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Peer-pairing sessional staff in a large first year Science unit as a form of supportive academic development

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Abstract

This study evaluated how the pairing of sessional teaching staff in a large first-year undergraduate science subject provided context-specific professional development for sessional teaching staff. We used a likert-scale questionnaire to ask sessional staff to rate how effectively peer-pairing in the classroom contributed to a range of teaching skills and capacities. Irrespective of the level of teaching experience, all sessional teaching staff rated the pairings as very beneficial to extremely beneficial for support with subject content. Lesser-experienced peers also found the pairings to be very beneficial to extremely beneficial for developing classroom management and student interaction techniques. This evaluation of peer-pairing in a large first-year science subject demonstrates the strategy can be an effective means of providing teaching development opportunities for sessional teaching staff, and facilitates particular teacher-student interactions to engage students in discipline-based discourse about their learning and their transition to university life

Keywords

first-year science, sessional staff, large classrooms, peer-pairing

Introduction

Sessional teaching staff carry at least half, or in most circumstances, the majority teaching load for undergraduate classes in Australia, the United States, the United Kingdom, France, Germany and Japan (Bryson 2013; Coates & Goedegebuure 2010; May, Strachan & Peetz 2013; Dolinsky 2013; Jacoby 2006). Consequently, the educational experience of first-year students is largely shaped through interactions with teaching staff who may also be in a state of transition to, or in the early stages of an academic career (Kift 2003). The casualisation of teaching staff shows no signs of abating and in fact is likely to increase (Marshall 2012). The Benchmarking Leadership and Advancement of Standards for Sessional Staff project, or BLASST, establishes criteria for good practice standards in supporting sessional teachers (Harvey 2014). One key standard in the Framework is to support sessional teachers through the facilitation of teaching teams (Criteria 1.3c, BLASST Framework, p. 4) where good practice includes sessional teachers being 'involved in teaching teams in order to debrief, plan and share good practice, and, collaborate in the development of learning and teaching strategies as well as mentoring and team-building' (BLASST Framework, p. 4). While many examples of good practice exist in Australian faculties, there is also evidence of a lack of systematised standards of support for sessional teachers (Savage & Pollard 2016). For subject coordinators, it is sometimes necessary to create a localised, collegial structure to support sessional teachers that address standards such as those described in the BLASST Framework. We suggest that co-teaching (or as we prefer, peer-pairing) is an example of a supportive collegial structure that meets the BLASST Framework of good practice.

In this paper, we present a qualitative evaluation of a peer-pairing model for sessional teachers in a first-year science subject at an Australian university. We took an interpretive, constructivist viewpoint (Schwandt & Gates 2018) for our case study in order to apply a framework consistent with the 'good practice' BLASST Framework (Harvey 2014) and consistent also with privileging the voices of sessional teachers in the evaluation of the peer-pairing model. The focus of the evaluation is the sessional teachers' perception of the strategy as a form of supportive professional development that helps them reflect on their classroom practice. Success of the initiative therefore lies with the voices of the participant sessional teachers – did they believe peer-pairing facilitated reflection about teaching and learning practice, and, did they believe students benefitted from the peer-pairing structure? For the purposes of this paper, we refer to our participants as sessional teachers. However, across Australian universities they are known as casual staff, graduate teaching assistants, and sessional academics, and as adjunct faculty and temporary faculty in the United States. In the United Kingdom the term is often 'part-time teachers' (Savage & Pollard 2016).

Retaining first -year science students

Our desire to support sessional teachers' teaching practice development is related to the well-established challenges students face in first-year science courses. In particular, we set out to increase the number and quality of interactions between sessional teachers and their students. Successful transition for first-year students is strongly correlated with the extent of their intellectual involvement with their learning, and this has been attributed to the quality of interactions they have with academic staff (Krause & Coates 2008). Therefore, supporting students in transition is likely to be more effective within the students' chosen curriculum program, where they expect to interact with their teachers, than via support services. While support services outside the degree course are potentially helpful, they are separate to a student's enrolled curriculum. As Kift (2009) argues, 'The curriculum is what the students have in common, is within our institutional control, and is where time-poor students are entitled to expect academic

and social support and engagement' (p. 9). Teaching strategies that increase the opportunities for interaction between teachers and students such as a peer-pairing approach are supportive of the types of interaction first-year students find important.

A teaching challenge for university teachers is facilitating purposeful interactions with and between a very diverse cohort of students within the course's curriculum. In 2011, the introduction of demand-driven places at Australian universities was a positive equity and access policy initiative. However, the data indicates that increased participation by students with low Australian Tertiary Admission Rank (ATAR) entry scores, students studying part-time, and students studying online has resulted in an increased non-completion rate (Norton, Cherastidtham & Mackey 2018, p. 31). There are issues within disciplines that also have an effect on the involvement of first-year students in scholarly interactions. For example, many students in North American universities, who intend to major in STEM fields, do not end up doing so. (Bradforth et al. 2015). We believed that introducing a peer-pairing approach could increase the opportunity for students to engage in discipline-based discourse about their learning with their subject teachers, and that this may in turn help to improve students' desire to continue beyond their first year of study. Bradforth et al. also point to didactic teaching methods as a likely cause of poor retention, suggesting that the adoption of improved teaching methods has been slow. While many sessional teachers are experienced and skilled in active and enquiry-based pedagogies, some will be teaching for the first time. We took the Australian Council of Deans of Science guide to evidence-based teaching and learning practice as our definition of active and enquiry-based pedagogies:

- Students are asked to construct their own interpretation of core concepts
- Pose problems and challenges that require students to review their own understanding through application. (Overton & Johnson 2016, p. 10).

We saw peer-pairing as a direct strategy for developing evidence-based teaching and learning practices that impact positively on the students' learning experiences.

Peer-pairing as a method for developing teaching practice

There is a significant body of research about co-teaching a higher education class but definitions of the term in the literature are quite broad. They relate, but are not specific to, peer-teaching, and include peer-lecturing (Burden, Heldal & Adawki 2012), co-teaching or collaborative teaching including curriculum-writing (Chanmugam & Gerlach 2013; Bouck 2007; Crow & Smith 2005), and team-teaching (Hanusch, Obijiofor &Volcic 2009; Wenger & Hornyak 1999). Lester & Evans (2009) note studies relating to team-teaching are often evaluating a teaching method suitable for interdisciplinary courses (Robinson & Schaible 1995; Shibley 2006; Vogler & Long 2003). The study of these interdisciplinary teams provides insights into what academics learn about pedagogy from the experience of team-teaching. Carbone's evaluation (2015) of a peer-assisted teaching program describes two co-teaching structures: a mentor and mentee relationship, and, a reciprocal co-member partnership. Both co-teaching strategies in Carbone's study were supported by a university-wide, collegial framework.

Our model of peer-teaching (called peer-pairing in this paper) is more closely linked to studies relating to co-facilitation of teaching (Cohen & Delois 2012) where the authors examined the potential of co-facilitation in a class setting for role modeling an effective group-leadership relationship to students, and, for contributing to professional development of teachers. Roth & Tobin (2002) argue shared facilitation of a class is a method to reduce the distance between espoused theories of teaching and the lived experience within each teaching context (as each class

of students and what is learned is unique in context). They described their co-teaching model as two teachers experiencing classroom events 'not as "flies on the wall", that is, as outside observers, but from a similar perspective and under the same constraints as our fellow co-teachers' (p. xii).

Quinlan and Akerlind (2000) stress that recognition of disciplines is of primary importance within each faculty and noted an emerging literature on discipline-specific aspects of teaching. Consistent with notions of localised theories and discipline-specific instruction is Luft et al.'s study (2004) that found content instruction in biology (for example) is insufficient in the teaching development of sessional teachers: pedagogical content knowledge and curriculum knowledge are required. Sessional teachers benefit from learning instructional methodologies to better facilitate an alignment of discipline knowledge with knowledge about how to design learning within the specific discipline.

The co-teaching model described by Cohen & Delois (2012) and Roth & Tobin (2002), and the emphasis on discipline-specific pedagogy described by Luft et al. (2004) more closely reflect the intention of our peer-pairing model, and specifically, stresses the reflection in, and on action, as described in Schon's work (1983) within a professional discourse community. Of immediate concern for us was to create a community of practice 'composed of individuals with similar goals (who) can support one another' (May et al. 2011, citing Rogan 2007). Pairs of individuals who are focused on the same learning group are, however, likely to experience tensions on the issue of power. Issues of power and expertise are 'universal in a collaborative setting' (Ferguson & Wilson 2011, p. 52). In response to this expected outcome, sessional teachers were encouraged to reflect on their own capacity to articulate the positive intent and 'likelihood of growth inherent in having two people in charge' (Ferguson & Wilson, p. 63). In particular, through peer-pairing we intended to increase teaching and learning dialogue that allows sessional teachers 'to have thoughts they could not have on their own' (Game & Metcalfe 2009, p. 45). We focused on providing a structure that helped sessional teachers to develop their professional knowing while teaching (in action), and, help them to analyse after their teaching (on action); did the structure develop their professional knowledge to judge the learning outcomes and what teaching adjustments were effective, or not? (Schon 1983).

With this in mind, we suggest that peer-pairing of teachers to teach in the same class provides opportunities to work collaboratively to formulate understandings about the practical knowledge of teaching, or, teaching praxis. Smith and Winn (2017) cite a number of studies (Chanmugam & Gerlack 2013; Ferguson & Wilson 2011; Graziano & Navarrete 2012; Kluth & Straut 2003; Simpson et al. 2012; Tobin 2014) that find co-teaching benefits collaboration, problem-solving, creativity, feedback, encouragement, and motivation in teaching (p. 437). As such, peer-pairing provides opportunities for professional development that is highly valued in good teaching practice development but is offered rarely to sessional teachers. These benefits are also consistent with the scholarship of teaching where, in addition to being scholarly, 'teaching needs to be public, open to critique and evaluation, and part of a comprehensible model for colleagues and a continual development of practical techniques'(Barnard et al. 2011, p. 436)

The teaching context

This paper reports on a peer-pairing initiative, undertaken in an ecology and the environment subject at an Australian university. This is a core first-year subject for approximately 800 students, with usually equal numbers of students enrolled in either science or education degrees. The subject is taught through two face-to-face lectures per week and one face-to face seminar per fortnight.

Online support is provided through a discussion forum, with the subject coordinator engaging with students frequently each day throughout trimester, as well as a range of supporting online video tutorials.

There are substantial challenges associated with capturing the interest of all students in the classroom. For example, the subject lies outside the education faculty curriculum of pre-service teachers, and prior levels of science education can vary widely amongst this cohort. By pairing sessional teachers with diverse educational backgrounds and levels of prior teaching experience to teach bi-weekly seminars, we aimed to provide professional development for sessional teachers and optimise the learning experience for our students. This study is a qualitative exploration of sessional teachers' experience of peer-pairing and whether they perceive benefits to their teaching practice.

There were ten peer-pairing combinations of sessional teachers. Our rationale for the pairings was based on two elements: subject knowledge and pedagogical experience, as these were identified by ourselves and the participants as practical points for differentiation. Firstly, we considered the level of prior teaching experience. Secondly, we established whether the sessional teacher had prior experience teaching the subject, or had completed the subject as an undergraduate student within the last three years. Consequently, the pairings comprised:

A more experienced sessional teacher, with either more than three years' tertiary teaching experience, or more than ten years teaching experience paired with an equally experienced sessional teacher who had less experience teaching the subject,

A more experienced sessional teacher with either more than three years' tertiary teaching experience or more than ten years' teaching experience, paired with a less experienced sessional teacher with up to two years' teaching experience.

One pairing comprised a sessional teacher with two years' tertiary teaching experience paired with a sessional teacher with less than one year of experience, but for both peers, they had been paired earlier in the teaching week with a more experienced colleague and both peers had either prior experience teaching the subject, or had taken the subject as an undergraduate student within the last three years (and therefore had successfully mastered subject content).

Research methodology and approach

In this study, we were concerned with identifying the impact of a teaching and learning intervention on sessional teachers in an ecology and environment subject teaching team. We focussed on sessional teachers' perception of value of the teaching intervention. As such we adopted a case study methodology to enact and analyse a single instance, that is, the teaching and learning intervention, 'within its normal context' (Taber 2014). Essential to our case study methodology concerned with the lived experience of the informants in order to construct greater understanding of the phenomena (Stake, 1978) was the development of a theoretical framework to guide our case study. As a result of our goal to create a community of practice (Wenger E 2010) that would enact BLASST principle 1.3c involved in teaching teams in order to debrief, plan and share good practice, and collaborate the development of learning and teaching strategies as well as mentoring and team-building (Harvey, 2014), we were concerned with privileging the narratives of the informants themselves (Hyett et al 2014) where the informants' voices (the sessional teachers) were of primary importance to the case study. As such our priority reflected an interpretive viewpoint that is 'constructivist in the sense that …the world (is) socially made' and 'historically-situated and entangled in power relationships' (Schwandt & Gates 2018). We chose a data collection method consistent with an interpretive, constructivist framework where issues of power between the researchers and the informants could be reduced through the sessional teachers evaluating their own historical teaching experience, and, evaluating the value of the intervention.

Key words in the BLASST Principle 1.3c – 'share, collaborate, mentor, team-building' (Harvey 2014) are consistent with a community of practice and as such, we required our research methodology and data collection method to be consistent with facilitating sessional teachers' agency.

While the outcomes of the teaching and learning innovation in this case study are of singular importance for this one context, the case study does intend to contribute to a more extrinsic generalisability. This case study might be 'epistemologically in harmony with the reader's experience and, thus to that person a natural basis for generalisation' (Stake 1978, p.5). It is certainly the intention of the researchers to contribute to the literature on strategies for implementing standards relating to the BLASST Framework (Harvey, 2014).

Methods

Within the boundaries of the case study, the research focused on investigating how pairing of sessional teachers in a large first year science classroom (up to 65 students) contributed to development of their teaching practice. At the end of the teaching trimester, sessional teachers teaching into the subject were invited to participate in a survey, comprising eleven questions requiring qualitative responses. The first three questions identified how many years' experience they had teaching the subject, teaching in a tertiary setting, or other teaching experience. Respondents were then asked to use the framework established by Nyquist and Wulff (1996) identifying three stages in sessional teacher development. These stages are:
Stage One - Senior learners: identify more with students than faculty but have a stronger knowledge base than students. Senior learners are concerned about evaluation of their teaching and their teaching performance.
Stage Two - Colleagues in training: at this stage sessional teachers develop their interest in teaching skills and methods.
Stage Three - Junior Colleagues: Sessional teachers at this stage recognise themselves as fellow members of the faculty and are concerned with the impact they have on student learning and engagement.
In question four, sessional teachers were asked to rank themselves with respect to each of these stages on a five-point Likert scale, with one being a low level of identification and five being a high level of identification with each stage.

Questions five to eight asked sessional teachers to use a Likert-scale ranking, from one (not beneficial), through to five (extremely beneficial) to identify the extent to which peer-pairing assisted in terms of support with subject content, classroom management techniques, presentation skills (leading activities and student discussion, revising concepts, introducing assessment tasks), time management and the development of active learning and enquiry-based teaching techniques. We conducted one training session prior to the start of teaching in trimester one and one during trimester, to workshop the active and enquiry-based learning approaches used in our seminars.

Sessional teachers who were paired with more than one other staff member during the trimester, were asked to provide responses for each pairing. Question six asked sessional teachers to rank their own content knowledge and teaching skills (less experience, equal experience or more experience) in relation to each of the peers with whom they were paired. These self-rankings were used in the analysis question five, to classify responses according to whether sessional teachers were paired with a peer with lesser, equal or more experience.

Questions nine to eleven asked respondents to identify whether they considered that students benefitted from being taught in a peer-paired classroom (yes or no), and to qualify how through written responses, whether they preferred teaching large classes when paired with a peer (yes or no) and whether they were provided with sufficient support to participate in peer-paired teaching teams (yes or no).

Respondents were provided the opportunity to contribute additional comments with respect to all questions, to clarify how they perceived peer-pairing to assist (or not) in developing their teaching practice. While not focusing on students' perceptions of peer-pairing in this study, we also include the University's teaching evaluation surveys of this subject for the first trimester, 2016, to review the students' level of satisfaction with the peer-pairing strategy. The evaluation is reported as the percentage of student responses in each category of a Likert scale, from strongly agree to strongly disagree, for a range of questions about teaching quality and individual written comments. Students' individual comments with respect to peer-pairing are included in this paper.

Results

Nine sessional teachers taught into the subject in Trimester One 2016 and all sessional teachers participated in the survey. Two sessional teachers were teaching for the first time in 2016 and were completing an honours year of study in Environmental Science. Two other sessional teachers had one to two years of tertiary teaching experience (one of these respondents had over ten years' experience teaching in secondary schools and the other was in the early stages of post-graduate study). Six sessional teachers had more than three years tertiary teaching experience. Five of these were in mid-to-later stages of post-graduate study and one had over thirty years' experience as a senior secondary school teacher.

Of the two peers who had less than one year's tertiary teaching experience, both identified most strongly as being at Stage One to Two (Senior Learner) using Nyquist and Wulff's (1996) framework of sessional teacher development. Of the peers that had one to two years tertiary teaching experience, one also self-identified most strongly with Stage One, whereas the peer with more than ten years' experience at secondary level, self-identified as being at Stage Three (Junior Colleague). For sessional teachers with more than three years' tertiary teaching experience there were diverse responses with respect to their identified stage of development. One sessional teacher with over thirty years' experience teaching in secondary schools identified most strongly with Stage three (Junior Colleague). Two sessional teachers with more than three years tertiary teaching experience identified most strongly at Stage Two (Colleagues in Training), and one identified as Stage One.

When asked to rate their own content knowledge and teaching skills in relation to the peers they were paired with, sessional teachers with less than one year's teaching experience acknowledged their lesser teaching experience, but not necessarily that their content knowledge was lower. Experienced peers also acknowledged that sessional teachers with less teaching experience were often equals in terms of content knowledge.

Peer-pairing and the development of teaching skills support with subject content

Irrespective of level of teaching experience *or* whether paired with a less or more experienced peer, most sessional teachers identified peer-pairing as beneficial to extremely beneficial for support with subject content (Figure 1). Only iin one case did a sessional teacher, self-identified as having greater teaching skills than their peer, deem the pairing as not beneficial for support with subject content.

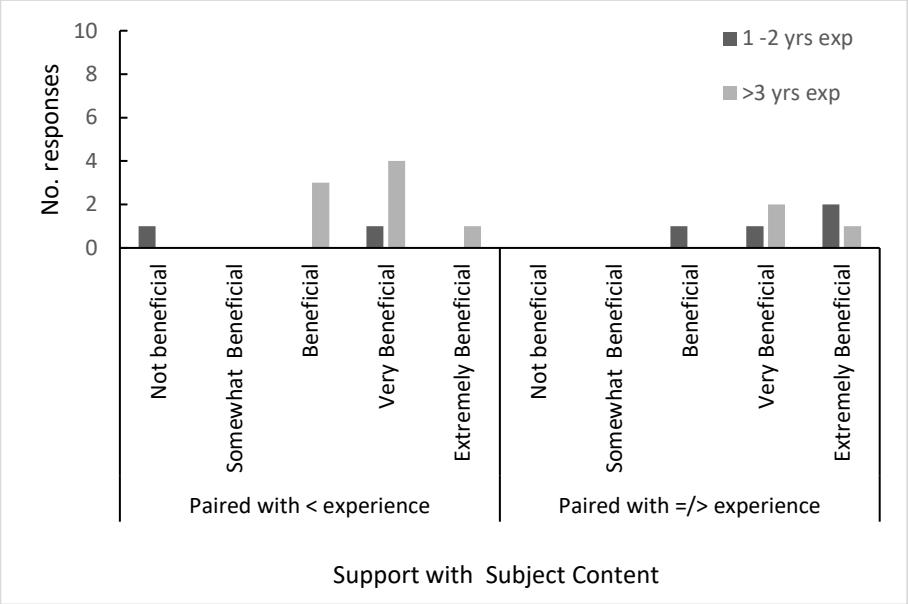

Figure 1. Number of responses identifying peer-pairing as beneficial to extremely beneficial for support with subject content.

Support with classroom management techniques

Sessional teachers with up to two years' teaching experience identified peer-pairing as beneficial to extremely beneficial for support with classroom management techniques, when paired with a sessional teacher with more experience (Figure 2). When paired with a sessional teacher with less experience, the pairing was deemed either not beneficial or somewhat beneficial. All sessional teachers with more than three years' experience determined peer-pairing to be beneficial to extremely beneficial for support with classroom management techniques if paired with a peer of equal or more experience (Figure 2) and two-thirds of sessional teachers with more than three years' experience also deemed the pairing as beneficial to extremely beneficial when paired with a peer with less experience.

Support with presentation skills

All sessional teachers with more than three years' teaching experience considered that peer-pairing provided support with presentation skills if they were paired with a peer with equal or more experience, but it had less benefit when paired with a peer with less experience (Figure 3). For sessional teachers with one to two years' teaching experience, half of these considered peer-pairing to be beneficial when paired with a peer with less experience and all considered it to be somewhat beneficial to extremely beneficial when paired with a peer with equal or more experience (Figure 3).

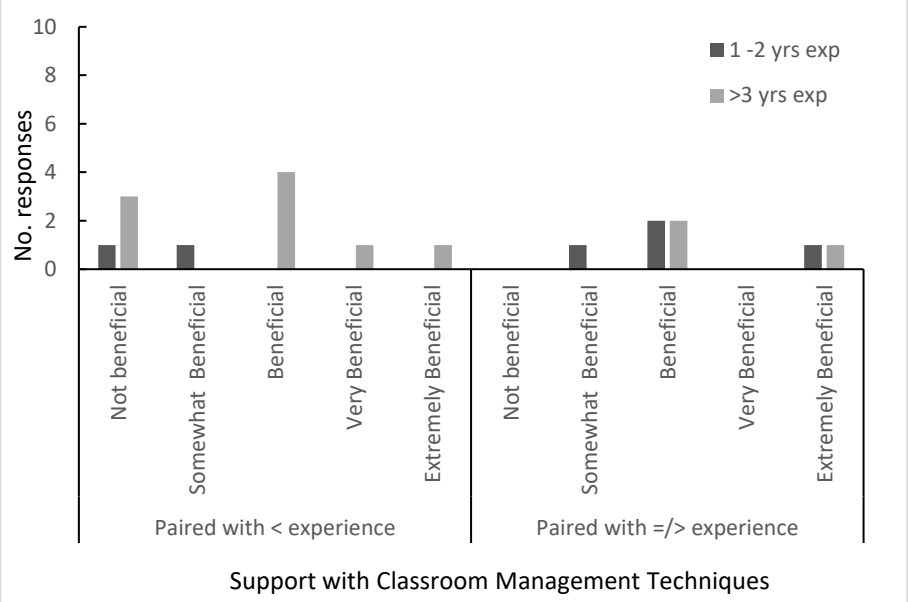

Figure 2. Number of responses identifying peer-pairing as beneficial to extremely beneficial for support with classroom management techniques.

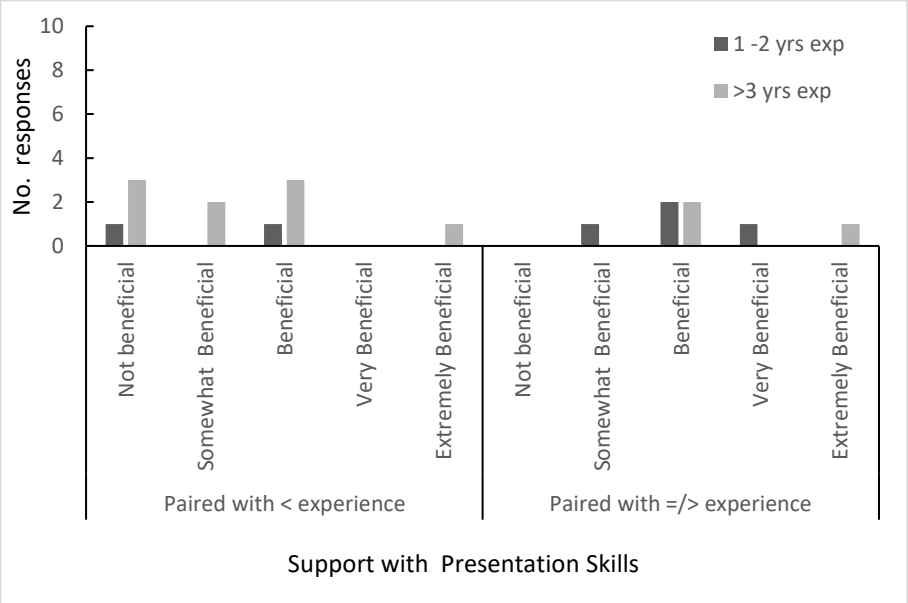

Figure 3. Number of responses identifying peer-pairing as beneficial to extremely beneficial for support with presentation skills.

Support with time management

All sessional teachers identified peer-pairing as somewhat to extremely beneficial for support with time management when paired with a more experienced peer (Figure 4). When paired with a less

experienced peer, seven out of nine sessional teachers with more than three years' teaching experience considered the pairing to be beneficial to very beneficial (Figure 4).

Support with student engagement techniques

All sessional teachers considered peer-pairing to be somewhat beneficial to extremely beneficial for support with student engagement techniques, if paired with an equal or more experienced peer (Figure 5). For sessional teachers with one to two years' experience, three out of four of these peers considered it to be very beneficial to extremely beneficial when paired with a peer with equal or more experience. One of two sessional teachers with one to two years' experience and four out of nine sessional teachers with more than three years' teaching experience also considered the pairing to be beneficial when paired with a less experienced peer.

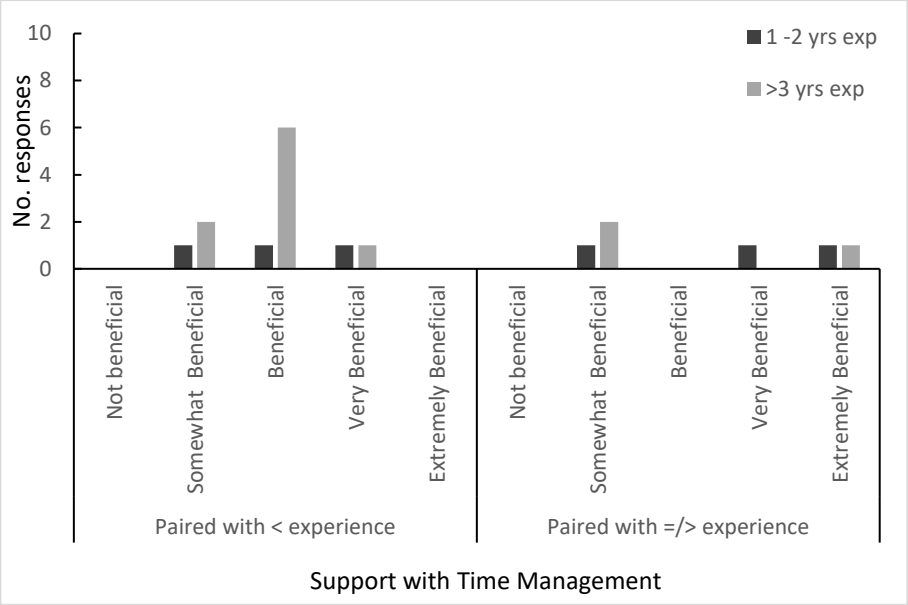

Figure 4. Number of responses identifying peer-pairing as beneficial to extremely beneficial for support with time management.

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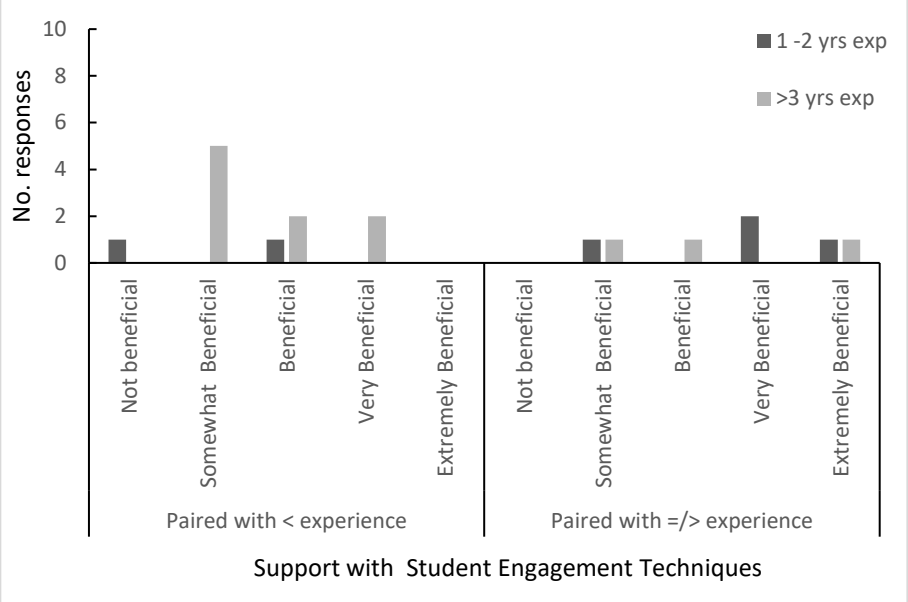

Figure 5. Number of responses identifying peer-pairing as beneficial to extremely beneficial for support with student engagement techniques.

Support with developing enquiry-based learning approach

When asked how beneficial peer-pairing was in helping to develop skills in an enquiry-based learning approach, four out of six sessional teachers identified it as somewhat to extremely beneficial when paired with a less experienced peer and all identified it as somewhat to extremely beneficial when paired with an equal or more experienced peer (Figure 6).

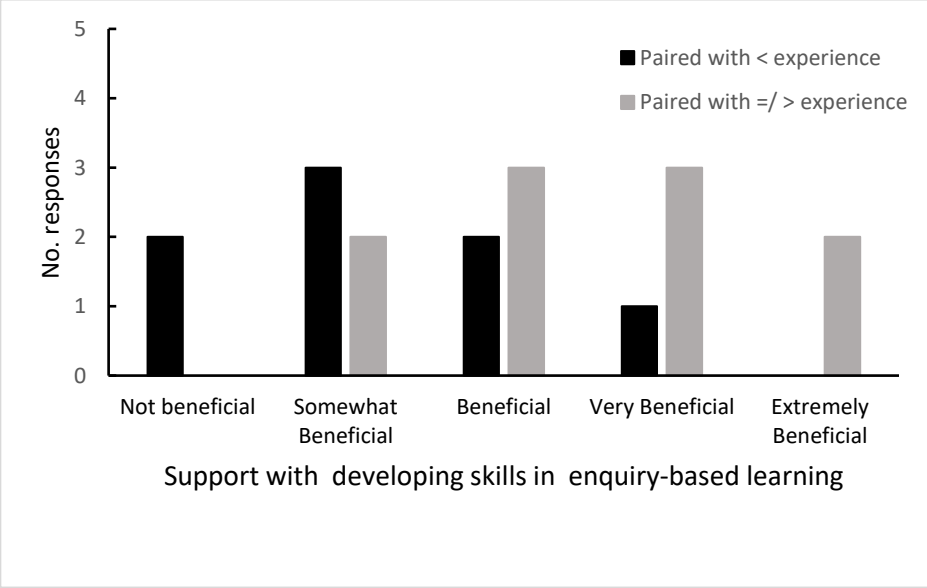

Figure 6. Ranking of peer-pairing for support with developing skills in enquiry-based learning.

Discussion

Peer-pairing as a method for developing teaching practice

In this case study we investigated how pairing of sessional teachers (peer-pairing) contributed to sessional teachers' development of teaching practice. At the start of the teaching trimester, pairings were determined by the subject chair (subject coordinator). The first criterion was to match more experienced peers with less experienced peers. The second criterion was to facilitate matches that offered students a range of different specialist knowledges and teaching styles, to meet the increasing diversity of our student cohort (Kift, Nelson & Clarke 2010). The pairings determined by the subject chair aligned well with each sessional teacher's own assessment of their level of teaching development and with the assessment of their experience relative to each of the peers with whom they were paired. In terms of content knowledge, experienced sessional teachers stressed that they considered peers with less teaching experience to be equals in the classroom, with one of the benefits to students being that it provided students with access to a broad knowledge base. One sessional teacher commented:

> *'Multiple viewpoints from teachers in the classroom can provide contrasting discussions and facilitate deeper exploration of topics, as well as provide a greater breadth of examples regarding various topics'.*

Consequently, peer-pairing facilitates the type of active learning environment that aligns and supports students' own learning; this is consistent with a constructivist approach to building knowledge (Duffy & Cunningham 1996), where students construct knowledge rather than acquire knowledge. While less experienced sessional teachers demonstrated confidence with content knowledge, the research highlighted how peer-pairing can be applied to provide support with classroom management techniques. Experienced sessional teachers found the pairings to be beneficial irrespective of whether they were paired with a peer of perceived lesser, equal or more experience. They commented on being able to observe different or novel approaches to develop their own teaching practice. For less experienced sessional teachers, the pairings were deemed beneficial only if paired with a peer with more (perceived) teaching experience. For example, despite having over ten years teaching experience in a secondary setting, one sessional teacher with limited tertiary teaching experience identified that being paired with a less experienced peer was not beneficial for support with classroom management techniques, but qualified the response by stating:

> *'Teaching is always a learning experience and it is great to teach alongside others to observe their tricks and processes. Even when you don't necessarily agree with the way another teacher approaches a particular situation/question, it still informs your own teaching (I should do that next time, I think their approach would have been better if they did it like this). Good bad or indifferent, observing the behaviours of others informs your own teaching'.*

When evaluating the peer-pairing experience with respect to some fundamental aspects of teaching, such as time management and presentation skills, experienced sessional teachers tended to be influenced less by the experience level of their peer. For example, among sessional teachers with more than three years' experience, seven out of nine considered the pairing beneficial for time management when paired with a less experienced peer and all peers considered it beneficial when paired with an equally or more experienced peer. These results suggest that among our experienced sessional teachers there is greater recognition of how the peer-pairing experience can develop their own teaching practice, to reflect in and on action (Schon, 1983), even if they are not

directly learning new instructional methods. We pose that for less experienced sessional teachers, the acquisition of fundamental teaching skills has primacy. When paired with a more experienced peer, there is a perceived greater opportunity to learn and apply new knowledge.

The teaching environment for the subject's seminars is an active learning environment utilising enquiry-based learning. It sits outside the more common practical class structure that sessional teachers in the sciences may be more familiar with, where there are set experimental processes with predictable outcomes. Consequently, three out of four sessional teachers found that the peer-pairing experience, evaluated with respect to student interaction techniques, was of greater benefit when paired with more experienced peers and one third considered the peer-pairing experience not beneficial for developing skills in enquiry-based learning if paired with a less experienced peer. While sessional teachers acknowledged that the learning environment promoted the development of essential skills for science graduates, the results indicate that they were more confident in engaging students in this process if they were supported by an experienced peer. For example, one sessional teacher commented:

> *'By engaging the students in various activities and promoting open discussion, we effectively inspired critical thinking and problem solving'.*

and another responded:

> *'Peer-pairing teaching teams immediately double the socialisation of students into ecology as a discipline. There are also more teachers available per student and more expertise in the classroom, meaning there are more resources available to them'.*

These sessional teachers' comments reflect confidence in the teaching team's ability to provide higher order learning opportunities (inspired critical thinking and problem-solving), as well as acknowledging the ability of teaching pairs to further the specific discipline knowledge ('*double (s) the socialisation of students into ecology as a discipline'*). This is consistent with Luft et al.'s point (2004) that content knowledge alone is insufficient in the teaching development of sessional teachers. And another neatly summarised the experience thus:

> *'In relation to both enquiry-based and active learning, the focused attention sometimes required by these strategies lends itself to teams, as one of the pair can take more time with individuals or small groups of students while the other can be more generally vigilant and field the numerous small problems and questions that such strategies generate. Therefore, the coupling of peer-pairing with enquiry-based learning and active learning is well-matched'.*

Peer-pairing and interacting with first-year students in a science classroom

One of the biggest challenges in our subject is interacting with students in accessible, meaningful dialogue, particularly those from non-science faculties. Students undertake the subject in their first trimester of university as a core requirement of their course, at a time when they are also learning how to be a student in tertiary education (Kift et al. 2010). For those new to the study of science, there are additional challenges. The learning culture in science classrooms may differ to that of their major disciplines, and, they are being introduced to unfamiliar concepts and teaching methods (Parpala, Lindblom-Ylanne, Komulainen, Litmanen & Hirsto 2010). Furthermore, as we cater to growing demand for university places, large lecture sizes (more than 1000 students) for first year science subjects are becoming more common (Bone & Reid 2011), decreasing opportunities for interaction with academic staff. A successful transition to university is aligned with the quality of interaction with academic staff (Krause & Coates 2009). Hence, one way to

mitigate these impacts is to provide greater opportunities for students to practise new discipline-based language and concepts via our seminar sessions, when students are in smaller class sizes.

While students' evaluations of the peer-pairing strategy are not a focus of this case study, we include comments from students who reported on the peer-pairing teaching strategy in the standard subject evaluation process. Peer-paired seminars provided more favourable student-teacher ratios than in lectures and increased students' capacity to interact with sessional teachers. One student wrote:

> *'By having two class tutors it made it easier to work more efficiently as there were more teachers for students'.*

> *'X and X definitely helped me a lot during this semester, they worked amazingly together and bounced off each other to answer students questions, and also to communicate the lessons to the class'.*

Students were also able to observe sessional teachers interacting with each other, actively modelling how discourse in the scientific arena operates. For example, one student commented:

> *'I really liked my teachers. They were so knowledgable (sic) and helpful that I was actually excited to go to class. As I am not really a science fan, X and X were fantastic with getting everyone involved and making the class an enjoyable area to understand science. The most helpful aspect of class was the group work, especially when it was moving around, like the food-web game. It was an inventive way of learning!'*

Students who responded to the university's subject evaluation process were very satisfied with the quality of teaching and appreciated the breadth of knowledge sessional teachers brought to the classroom.

Post study reflection

Since initiating the peer-pairing program and evaluating the responses from our sessional teachers we have refined the program for future iterations of the subject. One issue that we did not foresee was the responsibility placed on experienced peers, if they had pairings with multiple inexperienced peers. This research helped us to identify the issue and address it by ensuring that experienced peers had no more than two different pairings with less experienced peers. We consolidated the teaching relationship by repeating the number of times they taught with the same peer. Over a number of iterations, we have facilitated the professional development of our teaching team, and retained many of them, so that those who were less-experienced in 2016, are now confident in supporting newer team members.

Not all comments by sessional teachers were unconditionally supportive of peer-pairing over a single tutor approach. One experienced sessional teacher who had worked hard to discover and implement scholarly teaching practice reminded us that a good teacher-student ratio and a skilled tutor also achieves excellent results: 'In my experience, a single teacher is able to cover all bases in a sufficiently small classroom without compromise'. We are mindful that peer-pairing of teaching should not be seen as a panacea for increasing seminar group numbers, nor do we argue here that peer-pairing of sessional teachers should replace single tutor seminars. Peer-pairing of sessional teachers should be one strategy among many in creating structures that support the work and development of sessional teachers.

Conclusion

As the tertiary learning environment changes to accommodate increased enrolments, there has been a concurrent shift away from traditional teaching approaches. In the new learning spaces that we create in science-related disciplines, there is a greater expectation that learning is enquiry-based and that students will be involved in active learning. Often, these are in first-year, large classrooms, where students interact with teaching teams. Students could benefit from a model for peer-pairing sessional teachers as it provides more favourable staff-to-student ratios who model how discourse within the discipline is practised and offer more diverse perspectives on subject content. This may help support students' transition into the discipline.

Importantly, this study demonstrates the value of a peer-pairing strategy for sessional teachers. Our intention for peer-pairing sessional teachers was to create a collaborative and shared means to explore the teaching and learning environment. While peer-pairing presents an opportunity for continuing professional development in situ, it was the researchers' intention to facilitate a community of practice approach for sessional teachers that reflected the BLASST standards for supporting sessional staff (BLASST). In particular, Standard 1.3c describes the need for sessional teachers to be 'involved in teaching teams in order to debrief, plan and share good practice, and collaborate the development of learning and teaching strategies as well as mentoring and team-building' (1.3c, BLASST Framework, p. 4.). The sessional teachers in this study identified the benefits for themselves through their participation in a case study informed by an interpretist constructivist viewpoint. For those in the early stages of their teaching careers, the sessional teachers reported that peer-pairing facilitates context-specific professional development through observation and interaction with their more experienced peers. The peer-pairing teams shared teaching experience with another, more experienced peer allowing less experienced sessional teachers to explore how students are interacting with disciplinary concepts and learning activities. The study also elucidated that the more experienced sessional teachers use peer-pairing to reflect critically on their own teaching practice. In this way, they are making a transition to a more scholarly teaching and learning approach consistent with the values we associate with communities of practice and teacher agency.

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