Using the Freeth/Kirkpatrick model to evaluate interprofessional learning outcomes in a rural setting

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Abstract

Background: Considerable claims have been made for the benefits of interprofessional learning (IPL) despite limited evidence of its long-term effectiveness. A collaboration between the Australian National University and the University of South Australia offered opportunities for senior health professional students to undertake IPL teamwork placements in rural NSW—the Health "Hubs and Spokes" Project. The aim of this study was to evaluate, using mixed methods, the outcomes of an IPL project on all four levels of the Freeth/Kirkpatrick evaluation model.

Methods: Students completed a debriefing questionnaire, the Interprofessional Education Perception Scale (IEPS) and the Team Performance Scale (TPS) at the time they undertook IPL placements. A follow-up study measured anticipated professional networks and extent of their interprofessional experience. IPL facilitators, clinical supervisors and local health service representatives were asked to provide their views of perceived project outcomes.

Results: Initial evaluation demonstrated positive student reaction (Level 1), attitude change and collaborative skills (Level 2). While the follow-up study failed to show significant changes in the size of expected professional networks, qualitative exploration of transfer of learning to professional practice (Level 3) and impact of IPL placements in rural locations (Level 4) suggest a positive impact on participants and on healthcare delivery.

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Conclusion: The project generated student satisfaction, changes in attitude and skills, and longer-term positive impacts on the community and possibly on the students' professional practice. This evaluation model can be used effectively to evaluate outcomes of IPL teamwork placements in rural settings and potentially in other locations.

Keywords: interprofessional learning; evaluation; rural.

Introduction

Considerable claims have been made for the benefits of interprofessional learning (IPL) despite limited evidence of its longer-term effectiveness. A series of systematic reviews of randomised controlled trials and controlled "before and after" studies explored the effects on patient/client or healthcare process outcomes (Reeves et al., 2008; Reeves, Perrier, Goldman, Freeth, & Zwarenstein, 2013; Zwarenstein et al., 1999). Although these reviews included successively larger numbers of studies, the evidence base remains limited by both the small number of studies and the heterogeneity of interventions and outcome measures (Reeves et al., 2013).

Nevertheless, health profession accreditation bodies require confirmation of interprofessional experience during basic training—local examples include medical (AMC, 2012), nursing (ANMAC, 2012) and pharmacy (APC, 2012) accreditation requirements. In building a stronger case for IPL, it is therefore prudent to consider whether IPL experiences during health professional training result in improved collaborative practice and, in the longer term, improved delivery of healthcare.

Freeth and colleagues have recommended a modified version of Kirkpatrick's four-level model for evaluating training programs (Kirkpatrick, 1996; Freeth, Hammick, Koppel, Reeves, & Barr, 2002). This Freeth/Kirkpatrick model captures educational outcomes ranging from student reaction (Level 1) to the impacts on the organisation (Level 4a) and patient (Level 4b). The levels are listed in the first column of Figure 1. The four levels of educational outcome have been employed in many IPL evaluations, and a range of programs have reported achievement of positive, short-term (i.e., Level 1 and 2) outcomes (for example, Curran, Sharpe, Flynn, & Button, 2010; Gillan, Lovrics, Halpern, Wiljer, & Harnett, 2011). However, while programs of this nature aim to bring about complex behavioural changes in both individuals and within organisations, fewer have investigated what Kirkpatrick considered more meaningful Level 3 and 4 outcomes (Anderson & Thorpe, 2014; Carpenter, Barnes, Dickinson, & Wooff, 2006; Freeth et al., 2002; Furness, Armitage, & Pitt, 2012; Hammick, Freeth, Koppel, Reeves, & Barr, 2007; Thistlethwaite, Kumar, Moran, Saunders, & Carr, 2015).

It should be noted that the same diminishing returns apply to evaluations of training programs in general. An American Society for Training and Development benchmarking study on the extent to which the 276 organisations surveyed evaluated their training programs at each of the four levels reported that 75% of organisations evaluated participants' reaction, 41% evaluated learning, but only 21% and 11%, respectively,

ISSN 1442-1100

evaluated Level 3 and 4 (Chevalier, 2004). Investigating behavioural and organisational outcomes can be methodologically challenging as they occur in complex workplace settings, necessitating well-planned and theorised mixed-method studies.

From a learning perspective, the transfer of behaviour to professional practice (Level 3) is crucial (Mann, Sargeant, & Hill, 2009a). Since this level focuses on behaviour in the context for which students were trained, it seems apposite that it be measured once participants are active in the workplace. But while this may be feasible for work-based learning programs, drawing connections between a curricular activity and behavioural practice for university-based curricula is more difficult. Most reported measures at this level are qualitative (for example, Barnes, Carpenter, & Dickinson, 2006; Furness, Armitage, & Pitt, 2011; Hunter et al., 2008). A review of survey instruments found no single instrument for measuring behaviour change; and where items were found within other instruments, these were subjective measures, such as self-reported behaviour (Gillan et al., 2011).

Level 4 addresses the impact of a program, implying the passage of a period of time (Frye & Hemmer, 2012). Gillan et al. (2011) found even fewer objective measures reported at this level, with these referring to staffing change and team criteria, neither of which were clearly defined). Some well-established IPL programs report using several methods, including student statements, practitioner interviews and focus groups or surveys of health service users to evaluate both Level 4a and 4b outcomes: the Leicester Model and TUILIP project being two examples (Anderson & Thorpe, 2014; Furness et al., 2012).

A further difficulty with follow-up evaluations arises when attributing outcomes to educational programs (Frye & Hemmer, 2012; Parker, 2013) rather than to other workplace factors. The environments in which students learn and eventually practice may facilitate or inhibit any beneficial behaviour change resulting from IPL experiences and confound results (Thistlethwaite et al., 2015), or the time period involved and the range of contextual factors may make attribution difficult. In response to these challenges, studies that have explored Freeth/Kirkpatrick's longer-term outcomes have used a diverse range of methods, informants and time periods to follow up (Carpenter et al., 2006; Furness et al., 2011; Mann, Sargeant, & Hill, 2009a; O'Carroll, Braid, Ker, & Jackson, 2012). There were more methodological differences than similarities, and techniques were often context specific (Gillan et al., 2011). This study aimed to evaluate, using mixed methods, the outcomes of an IPL project—the "Health Hubs and Spokes" Project—on all four levels of the Freeth/Kirkpatrick model, including student satisfaction, skillset, behaviours and organisational changes.

The Health "Hubs and Spokes" Project

Between 2010 and 2012, the Australian National University (ANU) and the University of South Australia (UniSA) collaborated to offer opportunities for senior medical students from ANU (n = 45) and pharmacy, nursing and allied health students from UniSA (n = 63) to undertake IPL teamwork placements in rural NSW. Placements ranged in time from 4–6 weeks. Students worked together in IPL groups of 2–5 on

ISSN 1442-1100

small, locally relevant projects proposed by local health practitioners. An IPL facilitator met weekly with each team, working through a series of reflective exercises and monitoring students' progress with their team projects. Details of the Health "Hubs and Spokes" Project (hereafter referred to as the "Project") are available elsewhere (Craig, Barnard, Glasgow, & May, 2014). The Project was funded by the Australian Government Department of Education, Employment and Workplace Relations.

Methods

The set of methods employed to evaluate outcomes of the Project included: a student debrief questionnaire (*student reaction*); the Interprofessional Education Perception Scale (*modification of perceptions and attitudes*); the Team Performance Scale (*interprofessional collaborative skills*); the Professional Networks Questionnaire (*exposure to and willingness to work in health teams)*, supplemented by stories of real interprofessional experiences of working together (*transfer of learning to professional practice*); and feedback received from health service informants at the rural sites where IPL took place (*impact on the organisation*). Figure 1 provides a structural summary of the evaluation framework, organised by Freeth/Kirkpatrick level, outlining interprofessional elements being assessed, methods and tools used, and the subjects and beneficiaries.

One hundred and eight students (45 ANU, 63 UniSA) participated in 37 IPL teams during the 3 years of the Project's implementation. All students in the 2011 and 2012 cohorts (n = 79: ANU = 32, UniSA = 45) were invited to participate in Level 1 and 2

Freeth/Kirkpatrick Model level	*Method*	*Tool*	*Subjects*	*Focus of outcomes*
1: Student reaction	Questionnaire	Student Debrief Questionnaire	IPL participants	Outcomes for students
2a: Attitude change	Test	Interprofessional Education Perception Scale (IEPS)	IPL participants A control group	
2b: Interprofessional collaborative skills	Test	Team Performance Scale (TPS)	IPL participants	
3: Transfer of learning to professional practice behaviour	Online survey (Exposure to and willingness to work in health teams)	Resource networks: i) during training ii) in managing patients	IPL participants A control group	
	Interviews (interprofessional practice)	Analysis of reflection and critical incident reports	IPL participants	
4a: Impact of the IPL project on the organisation	Interviews and document review (organisational change)	Enquiry into lasting effects resulting from IPL placements	IPL facilitators, supervisors, health service staff	Outcomes for community

Figure 1: Data collection methods, tools and Freeth/Kirkpatrick outcome level used in the study.

ISSN 1442-1100

evaluation at commencement and immediately following their IPL placement. A comparison group of ANU students (n = 19) who did not participate in the Project also completed one of the instruments. A larger retrospective sample of IPL participants from 2010, 2011 and 2012 (n = 108), along with a control group of 220 non-participant ANU students, were invited to respond to follow-up surveys targeting evaluation at Level 3. An outline of these participant samples and relative response rates is provided in Table 1. To assess Level 4, a convenience sample of 57 respondents were invited to participate in a telephone interview. This group included IPL facilitators, clinical supervisors, rural clinical school academic staff and 14 representatives of local health services in the six towns where the IPL teams had been placed.

Table 1
Response Rates at Each Level of the Freeth/Kirkpatrick Evaluation Model

Levels 1–2 (2010, 2011 cohorts)			
	IPL Participants (n = 79)		
	UniSA participants (n = 45)	*ANU participants (n = 34)*	*ANU non-participants*
Level 1: Debrief Questionnaire	44 (98%)	32 (94%)	
Level 2a: Inter-professional Education Perception Scale pre-test	39 (87%)	27 (79%)	
Level 2a: Inter-professional Education Perception Scale post-test	45 (100%)	34 (100%)	19
Level 2b: Team Performance Scale	45 (100%)	34 (100%)	
Level 3 (2010, 2011, 2012 cohorts)			
	UniSA participants (n = 63)	*ANU participants (n = 45)*	*ANU non-participants (n = 220)*
Level 3(i): SNA	20 (32%)	16 (36%)	26 (12%)
Level 3(ii): Interviews	14	9	

Level 1: Student reaction

Study instrument

A specially designed student debrief questionnaire was completed by the students at the end of their placements, eliciting comments on the process, their experiences, perceived strengths and weaknesses, and suggested improvements.

Analysis

Responses representing students' reactions to their learning were analysed by theme and summarised.

ISSN 1442-1100

Level 2a: Modification of perceptions and attitudes

Study instrument

The Interprofessional Education Perception Scale (IEPS) (Luecht, Madsen, Taugher, & Peterson, 1990) is a widely used, previously validated 18-item questionnaire. Items were grouped into four factors: "perceived competence and autonomy within own profession" (Factor 1), "perceived need for cooperation" (Factor 2), "perception of actual cooperation" (Factor 3) and "understanding the value of other professions" (Factor 4). Project students completed the IEPS before and after their placement. A comparator group of students from ANU (n = 19) who did not participate in the Project also completed the IEPS.

Analysis

Paired pre and post t-tests were calculated for all participants; participant and non-participant medical students were also compared.

Level 2b: Interprofessional collaborative skills

Study instrument

Students completed the Team Performance Scale (TPS) at the end of their IPL placement. The TPS is an 18-item 6-point Likert scale instrument developed to measure team skills, which is capable of distinguishing between teams (Thompson et al., 2009). Many instruments exist for measuring collaborative practice. The TPS was a pragmatic choice as a short, validated measure of skill acquisition better suited to the interprofessional activities undertaken by these students than measures pertaining to patient care. An added advantage was its ability to measure inter-team differences.

Analysis

Team scores were compared using ANOVA and the proportion of variance explained by the team effect explored. Median team scores, averaged across team members, were also calculated.

Level 3: Transfer of learning to professional practice behaviour

Methods used to evaluate this level included social network analysis and interviews.

(a) Social network analysis

The network of health professionals that any clinician can draw on is a resource that drives interprofessional work. We proposed that measuring changes in the size and strength of the network of health professionals that students were exposed to, and would anticipate working with, were both proxy outcomes of transfer of learning to professional behaviour.

Recruitment

Participants were invited to respond to a retrospective, web-based survey by email, with two follow-up reminders. The period between IPL placements and subsequent analysis varied between 6 months and 2½ years; this was unavoidable as the follow-up study was undertaken 6 months after the final IPL teams finished.

ISSN 1442-1100

Study instruments

The online survey comprised demographic data, current practice and career intentions, and the Professional Networks Questionnaire (PNQ). The Professional Networks Questionnaire is a modification of a resource generator survey used in social network analysis to estimate the persons who make up an individual's network and therefore act as a resource for them (Van der Gaag & Snijders, 2005). We focused on health professionals as part of an individual's personal resource network (Marin & Hampton, 2006). Similar adaptations have been utilised in rural mental health service description and re-design (Fuller et al., 2007; Fuller, Kelly, Law, Pollard, & Fragar, 2009). The Professional Networks Questionnaire captured data in relation to (a) participants' "learned-about" and "learned-from" networks—in which respondents were asked to identify, from a list, the number of disciplines from which they had learned, about whom they had learned and those disciplines that they did not engage with during their training and (b) their "anticipated" networks—in which respondents were asked to nominate, generally speaking, how likely they were to use a range of health professionals as a resource in managing their own patients.

Response options included "likely", "possible but not likely" or "unlikely".

Analysis

This was an ego network analysis. Resource network data were collated and analysed using UciNet (Analytic Technologies). Comparisons were made between participants from ANU, non-participants from ANU in third-year medical school and pharmacy, allied health and nursing participants from UniSA, using simple parametric tests on SPPS-X (IBM Corporation).

(b) Interviews

All respondents were invited by email to participate in an interview; 23 agreed. Of these, 20 were practicing health professionals, and three were final-year students. They were interviewed about perceived effects of their IPL experience, the health professions they have worked with since their training and their perceptions of the advantages and disadvantages of IPL now that they are in practice. They were also asked to describe a critical incident illustrating how they have worked with other health professionals.

Analysis

All interviews were digitally recorded and transcribed to ensure accuracy. Transcribed interviews were analysed for common themes by one author (PC) and reviewed by other team members.

Level 4: Impact of the IPL project on the organisation

Study instrument

Semi-structured telephone interviews addressed informants' views on the Project, perceived outcomes from the student projects in their local area and the impacts on the health service organisation or the community. Where a student team had produced a particular resource or recommended a change to procedure, informants were asked

ISSN 1442-1100

if these were still in use. Documented evidence of project results (in local newspapers/ in-house newsletters and changes in referral patterns) was also investigated. The telephone interviews were recorded using contemporaneous handwritten notes and reconstructed afterwards.

Analysis

We undertook a thematic analysis of the documents and interviews, focusing on outcomes at the level of the health service organisation. Initial coding of the interviews was performed by one team member (PC), with review and synthesis of all data undertaken by other team members to confirm that saturation had been achieved. We categorised outcomes as occurring at several points: increased local awareness of a particular issue addressed by the team, improved communication between different health professions, continued use of the team's product or a changed procedure in response to the teams' work or evidence of improved use of a particular local health service.

Ethical approval for the IPL project evaluation study was granted by ANU Human Research Ethics Committee (Application 2010/526).

Results

Levels 1 and 2

Evaluation of students' reaction, attitude change ($t = 2.803$; $p = 0.007$) and collaborative skills (ANOVA, $F(31,45) = 1.987$, $p = 0.018$) demonstrated that the Project provided good opportunities to learn from and about one another's professional roles as they worked together on real local rural issues, providing significant improvement in attitudes and evidence of working collaboratively in teams. Participant medical students also scored higher on the IEPS than their non-participant colleagues ($t = 2.024$; $p = 0.047$) (Craig et al., 2014).

Level 3: Transfer of learning to professional practice behaviour

Social network analysis

While there were few differences between the three groups in the size of "learned-about" networks, medical students from ANU (both Project participants and non-participants) indicated much larger "learned from" networks than the IPL participants from UniSA (mean 8.9 vs 5.1, $p < 0.005$). Differences within the ANU cohort between IPL participants and non-participants were negligible (Table 2a). These findings suggest that features of the training offered at home institutions, over and above participation in the Project, may have a marked effect on exposure to multi-disciplinary learning experiences, and that through the course of their training, students at ANU have encountered opportunities to learn from many more disciplines than their counterparts in UniSA.

ISSN 1442-1100

Overall, respondents were most likely to have learned from pharmacists, general practitioners and general practice nurses, while they were most likely to have learned about Aboriginal health workers, occupational therapists and nutritionists. Disciplines with whom students had the least engagement were complementary therapists, such as massage therapists, chiropractors, osteopaths and Chinese medicine practitioners.

When respondents were asked about generic anticipated resource networks for practice, there were no statistically significant differences in potential network size for any of the three groups. However, when the strength of ties within these networks was examined, students from ANU displayed larger networks with strong "likely or probable" links (mean 15.4 vs 12.0, $p < 0.005$), while students from UniSA tended to have larger networks with weaker ties (mean 5.5 vs 2.6, $p < 0.005$). These results are summarised in Table 2b. The proportion of respondents from UniSA likely to include individual disciplines in their proposed practice networks was significantly lower for 11 of 20 individual disciplines considered (X^2, $p < 0.05$).

Table 2
Social Network Analysis (SNA) Studies for IPL Participants and Controls

	ANU participants (medicine) (n = 11)	*ANU controls (medicine) (n = 27)*	*UniSA participants (pharmacy, allied health & nursing) (n = 20)*	*Significance ANU participants vs ANU controls*	*Significance ANU participants vs UniSA participants*
	Mean (SD)	*Mean (SD)*	*Mean (SD)*	*(t-test)*	*(t-test)*
2a: Size of "learned-from" and "learned-about" networks					
Learned from	10.8 (4.42)	10.6 (3.15)	5.1 (2.99)	NS	< 0.005
Learned about	9.5 (7.22)	8.7 (5.48)	5.0 (3.14)	NS	NS
2b: Potential networks vs likely networks					
Potential	17.7 (1.68)	17.9 (1.49)	17.1 (3.09)	NS	NS
Likely	15.4 (2.34)	16.0 (1.9)	12.0 (3.8)	NS	< 0.005
Possible	2.6 (1.35)	3.0 (1.39)	5.5 (2.19)	NS	< 0.0005
Unlikely	3.3 (1.68)	2.7 (1.21)	3.9 (3.09)	NS	NS

Interviews

All 23 interviewees provided some positive reasons for interprofessional learning (IPL) and interprofessional practice (IPP), with most also suggesting some disadvantages. Benefits identified were first and foremost a sense of collegiality, contributions to their own knowledge and understanding, and benefits for patients and for the health system. Disadvantages related to the process of working together, with potential for issues around effective communication and misunderstanding about respective roles, sometimes leading to rivalry between professional groups.

ISSN 1442-1100

Respondents were asked to describe an incident (tell a story) about working interprofessionally. Of the 20 who could do so, all but two related an episode involving health professions that differed from those who had participated in their IPL team. Many also reflected on the experience of working interprofessionally, with several acknowledging the role played by the Project in raising their awareness of the importance of IPP. The reported examples, and some reflections, illustrated additional positive experiences and growing commitment to IPP and patient-centred care. For example, a pharmacist working in a rural hospital (who had previously participated in IPL with a medical student) said:

> *"We have a good relationship with the speech paths [about] the patient's swallowing abilities. … The physios often ask us for information about pain relief when they have their out-patients, … the dietitian with their requirements for certain supplements. [There are] multidisciplinary discharge planning meetings, and nursing hand overs are attended by physios, the OT, the nursing unit manager and the pharmacist. We're all there and we could just bounce off all the plans that we had for the patient to go home and how they'd work with each other. … It's impossible not to work with other health professionals, it's just about whether we do it well and whether we do it with the knowledge of what that other person's role is and respect that person's role rather than just doing it and expecting them to do their bit."*

An occupational therapist working with a physiotherapist, nurses and a doctor in acute care in an urban hospital (who had previously participated in IPL with medical and pharmacy students) reported:

> *"I've got a better idea about what everyone's role is in the acute setting. … I probably have a better awareness of what the occupational therapy role is as well."*

A medical graduate working in oncology (who had previously participated in IPL with an occupational therapy student) remarked:

> *"I reckon the pharmacists are the most essential member of the team in some ways. … There's so many complications and all the medications, and there's so many interactions between the different medications. The consultant who's making decisions about patient care is often really dependent on the pharmacist to be there and be able to provide the information instantaneously. My interactions with the pharmacist have been really positive experiences."*

Level 4: Impact of the IPL project on the organisation

The 57 respondents provided information on the 37 IPL teams that took place in the towns where the rural clinical school maintained an office; each of these towns hosted between 2 and 10 IPL teams.

Some level of positive outcome was reported for 19 of the 37 IPL teams, including perceived improvement in interprofessional communication and/or increased local awareness of a particular issue addressed by the team (at least 10 teams), continued use of a product or changed procedure developed by the team (9 of the 21 teams) and evidence of improved use of at least five particular local health services. More than one

ISSN 1442-1100

outcome was identified for some teams (Table 3). A detailed analysis and discussion of these outcomes and their implications for rural healthcare is reported elsewhere (Craig, Phillips, & Hall, 2015).

Table 3
Impact of the IPL Project on the Organisation—Reported Outcomes of IPL Team Projects

Increased awareness/improved communication between professions	> 10/37 teams (27%)
Examples: • Eased time for patient with intellectual disability in hospital at the time and during a subsequent hospitalisation • A communication system between doctors and pharmacists for flagging prescription shoppers • Raised awareness of use of local e-health system as a communication tool between acute health, community health and social service sectors.	
Continued use of a "product" or procedure	9/21 products/procedures (43%)
Examples: • Continued use of a flowchart "Assessment of bleeding & thrombotic risk" in an operating theatre • Patient handouts, "Smoking in Pregnancy" and "Substance Use Whilst Breastfeeding" distributed as needed by maternity ward and hospital pharmacy • A "Cardiac Rehabilitation Diary" used as a communication tool between referring doctors, a cardiac rehab program provider and patients.	
Improved use of a service	5/37 teams (14%)
Examples: • Increased number of stroke patients receiving immediate optimal available care • Additional part-time staff member employed to conduct falls risk assessments at the local nursing home • Increased number of referrals to a locally provided chronic obstructive pulmonary disease service.	

Discussion

Our study showed evidence of positive results from the Health "Hubs and Spokes" Project at the levels of learner satisfaction and skills development. The evidence for transfer to professional practice, based on students' perceived interprofessional resource networks, was less strong, though participants in the Project could provide clear accounts of good interprofessional practice. The Project was able to demonstrate some changes at the level of the healthcare organisation.

The strengths of the study include its methodological diversity, high response rates for evaluation of the first two levels and direct engagement with real issues in the health setting to assess the impact of the Project. Response rates to the follow-up studies were substantially lower than for the initial study, limiting its power. New graduates are a notoriously hard group to contact and their focus is forward rather than back to the time of their studies. The absence of control groups from UniSA limited the potential for comparative analysis, especially in relation to the social network analysis

ISSN 1442-1100

(SNA). It should also be noted that although there were only a small number of controls in the IEPS analysis, the differences were so marked that it was possible to demonstrate significance.

Our SNA did not find a difference between participants and non-participants in the size or strength of projected professional networks, or in exposure to other disciplines. It is possible that the differences we observed between allied health and medical students, who had the largest "learned-from" networks and were more likely to express a stronger intention to work with other disciplines, resulted from institutional or curriculum-based factors. Medical students in this study may have been more exposed to other disciplines because they spend most of third-year in community-based clinical settings. Medical students from ANU were also automatically enrolled in the Project, whereas students from UniSA were volunteers. Volunteerism is a characteristic of many IPL programs (Hall & Weaver, 2001; Thistlethwaite et al., 2015), and while it has been reported that there is no discernible difference between volunteers and non-volunteers (Kilminster et al., 2004), in this study, volunteers may have had more commitment to interprofessional working than the co-opted students from ANU. If this is true, the relative smallness and weakness of the anticipated professional networks found in UniSA are likely to be further reduced if non-volunteer students from UniSA were included.

Despite a strong likelihood of positive bias among those agreeing to relate their experiences, interviews were by no means all positive. We were encouraged by the fact that most interviewees related incidents of working interprofessionally with professionals other than those in their IPL team, suggesting that some transfer of learning to professional practice had indeed taken place. The stories and reflections presented in this paper indicated a high degree of commitment to working interprofessionally, and while this fervour cannot be attributed solely to the Project, the depth of the resolution they expressed is very encouraging. What we can say is that positive IPL experience in real work settings as students, combined with additional positive interprofessional experience, can potentially build a new generation of interprofessional practitioners.

Our findings also show that social network analysis is capable of identifying intergroup differences in exposure to and willingness to work in health teams, suggesting its potential for use with larger numbers, well matched controls and in before-and-after studies. We thus conclude that social network analysis is a promising technique for future application in evaluating interprofessional learning outcomes.

Australia and New Zealand are still at a relatively early stage in providing local evidence for longer-term outcomes of IPL. Our study found that it is challenging to determine whether learning transferred into professional practice, and therefore this aspect requires more methodological attention from evaluators. We attempted, as Parker (2013) suggested, to measure Level 3 performance rather than behaviour, albeit reported performance, by our choice of instruments.

ISSN 1442-1100

One of the potential weaknesses of the Kirkpatrick model, and its modifications, is its presumption of causal connections between the educational intervention and outcome. There are many intervening variables that may affect learning, many of them context-dependent. In order to capture the breadth of outcomes, a range of qualitative methods should be used, taking into consideration the changing contexts, the synthesis of results and the students' own views. The points made above acknowledge that a single positive student IPL experience is insufficient for building ongoing behaviour change. While we attempted to triangulate results by using different methodological approaches, our results were equivocal, due in part to the limitations imposed by only one source of controls in the quantitative analysis. In contrast, the interviews provided some real examples of IPP among novice health professionals, i.e., recognising the scope and contribution made by other professions, consulting each other, participating in care and discharge planning and reflecting on the consequential benefits for healthcare and for patients. Many of the sentiments expressed in the participants' stories were similar to those reported by health professionals working in rural Australia (Parker et al., 2013).

This study did not explore Level 4b outcomes (those relating to changes for individual patients) due to limited time and the logistical challenge of capturing patient-level outcomes across all the sites (Frye & Hemmer, 2012; Parker, 2013). Level 4a outcomes—changes to the healthcare organisation and community—were identified as a strength in the rural sites where the IPL teams were based. We feel confident in our conclusion that this indicates a lasting benefit beyond the intervention for the localities where the Project was implemented. Several students remarked on their gratitude for having made a valuable contribution to the local community that had hosted their placement. It remains a moot point as to whether the experience also contributed to a greater likelihood to work rurally in the future.

Conclusion

This study reported a two-stage evaluation of outcomes of an IPL project, using a range of methods to address all four levels of the Freeth/Kirkpatrick model. In the process, we trialled a novel modification of social network analysis to suit our particular context and obtained some rich stories of working interprofessionally by asking our respondents to describe their experiences and drawing on written reflections. The Project outcomes supported the benefit of the "authentic environment", whereby students' experienced real problems in real contexts (Mann et al., 2009b). Furthermore, we were able to acknowledge the value of this authenticity through some evidence of a positive, lasting contribution made in the rural locations where IPL took place. We recommend employing a wide suite of methods, both quantitative and qualitative, for evaluating these complex educational programs.

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ISSN 1442-1100

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