragile status of peer mentors as facilitators of knowledge (Brown et al., 2014). Further evidence has been provided in this thesis regarding how participants' expectations, in conjunction with characteristics of the learning environment in which peer learning programs operate, can affect mentoring dynamics. Although mentors in Study 3 saw their role as being one of learning facilitation, mentees expected a more directive approach that included proofreading of work drafts, an expectation probably influenced by looming assessment completion dates. In this regard, if mentees are guided by assessment completion (influenced by learning context) and motivated by extrinsic goals, they would be more likely to expect a directive mentor, potentially resulting in highly strategic learning paired with limited skill acquisition. On the other hand, if mentees are guided by intrinsic goals, they would be more likely to expect mentors to act as facilitators, and learning dynamics would be more conducive to deeper learning outcomes and higher acquisition and transferability of learning skills.

Once issues related to the degree of peeriness, student goals, and expectations about PAL have been addressed (e.g. through training for mentors), it is expected that peer mentors would be more likely to engage in knowledge facilitation and role-modelling of effective skills, attitudes and behaviours. I suggest that effective mentors would progressively develop mentees' skills, following a developmental approach. That is, students who attend PAL progress through a continuum of skills (from surface to deep) as they engage in more learning interactions with peer mentors. The longitudinal evaluation of online peer mentoring interactions in Study 4 (Chapter 7) allowed for the examination of learning processes and outcomes that are not typically captured in end-of-program evaluations. It also showed how mentors progressively employed strategies to provide mentees with opportunities to increase their active participation and gain ownership of session activities. Furthermore, findings from Study 2 (Chapter 5) suggest that help-seeking behaviours are inherently dynamic and best conceptualised as part of a behavioural continuum rather than discrete categories. If conceptualised in this way: (a) students would be able to identify themselves with a combination of adaptive and executive goals, with the latter being less behaviourally consistent and potentially malleable; and (b) peer mentors would be able to employ less adaptive goals or behaviours to model metacognition to progress students through a developmental continuum. In addition, results from Study 3 (Chapter 6) provide further evidence for the developmental nature of the work undertaken by peer mentors in that factors (e.g. help-seeking behaviours) positively associated with student achievement and engagement were mentioned by mentors as important outcomes of peer learning interactions. The existence of such mediating outcomes suggests that mentors were working on foundational aspects to ensure independent and self-regulated learning in students.

A critical area of debate in the PAL literature revolves around the potentially strategic nature of its learning outcomes. I use the idea of mentors working through a continuum of student help-seeking behaviours and goals, and connect it to the provision of contextualised learning in PAL to argue how both strategic and developmental approaches to learning can co-exist in PAL.

#### 9.3.1.1. *PAL Providing a Situated and Contextualised Learning Context*

Recent PAL studies have shown that peers can provide situated learning experiences for students (Tamachi, 2018). Here, I expand on this concept to describe the multi-layered nature of learning experiences within PAL in relation to congruence, mentors' role-modelling, and task-oriented mentoring activities. Firstly, learning would occur through the use of cognitive and social congruence, which allows mentors to understand and address specific gaps in mentees' understanding, and provide explanations and learning opportunities attuned to mentees' current cognitive and social development. Mentors' use of peer congruence would not be restricted to addressing students' immediate needs, but also to medium and long-term academic needs. As

mentors model thinking and metacognitive processes, they help students create connections between the skills and knowledge acquired in peer learning contexts and their applications to other learning or professional contexts (Dawson et al., 2014). Opportunities to acquire valuable social and cultural capital in relation to learning and education are also paramount in peer learning programs, allowing students to progress from novice to expert learners (Arendale, 2014; Gunn, Lee, & Steed, 2016). Thus, successful PAL allows students to become active members of the academic community through the acquisition of critical knowledge and academic language, supported by experienced students (Lave & Wenger, 1991).

Secondly, mentors provide situated learning opportunities in relation to the role-modelling of effective approaches to learning. The relationship between peer learning and approaches to learning acquisition (as defined by Entwistle, 1997) has long been a topic of interest for PAL researchers, although the direction of the impact of PAL on approaches to learning remains unclear. The analysis of the experiences of the mentors who participated in Study 3 (Chapter 6) illustrated a strong focus on assessment tasks during mentor-mentee interactions, suggesting that mentors, indeed, may not work within a deep or meaning-oriented learning approach in all situations. However, I argue that mentors can accomplish deep learning approach objectives in various ways when supporting assessment completion. Mentors' focus on one or other approach (or a combination of) may be affected by the context in which PAL programs operate and the nature of mentees' support requests. These requests tend to be highly focused on assessment completion, as shown in mentors' accounts of learning interactions with students in Study 3. In addition, the academic objectives guiding the implementation of PAL programs can also influence mentors' decisions to work or enhance one or other approach to learning. In this regard, mentors' roles would act as translators of academic literacy conventions for less academically developed students, especially those in a transition phase to higher education contexts (McKenna & Williams, 2017). To accomplish this role, mentors would need to employ assessment tasks as the learning context in which to develop students' academic literacy knowledge. Thereby, mentors' role-modelling of strategic approaches can be an indicator of peer learning success if mentors are providing support for students with specific needs in a learning context dominated by assessment completion. In this scenario, students could increase specific metacognitive knowledge aspects, such as procedural knowledge of specific strategies to succeed in academic assessment tasks, provided that mentors are able to model metacognitive and regulation learning processes in mentees.

If approaches to learning are understood as behaviours and attitudes happening along a continuum, rather than as discrete categories, a strategic approach to learning would not always result in a reduction in learning quality, but rather a progression towards more meaning-oriented

approaches. For example, Backer et al. (2011) found that students were more able to regulate their learning after participating in PAL, although no significant improvements were found in their metacognitive knowledge. The researchers argued that students improved in one aspect of their metacognitive skills (regulation and monitoring), which may eventually lead to better metacognitive knowledge and awareness. Thus, I suggest that mentors can use students' expectations, help-seeking requests, and learning needs as a point of entry to gradually develop more adaptive learning behaviours aligned with deeper approaches to learning and the development of independent learning skills. A focus on peer learning interactions as inherently developmental has implications for how outcomes for students participating in PAL programs are measured. I turn now to discuss contributions of this thesis to PAL implementation and research, including the measurement of impact and effectiveness in PAL programs.

#### **9.4. Implications for PAL Implementation and Research**

In this thesis, I have proposed a theoretical framework of peer learning relationships that can be used to advance peer learning research and practice, and provide enriched training and development opportunities for mentors. Here I discuss implications for the implementation and research of PAL programs in higher education. I use this discussion to highlight directions for future research in PAL, paying particular attention to the measurement of PAL impact and students' engagement and participation in PAL. I conclude with practical recommendations to enhance and extend the implementation of PAL programs in tertiary settings. The following section is a discussion of implications arising from the conceptual framework of effective Peer Learning Relationships (PLR framework) to the measurement of effectiveness in PAL programs.

##### **9.4.1. Measuring PAL Impact and Effectiveness**

In this thesis, I sought a better understanding of the processes underpinning successful peer learning interactions. In addition to investigating the role of congruence and help-seeking behaviours in PAL, my findings raise questions regarding the outcomes that have been measured in previous studies and whether these reflect the most important gains to be acquired in peer learning. An ongoing debate in the PAL literature refers to the measurement of academic or socio-psychological outcomes as most relevant to PAL contexts. A number of researchers, such as Ginsburg-Block (2006) and Capstick (2004), have argued that an excessive focus on academic gains has resulted in social and psychological gains for students being overlooked. On the other hand, other researchers have contended that more sophisticated measures of academic gains need to be obtained, especially in light of studies that show moderate gains or limited skill transferability to learning domains other than the immediate context in which mentors and mentees interacted (Akinla, 2018; Williams & Reddy, 2016). Fewer researchers, however, have questioned whether current measures of PAL

effectiveness can capture medium- and long-term benefits for PAL participants.

If learning with and from peers can lead to the acquisition of skills that facilitate the development of longer-term academic and/or social gains, the study of those mediating skills becomes key to understanding the impact of PAL on students. Moreover, learners may acquire behaviours that they do not demonstrate at the time of learning (Bandura, 1986). Likewise, students participating in PAL can acquire skills and knowledge that are not immediately observable nor transferable to current learning situations. Studies 3 and 4 (Chapters 6 & 7) depicted situations in which mentors and mentees engaged in the development of skills that are foundational to academic success, such as self-efficacy, practical applications of theoretical concepts, and increased engagement with their studies. For instance, mentors in Study 3 reported role-modelling effective help-seeking behaviours in students seeking academic support. Given that help-seeking is a self-regulated learning behaviour, the development of such skill would eventually lead to improved academic outcomes and independent learning skills (Karabenick & Berger, 2013). Studies employing longitudinal methodologies to follow up cohorts of students over time offer the potential to contribute to a more nuanced understanding of mediating variables and incremental gains for students participating in PAL. However, assessing the contributory impact of PAL may not be feasible due to the influence of multiple individual and environmental factors on students' learning behaviours. To overcome this limitation, it is suggested that studies focus on understanding how PAL related outcomes contribute to the acquisition of skills and behaviours critical to academic success over the life course of tertiary education. For instance, learning to actively seek developmental support in the first year of university can reduce student attrition and support engagement and persistence in tertiary studies (Karabenick & Gonida, 2018).

In addition to the inclusion of mediating variables and their contribution to longer-term skills for students, monitoring the quality of the relationship between students as it unfolds can be used as a tool to keep track of the development of PAL learning objectives. Perhaps due to a focus on outcome-based research, the effectiveness of PAL has been traditionally measured once the program has ended; as a result, learning dynamics conducive to student gains during the course of the program and potential deviations from program objectives have usually received little or no attention. End of program evaluations typically focus on changes in key student variables of interest, but rarely if ever on whether the PAL program achieved outcomes aligned with the program's philosophy or designed learning outcomes. A key aspect of monitoring the development of relationships is congruence; considerations on how to continue and refine the measurement of peer congruence are discussed next.

#### 9.4.1.1. *Measuring Congruence.*

Despite the importance ascribed to congruence in the PAL literature, attempts to measure social and cognitive congruence between peers remain scarce. Studies into empirical evidence of congruence in PAL programs have typically employed qualitative methods to describe the role of congruence in these programs (e.g. Tamachi et al., 2018). In addition to limited quantitative or multi-methods studies on peer congruence, definitions of congruence in the literature are often difficult to translate into specific measures of congruence; this is particularly true for social congruence. Whilst cognitive congruence is more readily associated with the zone of proximal development and mentors' ability to work within cognitive reach of mentees, indicators of social congruence are less defined. A number of authors understand social congruence as mentors' readiness to seek relationships with students and to convey a genuine interest in them and their learning (Schmidt & Moust, 1995). This definition, and similar conceptualisations of social congruence by Tamachi et al. (2018), for example, focuses on mentors' motivation and willingness to engage in learning relationships with their peers. Chng et al. (2011) and Lockspeiser et al. (2008) extended this definition to encompass mentors' interpersonal abilities to create a safe, egalitarian, and non-judgmental learning environment where mentees feel more comfortable to disclose their learning gaps and needs.

To explore how social and cognitive congruence are perceived by mentees, I employed indicators of each type of congruence as described in the literature to devise a congruence scale. Results of exploratory factor analysis of data from indicators of effective peer learning interactions (Garcia-Melgar, East, & Meyers, under review) suggest the presence of two underpinning factors, corresponding to conceptualisations of social and cognitive congruence. Further studies are warranted to refine this scale, with the objective of testing whether the two-factor structure remains stable across different samples of mentees. A multi-method approach could shed further light on two initial factor analysis findings: (a) whether mentees value mentors' explanations from a cognitive or social perspective; and (b) what indicators seem to serve both social and cognitive congruence. In Study 3 (Chapter 6), I suggested that mentors' ability to provide accessible or easy to understand explanations was found to load onto the social congruence domain because mentees may have focused on mentors' communicative efforts from a social rather than cognitive perspective: that is, as mentors' ability to communicate in a social learning environment, rather than their ability to adjust their explanation to mentees' learning needs. An alternative explanation is that, since the item required that mentees compare mentors and academic staff, the item loaded to the same domain as other comparative items, such as those measuring approachability (e.g. mentors are easier to

approach compared to academic staff). Further refinements of the scale could be through the inclusion of items that do not ask mentees to draw comparisons between mentors and academic staff. Such refinements may also reveal items pertaining to both social and cognitive domains, such as opportunities for mentees to ask any study related questions in PAL.

In addition to quantitative measures, further studies are needed to extend multi-method measures of mentors' self-reported behaviours to establish and maintain congruence, as well as mentees' perceptions of the value and effectiveness of such behaviours. Table 9-2 below summarises recommendations for the measurement of social and cognitive congruence. In addition, it includes suggested opportunities to extend the measurement of congruence to include comparisons of mentor and mentee perceptions to account for the influence of perceived vs actual (understood as agreement between mentor and mentee) congruence on learning and socio-psychological outcomes.

Table 9-2

*Suggested measurement of mentor-mentee congruence*

Type of congruence	Evidence (behavioural)	Measurement *
Cognitive	<p>Content and explanations suited to mentees' learning needs and level are used by mentors.</p> <p>Continued mentee engagement.</p> <p>Mentor uses own experience, alongside practical examples.</p>	<p>Mentees' perceptions of mentor knowledge (relative to subject or more general skills related to domain of learning), practicality of strategies or appropriateness of explanations.</p> <p>Mentors' perceptions: appropriateness of explanations, variations in student engagement, difficulties in communicating or explaining content.</p>
Social	<p>Empathy and trust are demonstrated</p>	<p>Mentees' perceptions about mentors: non-judgmental,</p>



Type of congruence	Evidence (behavioural)	Measurement *
	Continued mentee engagement	approachability compared to
	Disclosure of mentee learning gaps occurs	academic staff, openness of communication, empathy demonstrated by mentor.
		Mentors' perceptions: trust from mentees, openness, disclosure of learning gaps, rapport between mentor and mentee.

\*Qualitative and/or quantitative methods could be employed

Lastly, further research is suggested into additional synergies between social and cognitive congruence, and the existence of other types of congruence. Although social and cognitive congruence have proven to be defining aspects of PAL, their definitions can be quite broad as they incorporate an array of social and cognitive aspects. A further categorisation of types of congruence could lead to future research on how peers collaborate in PAL settings. For example, if social congruence was to be divided into more specific types of congruence within the social domain (e.g. emotional, or shared educational experiences), researchers could investigate how mentors employ specific strategies to establish trust, empathy, and provide social-emotional support. Likewise, cognitive congruence could be further categorised into discreet aspects within the cognitive domain, such as current educational experiences, or similarities in students' cognitive semantic networks. Moreover, new understandings on peer congruence could lead to the establishment of further synergies between types of congruence, such as the role of shared educational experiences in helping mentors both understand learning difficulties (cognitive domain) and establish rapport with mentees (social domain), or mentors' ability to explain topics in an understandable manner (which could accomplish both social and cognitive/academic purposes). These new understandings could also be employed to strengthen both the quantitative and qualitative measurement of congruence.

#### 9.4.2. Student engagement and participation in PAL

A second area in which research in PAL can be extended relates to understanding the motivations and help-seeking behaviours of students who do and those who do not participate in

PAL programs. Why an important part of the student population chooses not to engage in PAL remains a question in the peer learning literature (Dawson et al., 2014). Despite research evidence that demonstrates that peer learning can be an effective learning strategy, research has indicated that only a small percentage of students choose to engage in PAL programs (Heirdsfield, Walker, & Walsh, 2005) or elect to attend on a regular basis (Allen et al., 2019). Moreover, concerns about who seeks help and the existence of a self-selection bias in students attending PAL remain contested. In this thesis, I have argued that help-seeking theory can provide the basis for inferring processes that may preclude students from their participation in PAL through the examination of characteristics/traits and behaviours of PAL participants. With a body of literature largely based on researching program effectiveness, little is known about the characteristics of those not attending PAL, their help-seeking behaviours and preferred sources of support. Reaching students who do not engage in PAL can be problematic, as these students may be less likely to participate in studies in general. An alternative approach to the study of non-PAL participants is to investigate the motivational profile of participating students and their help-seeking goals in PAL programs in order to infer reasons for not engaging in PAL – although the accuracy of such inferences may be questionable. The application of help-seeking theory to PAL in Study 2 (Chapter 5) showed that students with those motivational profiles associated with increased academic success may be more likely to participate in PAL. To extend the investigation of factors that may preclude student participation in PAL, such as low academic self-efficacy, further studies will need to include students who choose not to engage in PAL. To that end, I suggest that help-seeking theory needs to be firmly embedded in PAL research to guide the measurement and comparison of students' motivations and help-seeking behaviours in both participants and non-participants.

The integration of motivation and help-seeking variables in PAL research requires the combination of qualitative and quantitative methodologies to overcome limitations of the studies included in this thesis. Although quantitative measures proved helpful in assessing students' motivational profiles and help-seeking behaviours (Garcia-Melgar, Meyers, & East, under review), mentors' reports in Study 3 (Chapter 6) provided a contradictory perception of help-seeking requests and the type of interactions that mentors and mentees engaged in. In this scenario, the use of observational methodologies would have provided a third data set against which to compare mentors' and mentees' responses. Moreover, the use of qualitative data when assessing mentees' motivation and help-seeking goals could provide richer insights into how and why they decided to seek help from peers and how these requests were expressed, with the objective of understanding students' engagement in PAL programs. Therefore, triangulating methods and data sources to measure motivation and help-seeking behaviours can help researchers obtain richer data that allow for the analysis of discrepancies across participants.

A combination of observational methodologies and data triangulation could be particularly relevant to the study of students' motivational profile and the existence of a potential self-selection bias for those students accessing peer support. To date, the use of self-reported measures and questionnaires have been limited in allowing students' expectations, learning goals, and motivations – in particular, in peer learning environments – to be discerned. The use of third-party reports (e.g. teachers and lecturers involved in PAL implementation), observations, and the analysis of mentor-mentee interactions (online and physical) could help researchers better discern what guide students to seek support and how their goals, motivations, and expectations are enacted in mentor-mentee interactions.

#### **9.4.3. Recommendations for the Implementation of PAL Programs**

In this section I discuss recommendations to enhance the implementation of PAL programs in tertiary education settings. Following from the previous discussion on student engagement in PAL, here I present strategies to reduce barriers to student participation in PAL programs. A second area of implementation recommendations relates to providing support to mentors to engage in peer learning relationships conducive to academic and social gains for participating students.

Monitoring peer learning relationships could provide PAL program administrators with valuable information to use in mentors' initial and ongoing development. Mentors could be trained in assessing variations in levels of social and cognitive congruence available during peer learning interactions. With knowledge of how variations in peer learning relationships can result in enhanced or diminished learning outcomes for students, mentors would be able to purposefully employ strategies to strengthen their learning partnerships with students. For example, further support to mentors could be provided ad hoc if students' requests for directive advice (influenced by upcoming assessment due dates) challenge mentors' role as knowledge facilitators. Study 5 (Chapter 8) described opportunities to train mentors in strategies to build relationships and promote the acquisition of learning outcomes based on the conceptual framework for effective peer learning interactions. Such strategies were included in both pre-mentoring and semester based learning activities, exemplifying the need to provide mentors with ongoing opportunities to develop mentoring skills and adapt to potential challenges arising over the course of their interactions with mentees (Garcia-Melgar, 2018). In this study I also described monitoring and further support strategies that provide mentors with knowledge and tools to respond to known adverse effects of external and mediating variables. It is important to note that the influence of the environment is exemplified in mentors' and mentees' expectations and goals when participating in PAL programs. These factors fall within the relationship realm: PAL administrators can introduce change (e.g. through training and monitoring activities) to re-align peer relationships within PAL pedagogical

principles. In particular, PAL administrators need to pay more attention to role expectations within PAL relationships. In study 3, I found that mentors and mentees held different expectations about the type of support offered in PAL programs, and argued that expectations about the role of peer mentors can jeopardise PAL program objectives and the development of independent learning skills in mentees. To address this issue, in study 5 I argued that mentors need to engage in initial training and further learning opportunities to gain the necessary skills to establish role boundaries and manage mentee expectations that may conflict with PAL objectives. Here, I extend this argument to suggest that mentees also need to participate in role induction processes (Ellis, Hutman, and Chapin, 2015). Role induction for mentees could involve clear messaging about the type of support offered in PAL, the role of the PAL mentor as knowledge facilitator, and expectations about the role of the student/mentee. These strategies would ensure that students hold clear expectations about their role and that of students providing support before they attend PAL.

In relation to increasing student engagement in PAL, peer congruence could be employed to bridge barriers to engagement in students with low academic self-efficacy or who avoid seeking help for fear of being judged by their peers in social learning environments, such as PAL. Since PAL programs usually employ high-achieving students as mentors, students with low self-efficacy may not seek help in PAL to avoid being judged by more academically developed peers. Programs that emphasise similarities between peer mentors and mentees (e.g. mentors as students in the same course as the mentee) could reach those students more likely to perceive peer learning as a negative social and learning experience. If cognitive and social similarities between students are firmly established as part of the discourse to promote peer learning, then students would be less likely to focus on comparisons between their academic skills and those of their peer mentors. For students with low self-efficacy or ability to appraise their academic skills, a focus on their similarities with students providing support would help them overcome potential fears of judgment. Once students are engaged in PAL, peer mentors could continue to emphasise congruence themes to enable disclosure of learning gaps or academic areas to work on. Congruence established during peer learning interactions would contribute to student retention in PAL, as opposed to perceived initial congruence, which would increase accessibility and visibility of PAL programs.

Increased visibility (e.g. through program marketing and lecturers' advice during lectures/tutorials) and perceived initial congruence may attract and retain students from populations less disposed to participate in PAL. However, the success of these strategies is limited by students' ability to actively seek academic support when needed, alongside limited understandings of the value and effectiveness of PAL programs as sources of support. For students to actively seek PAL support, they need to be exposed to, and benefit from, successful peer learning interactions underpinned by social and cognitive congruence. Embedding programs in the curriculum can engage students who

many not voluntarily attend PAL otherwise. Embedded programs could direct students to learning opportunities in PAL through connections with assessed curriculum or learning objectives of specific subjects. As such, embedded programs can guide students whose help-seeking and learning decision making processes may not be mature enough to actively source support in PAL or other available systems at university. Through making connections in the classroom with PAL, students would be exposed to the benefits of PAL and, thus, more likely to voluntarily engage in out-of-class PAL opportunities, such as the drop-in PAL program described in Studies 2 and 3 (Chapters 5 & 6). Finally, vicarious experiences of students sharing their experiences with PAL mentors would reach other students in the classroom and spark their interest based on perceived congruence with mentors and potential benefits of seeking help.

#### **9.4.4. Limitations**

A number of limitations to this study need to be acknowledged and taken into account when conducting further studies to strengthen and extend the PLR conceptual framework. Firstly, quantitative findings require caution when interpreting because of small sample sizes. These findings are to be interpreted as initial, exploratory findings of the application of the framework; further studies with larger samples of mentors and mentees are warranted in order to replicate and extend findings. Furthermore, predictions based on the conceptual framework could be tested by collecting student outcome data (academic and cognitive, and psycho-social) with the objective of investigating the relationship between model variables and student outcomes.

The application of help-seeking theory to PAL provided a useful conceptual framework to understand students' motivations when engaging in peer learning; however, as noted previously, further research could employ multiple methods and data sources to measure students' motivations and help-seeking goals when seeking support from peer mentors. Moreover, using more specific methods to categorise students' help requests (e.g. as vague or structured, focused on assessments or skill development) would also provide valuable data on how students express requests, what their goals are, and how mentors react and respond to them.

In Study 4 (Chapter 7), mentors' strategies and intentions to make changes to future sessions provided an in-depth overview of how mentors plan and conduct their sessions to maximise student learning and engagement. In order to investigate knowledge internalisation and transfer, measures of the progress and efficacy of mentoring could be collected during sessions, alongside mentors' planned strategies for subsequent mentoring sessions. Further research could measure and compare mentees' engagement and perceptions of mentoring success with mentors' reports, with the aim of pinpointing specific strategies that result in high engagement and student learning.

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Finally, the two PAL programs examined in this thesis represent specific PAL configurations

and, thus, results may not be generalisable to other PAL programs. The sample of students who participated in this study reflect the characteristics of the student population at the university in which these programs were implemented. Further studies could include the application of the PLR framework to PAL programs serving different student populations.

### **9.5. Conclusion**

PAL programs can enrich students' academic experiences through the provision of peer-to-peer support in open, non-judgmental, learning environments that complement traditional academic support strategies. The value of PAL lies in the mutually beneficial relationships established between fellow students, which can have long-lasting positive impacts on students' academic skills, learning strategies, and wellbeing. Despite PAL's long research tradition in tertiary education settings, knowledge of the processes that underlie effective peer learning interactions is still limited. Such knowledge becomes critical to PAL if these programs are to be established as sound pedagogical tools in higher education settings. Two inter-related shortcomings limit the development of PAL: (a) the assumption that it works; and (b) a research focus on proving that PAL programs are effective. Both shortcomings point to the lack of (or limited) conceptual frameworks that support understanding through a basis to explain outcomes of PAL research and inform further research. To address this gap, in this thesis I have proposed and applied a conceptual framework for peer learning relationships that can be used to generate process-based understandings of PAL effectiveness and provide enriched training and developmental opportunities for PAL mentors. The application of the framework to two PAL programs revealed mechanisms through which congruence between peers is enacted, as well as interactions between factors included in the framework and their effects on peer learning interactions.

The framework presented in this thesis provides tools for PAL program administrators to monitor the development of peer learning relationships, assess the impact of potentially disruptive factors, and purposefully implement strategies to support and build mentors' skills. This change in focus, from end of program evaluations to ongoing monitoring, is likely to result in increased opportunities for students to engage in learning interactions conducive to deep learning outcomes. Similarly, a shift from outcome-based to process and outcome research that integrates the factors included in the conceptual framework can lead to more nuanced understandings of the impact of PAL on students and the mechanisms that enable such positive outcomes.

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# Appendices

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## Appendix A. PLA Survey

### What is your area of study?

- ☐ Science, Technology and Engineering
- ☐ Education
- ☐ Health Sciences
- ☐ Humanities and Social Sciences
- ☐ Business, Economics and Law

### Please indicate your Campus

- ☐ Bundoora
- ☐ Bendigo
- ☐ Albury/Wodonga
- ☐ Shepparton
- ☐ Mildura

### Gender

- ☐ Male
- ☐ Female

### What type of student are you?

- ☐ Undergraduate
- ☐ Postgraduate by coursework
- ☐ Postgraduate by research
- ☐ La Trobe Melbourne
- ☐ Tertiary Enabling program

**Please indicate your age**

- ☐ 17-20
- ☐ 21-25
- ☐ 26-30
- ☐ 31-40
- ☐ Over 40

**How long have you been employed as a PLA?**

- ☐ Less than 6 months
- ☐ Less than one year
- ☐ Between 1 and 2 years
- ☐ More than 2 years

**In your opinion, what are the most important reasons why students use the PLA program? Select the most important reasons from the list below and rank them by importance (with 1 being the most important)**

- ☐ They want to improve their grades
- ☐ They want to improve their general academic skills
- ☐ They are afraid they would not pass an assignment
- ☐ They are unsure of something specific and want to double check with a PLA
- ☐ They want to get a students' perspective on an assignment
- ☐ They have asked a lecturer/tutor, but still need extra help
- ☐ Other \_\_\_\_\_

**What are the most frequent areas of support that students request when they use the program?. Select the most frequent reasons from the list below and rank them by frequency (with 1 being the most frequent).**

- ☐ Writing
- ☐ Grammar
- ☐ Speaking
- ☐ Critical thinking
- ☐ Referencing/ acknowledging my sources
- ☐ Essay structure
- ☐ Subject content (e.g. understanding a theory or concept)
- ☐ Exams
- ☐ Literature reviews
- ☐ Numeracy (e.g. maths, statistics)
- ☐ Understanding an assessment task
- ☐ Checking consistency and meaning of their assignments
- ☐ Searching for resources for their assignments
- ☐ Other \_\_\_\_\_

**How do students usually find out about the PLA program? (select all that apply)**

- ☐ Spot PLAs in the Library/ other locations
- ☐ They have used the program before
- ☐ University advertisement on campus
- ☐ They were advised/referred by academic staff (lecturers, tutors)
- ☐ They were advised/referred by university staff (for instance, Librarians)
- ☐ They were advised by a classmate/friend
- ☐ They were advised/referred by a university service staff (for instance, Counselling, Equality and Diversity,...)
- ☐ Other \_\_\_\_\_

**Think about why students decide to seek academic help. Why do you think they choose the PLA service? Rank the following reasons according to your experience with students as a PLA.**

- ☐ Students feel more comfortable talking to a fellow student rather than asking a lecturer
- ☐ Students think that their query would be best resolved by another student
- ☐ Students think that the feedback they receive from PLAs is more practical than that of lecturers/tutors
- ☐ Students were referred by their lecturer/tutor or another university service
- ☐ Students had contacted a lecturer/tutor or another university service but they were not completely satisfied
- ☐ Students find PLAs easier to approach than lecturers/tutors/other university services
- ☐ Students do not know how to contact other University services
- ☐ Other \_\_\_\_\_

**In your experience, what expectations about the PLAs do students usually hold? Select the most frequent reasons from the list below and rank them by frequency (with 1 being the most frequent).**

- ☐ Helpful with assignments
- ☐ Friendly and approachable
- ☐ PLAs read assignments
- ☐ PLAs give honest feedback
- ☐ PLAs have knowledge about subject content
- ☐ PLAs have knowledge about academic writing and study skills
- ☐ PLAs are able to direct/refer students to relevant staff if appropriate
- ☐ PLAs will proofread essays
- ☐ PLAs will correct references
- ☐ Students are unsure of how PLAs can help them
- ☐ Other \_\_\_\_\_

Do you have any comments in relation to students' expectations when they attend the PLA program?

**Thinking about a recent interaction at the PLA desk that you considered successful, describe the strategies that you employed to interact with the student and provide support.**

**Is there any other aspect about the PLA program that, in your opinion, has been effective/positive?**

**How can the program be improved? Please provide three suggestions for improvement.**

***END OF SURVEY***

## Appendix B. Survey for students accessing the PLA program

Thank you for participating in the survey. The information you provide will be very valuable and will contribute to knowledge of higher education students' strategies and preferences when seeking for help related to their studies, and the effectiveness of peer assisted learning programs in providing academic assistance to students. The survey should take around 10-15 minutes to complete, and will include questions about your demographic information, use of the Peer Learning Advisers program, your general motivation for studying at University and your preferred strategies in case you thought you were not performing as well as you wanted to. All responses will be anonymous and no identifying information will be kept.

Q1 What is your area of study?

- ☐ Science, Technology and Engineering (1)
- ☐ Education (2)
- ☐ Health Sciences (3)
- ☐ Humanities and Social Sciences (4)
- ☐ Business, Economics and Law (5)

Q2 Please indicate your Campus

- ☐ Bundoora (1)
- ☐ Bendigo (2)
- ☐ Albury/Wodonga (3)
- ☐ Shepparton (4)
- ☐ Mildura (5)
- ☐ Off campus (6)

Q3 Gender

- ☐ Male (1)
- ☐ Female (2)

Q4 What type of student are you?

- ☐ Undergraduate (1)
- ☐ Postgraduate by coursework (2)
- ☐ Postgraduate by research (3)
- ☐ La Trobe Melbourne (4)
- ☐ Tertiary Enabling program (5)

Q5 Age

- ☐ 17-20 (1)
- ☐ 21-25 (2)
- ☐ 26-30 (3)
- ☐ 31-40 (4)
- ☐ Over 40 (5)

Q6 What is your current year of study?

- ☐ First year (1)
- ☐ Second year (2)
- ☐ Third year (3)
- ☐ Fourth year or more (4)

Q7 Are you an International student?

- ☐ Yes (1)
- ☐ No (2)

Q9 Are you a full time or part time student?

- ☐ Full time (1)
- ☐ Part time (2)

Q10 Please indicate approximately how many hours do you work per week

- ☐ I don't work (1)
- ☐ Between 1 and 5 hours (2)
- ☐ Between 6 and 10 hours (3)
- ☐ Between 11 and 20 hours (4)
- ☐ More than 21 hours (5)

Q11 The following questions ask you about your motivation for studying at University. Use the scale below to answer the questions; there are no right or wrong answers.

My aim is to completely master the material presented in my course (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My goal is to learn as much as possible at University (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important to me that I learn a lot of new concepts this year (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important to me that I improve my skills this year (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My goal is to do better than other students in my class (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My aim is to avoid learning less than I possibly could (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important to me that other students think that I am good at doing university work (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My goal is to avoid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

performing poorly compared to others (7)					
My goal is to perform better than other students (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important to me that my lecturer/tutor does not think that I know less than other students in class (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My goal is to avoid learning less than it is possible to learn (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My aim is to avoid doing worse than other students (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important to me that I do not learn less than what I could learn in this course (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q12 For each of the following questions, please circle the option that corresponds to how certain you are about the following statements as a student:

I'm confident I can do a good job on the assignments and exams in this course (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe I will receive low grades in this course (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am certain I can master the skills taught in class this year (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm certain I can understand the most difficult material presented in this course (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can do almost all the work in class if I don't give up (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe I have the necessary skills to do well in the assessment tasks of this course (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My writing skills are not good enough to successfully complete the	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

assignments of this course (7)  I'm confident in my ability to meet the requirements of the assessment tasks of this course (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Q13 The following questions ask you about you as a university student. Use the scale below to answer the questions; there are no right or wrong answers.

If I try hard enough, then I will understand the subject content (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is really difficult to improve one's academic skills (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Getting good grades depends more on one's intelligence than on effort (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe I can improve my grades if I work hard (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q14 Suppose you were going to seek for help for your studies, what would be your primary goal?

Ask someone who could help me understand the general ideas or concepts, rather than just get the answers (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understand what I could do to improve my work so that I can keep improving my skills (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make it easier for me to finish this course (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Get feedback on my work so that I can keep learning (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Get a straight answer on what to do or change in my work to get a better grade (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Get someone to go through my work and revise it (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q15 The following questions ask you about your opinion about seeking help for your studies in general, including asking lecturers or tutors, other students or academic support services. Please indicate your level of agreement with the following statements:

I believe that it is normal to seek for help at university at some point (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would think less of myself if I couldn't do my course work without help (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think that asking for help can be very helpful (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Getting help with my studies would be an admission of my lack of ability (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Getting help with my studies would be an admission of my ignorance (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would prefer that my lecturers/tutors did not find out that I asked for help (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would not be concerned if my classmates found out that I asked for help (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q16 Indicate approximately how many times you have used the PLA program

- ☐ Between 1 and 5 times (1)
- ☐ Between 6 and 10 times (2)
- ☐ More than 10 times (3)

Q17 What was the main reason for using the PLA program? (select all that apply)

- ☐ I wanted to improve my grades (1)
- ☐ I wanted to improve my general academic skills (2)
- ☐ I was afraid I would not pass this assignment (3)
- ☐ I was unsure of something specific and wanted to double check with a PLA (4)
- ☐ I wanted to get a students' perspective on this assignment (5)
- ☐ I had asked my lecturer/tutor, but needed extra help (6)
- ☐ Other (7) \_\_\_\_\_

Q18 Last time I talked to a PLA, they helped me with... (select all that apply)

- ☐ Writing (1)
- ☐ Grammar (2)
- ☐ Speaking (3)
- ☐ Critical thinking (4)
- ☐ Referencing/ acknowledging my sources (5)
- ☐ Essay structure (6)
- ☐ Subject content (e.g. understanding a theory or concept) (7)
- ☐ Exams (8)
- ☐ Literature reviews (9)
- ☐ Numeracy (e.g. maths, statistics) (10)
- ☐ Understanding an assessment task (11)
- ☐ Checking consistency and meaning of my assignment (12)
- ☐ Searching for resources for my assignment (13)
- ☐ Other (14) \_\_\_\_\_

Q19 Approximately, what is/was the due date for the task you sought help for?

- ☐ This week (1)
- ☐ In one week (2)
- ☐ In two weeks (3)
- ☐ In more than two weeks' time (4)

Q20 How did you find out about the PLA program?

- ☐ Spot them in the Library (1)
- ☐ I have used the program before (2)
- ☐ University advertisement on campus (3)
- ☐ I was advised by academic staff (lecturers, tutors) (4)
- ☐ I was advised by university staff (for instance, Librarians) (5)
- ☐ I was advised by a classmate/friend (6)
- ☐ I was advised by a University service staff (for instance, Counselling) (7)
- ☐ Other (8) \_\_\_\_\_

Q21 What were your expectations about the PLAs before you approached them? (select all that apply)

- ☐ Helpful with assignments (1)
- ☐ Friendly and approachable (2)
- ☐ They would read assignments (3)
- ☐ They would give me honest feedback (4)
- ☐ They would have knowledge about subject content (5)
- ☐ They would have good knowledge about academic writing and study skills (6)
- ☐ They would direct me to relevant staff if appropriate (7)
- ☐ I was unsure of how they could help me (8)
- ☐ Other (9) \_\_\_\_\_

Q22 When I talk to a PLA/use the PLA program, my primary goal is to:

Ask someone who could help me understand the general ideas or concepts, rather than just get the answers (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understand what I could do to improve my work so that I can keep improving my skills (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make it easier for me to finish this course (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Get a straight answer on what to do or change in my work to get a better grade (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Get feedback on my work so that I can keep learning (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Get someone to go through my work and revise it (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q23 The following question asks for your opinion about peer assisted learning programs (programs where students provide assistance to other students). Please rate your level of agreement with how well the PLA service has performed for each of these statements.

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
The student who helps knows how to succeed at University (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The student who helps is knowledgeable about subject content (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The student who helps is knowledgeable about academic writing (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The student who helps knows strategies to improve assignments (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can ask any study-related question (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The student who helps can explain topics in a manner that is easier to understand compared to my lecturer/tutor (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The student who helps is	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



non-judgmental (7)					
The student who helps is easier to approach compared to lecturers/tutors (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The student who helps seems to understand what type of difficulties students may have (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PLAs are available when I need them (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q24 Would you use the PLA program in the future?

- ☐ Yes (1)
- ☐ No (2)

## Appendix C. Mentors' weekly post-mentoring questionnaire



### EMentor weekly reflective task

1. Your ID

2. Provide a summary of the mentoring session and topics discussed. Please include:

- key items of discussion
- student participation and engagement (e.g. did all students participate? did they ask many questions?) - challenges, if any
- reminders for next mentoring sessions- if any
- what specific things you would do to improve next session

3. The following list includes strategies<sup>1</sup> that mentors can use to establish effective mentoring sessions. Please indicate how important they were in your last mentoring session. You can also add more strategies under 'Other' if they are not in this list.

---

<sup>1</sup> Note: hover-over descriptors were provided for the following:

Using practical examples: for example, connecting science topics with real life examples or applications

Using interest examples to raise interest/engagement: for example, using examples that connect with mentees' scientific interests or aspirations

	Not at all important	Not important	Neutral	Important	Very important	Didn't apply
Asking students what they'd like to discuss/do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Asking students about their science interests	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Talking to students about my school experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Talking to students about my university experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Talking about my interests and aspirations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing them with science resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Explaining science topics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using practical examples	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using interesting examples to raise interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Showing students study strategies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Talking about my own challenges when learning science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Talking about science career opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (please specify)	<input type="text"/>					

6. Please indicate your agreement/disagreement with the following statements about your last mentoring session.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I feel that the mentoring relationship is getting stronger	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel distant from my mentee(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel frustrated about how mentoring is going	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel like my mentee(s) and I have a strong bond	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My mentee(s) is/are willing to learn from me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe my mentee(s) is/are benefitting from mentoring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. How easy was/were the student/s to talk to today?

- ☐ Very difficult
- ☐ Difficult
- ☐ Neutral
- ☐ Easy
- ☐ Very easy

## Section 2: Mentors' pre-mentoring placement questionnaire

1. Why did you choose to become an In2science eMentor? (select all that apply)

- ☐ To gain experience in schools
- ☐ For career development purposes (e.g. improve my resume)
- ☐ To inspire passion for science
- ☐ To apply my knowledge of science in schools
- ☐ To help students in regional/rural settings
- ☐ Other (please specify)

2. The following statements ask you about your current mentoring skills. Please indicate your level of agreement or disagreement.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I feel prepared to mentor students with different levels of engagement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm confident in my skills to maintain mentoring role boundaries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that I can inspire interest in science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel prepared to help students with their science topics/homework	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm confident that I'll make a difference in students' motivation to learn science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel prepared to be an online science mentor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. Mentors and mentees can engage in a variety of tasks and discussions. How would you prefer to spend your mentoring sessions with your students? Select all that apply.

- ☐ Helping them with their homework
- ☐ Explaining science topics/theories
- ☐ Talking about life at uni
- ☐ Discussing science careers and educational opportunities
- ☐ Talking about my degree
- ☐ Other (please specify)

4. What are the main challenges you expect to find in your eMentoring placement?

## Appendix D. Human Ethics Approval

Committee	Application Number
La Trobe University ASSC (Arts, Social Sciences and Commerce) Human Ethics Sub-Committee	E15/110
La Trobe University SHE (Science, Health and Engineering) Human Ethics Sub-Committee	S16-124

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