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Effectiveness of online interprofessional education in improving students' attitudes and knowledge associated with interprofessional practice

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Abstract

Background: Online delivery has enormous potential to solve many of the logistical barriers associated with interprofessional education (IPE); however, the application of online learning to IPE is still very new. In 2009, Deakin University introduced a fully online IPE unit which utilises both synchronous and asynchronous communication technologies. The aim of this study was to examine the extent to which this unit was effective in improving students' attitudes and knowledge associated with interprofessional practice.

Method: Students enrolled in the online unit in 2009 and 2010 were invited to complete an online questionnaire examining their interprofessional attitudes and knowledge both pre- and post-delivery of the unit. This questionnaire included the University of West England Interprofessional Questionnaire (UWEIQ), questions

assessing their confidence in understanding the roles of various health professionals and demographic information.

Results: Eighty-eight students completed the questionnaire both pre- and post-unit delivery. Student attitudes towards interprofessional interaction and interprofessional relationships and their confidence in their understanding of the roles of other health professions increased significantly for all professions from pre- to post-unit. No significant changes from pre- to post-delivery of the unit were noted for interprofessional communication/teamwork and interprofessional learning.

Conclusion: Fully online IPE overcomes many of the logistical barriers of implementing face-to-face IPE. This study suggests that fully online synchronous and asynchronous IPE may be an effective medium to improve students' interprofessional collaborative practice attitudes and confidence in understanding the roles of other professions. More research is required to further investigate the student and facilitator experience of synchronous and asynchronous online IPE.

Keywords: interprofessional education, collaborative practice, online, synchronous, asynchronous, attitude, e-learning.

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Introduction

Promoting and fostering a more adaptable workforce that utilises more effective collaborative approaches is a key feature in many health reforms initiated by both international and Australian governments in recent years (Curran, Sharpe, Flynn, & Button, 2010; LTTIP, 2009). The term interprofessional collaborative practice (IPCP) has been developed to describe “when multiple health workers, from different professional backgrounds, provide comprehensive services by working with patients, their families, carers and communities to deliver the highest quality of care across settings” (WHO, 2010). In addition to improving the IPCP capabilities of current health professionals, developing these capabilities in healthcare students has been identified as an urgent national workforce development task to be addressed by the higher education sector (LTTIP, 2009). An initiative to secure interprofessional learning and, through this, promote IPCP is known as interprofessional education (IPE). Interprofessional education has been defined as education that “occurs when two or more professionals learn with, from and about each other to improve collaboration and the quality of care” (CAIPE, 2007).

While the need for IPE is well recognised, the higher education sector continues to be challenged by the many barriers associated with its delivery. One of the most challenging of these is the logistical and organisational difficulties of bringing students from a range of courses together to learn with, from and about each other in a face-to-face manner. Some of these

difficulties include, but are not limited to, geography, timetabling, placements and external accreditation requirements (Barker, Bosco, & Oandasan, 2005; Casimiro, MacDonald, Thompson, & Stodel, 2009; Miers et al., 2007).

Online learning has enormous potential to solve many of the logistical problems of implementing and delivering IPE. The online format enables the creation of an accessible, organised and structured learning environment that learners are able to access at a convenient time and location. For these reasons, the use of online technologies is now a vital part of the Australian higher education landscape, with its effectiveness being well established in the teaching and learning literature (e.g., Ruiz, Mintzer, & Leipzig, 2006). Despite this evidence and a well-established history of its use, the application of online learning to IPE is very new, with the most effective content and processes yet to be established (Casimiro et al., 2009). Some researchers have investigated the delivery of IPE using asynchronous (non-real time) technology, in particular team discussion boards, and have found overall positive student evaluation of the experience (e.g., Miers et al., 2007; Santy, Beadle, & Needham, 2009) and reported learning about each other's roles (e.g., Soloman & Geddes, 2010). Others have investigated blended approaches using a combination of face-to-face and asynchronous technology (e.g., Curran et al., 2008) or using face-to-face, asynchronous and synchronous (real-time) technology with, again, some positive evaluation of the experience and the impact on IPCP attitudes (Carbonaro et al., 2008; Waterston, 2011). No studies, however, have

evaluated the fully online delivery of IPE incorporated into the students' curriculum, utilising both synchronous and asynchronous technology.

Deakin Universities IPE Unit

In 2009, the Faculty of Health at Deakin University introduced a fully online one credit point IPE unit (over 12 weeks), utilising synchronous and asynchronous communication technology for students from nursing, occupational therapy, social work, medicine, dietetics and psychology. After exploring various IPE delivery options, it was clear that fully online delivery was the only option to overcome the significant logistical barriers of students geographically dispersed across four campuses and university and placement timetabling difficulties of six different courses, while simultaneously aligning with Deakin's core commitment to contemporary and flexible teaching programs.

Deakin's IPE unit is designed to provide the students with the opportunity to examine the evidence for interprofessional collaboration, explore the roles, responsibilities and perspectives of the various professions in the healthcare team (including their own), reflect on personal factors that influence how they as individuals work in teams, collaborate with others in the interprofessional team to plan care/services and develop the ability to communicate with healthcare teams in the online environment. The unit is based on experiential learning with a particular focus on case-based learning, reflective practice and the creation of an interprofessional community of practice. Medicine, psychology and dietetics students take the unit as a compulsory

part of their curriculum, while it is currently an elective unit for nursing, occupational therapy and social work students (although the unit will be compulsory for these courses, as well, in coming years).

There are two streams to Deakin's IPE unit that run concurrently throughout the 12-week trimester: a self-directed stream and an interactive case conference stream. In the self-directed stream, students undertake structured experiential activities and reflective tasks to explore topics such as the roles of different health professionals, their own personality styles, team development, leadership, assertiveness and conflict management.

In the interactive case conference stream students are divided into interprofessional teams of approximately eight students supported by a facilitator. In these teams, students participate in weekly online asynchronous discussions (WebCT), focusing on issues related to IPCP such as overlapping roles of the professions and the role of the patient/client in the team. In addition, they participate in four 1 1/2-hour case conferences in which they develop care plans for complex patient/client cases. These case conferences are synchronous (real time) and run using the desktop virtual classroom environment *Elluminate* (www.illuminate.com). In this virtual classroom, students and a facilitator interact in real time via voice (headphones and microphone), instant texting and an interactive white board. The interactive white board allows participants to share various resources, such as word files, which they use to develop care plans as a team. The teams spend approximately an hour developing

their care plans, with an emphasis on recognising unique and overlapping roles and responsibilities of the different professions while maintaining a patient/client-centred approach. The team then spends an additional half an hour participating in structured reflective discussion about both their individual and the team performance.

The aim of this study was to examine the extent to which online asynchronous and synchronous delivery of IPE is effective in improving students' attitudes and knowledge associated with IPCP.

Method

Students enrolled in Deakin's online unit in 2009 and 2010 were invited to complete an online questionnaire examining their interprofessional attitudes and knowledge both at the commencement of the unit (pre-unit) and at the completion of the unit (post-unit). This questionnaire included the University of West England Interprofessional Questionnaire (UWEIQ) (Pollard, Miers, & Gilchrist, 2004) questions about their confidence in understanding the roles of different health professionals along with demographic information.

The University of West England Interprofessional Questionnaire (UWEIQ)

The UWEIQ was selected because it was originally developed to be used for multiple timeframes and was therefore appropriate for a pre- and post-test measure. This questionnaire also uses terminology which is appropriate for a broad range of health professions, similar to those undertaking the online IPE unit. The UWEIQ has 35 items

across four subscales: communication and teamwork, interprofessional relationships, interprofessional learning, and interprofessional interaction. For the interprofessional learning and interprofessional interaction scales, scores from 9–22, 23–31, and 32–45 indicate, respectively, positive, neutral and negative attitudes towards interprofessional learning and perceptions of interprofessional interaction. Scores on the interprofessional relationships scale from 8–20, 21–27 and 28–40 indicate respectively positive, neutral and negative attitudes towards the respondent's own interprofessional relationships. In the communication and teamwork scale, scores from 9–20, 21–25 and 26–36 are considered to indicate, respectively, positive, neutral and negative self-assessment of communication and teamwork skills. For all scales, therefore, a pre- to post-test decrease in scores indicates an improvement—that is a more positive attitude—on the measure. Reliability of the instrument has been reported to range from 0.76 to 0.84 (Pollard et al., 2004).

Roles of health professionals

Respondents were also asked to indicate their level of agreement with the statement, "I feel confident in my understanding of the role of a ... in the healthcare team" for nine specific health professions from 1 (strongly disagree) to 6 (strongly agree) for each profession.

Ethics

The study was approved by Deakin University Human Research Ethics Committee.

Table 1: Number, gender and mean age of students from each profession in the sample

Professions	N of students enrolled in course (% male/female)	N respondents (% response rate for profession)	% male/female of respondents	Mean age (SD) of respondents	% response rate of total sample
Nursing	56 (5.0/95)	9 (16)	0.0/100	28.4 (11.8)	10.2
Dietetics	18 (0.0/100)	3 (16.6)	0.0/100	23.3 (1.1)	3.4
Psychology	81 (11.1/88.9)	18 (22.2)	5.5/94.5	28.5 (7.3)	20.4
Medicine	243 (42.2/57.8)	41 (16.9)	37.5/62.5	25.0 (4.5)	46.6
Social work	54 (5.5/94.5)	10 (18.5)	0.0/100	33.00 (10.8)	11.4
Occupational therapy	42 (9.5/90.5)	7 (16.6)	14.7/85.3	21.6 (0.7)	8.0
Totals	494	88	19/81	26.5 (7.4)	100.0

Analysis

Data analysis was conducted in two stages. First, the participants who completed the online questionnaire both pre- and post-unit delivery were identified and extracted to a pre- to post-unit delivery matched (by person) data set which comprised the data informing this study. Means and standard deviations for the matched pre- to post-unit delivery sample were generated for each of the UWEIQ scales, as well as for the scales measuring student confidence in understanding the roles of the different professions. Any missing scores within a scale were replaced using mean substitution.

Next, as the data were normally distributed, paired sample T-tests were conducted to ascertain any differences in participant responses pre- and post-unit on the UWEIQ and confidence in understanding the roles of other professions questions. The analyses were performed using SPSS Version 17 Compare Means Paired Sample T-test, with SPSS frequencies being used for evaluation of assumptions.

Results

Characteristics of student participants

Of the 494 students who undertook the online IPE unit in 2009 (n=214) and 2010 (n=280), 88 (18%) completed the questionnaire both pre- and post-unit delivery. As the analysis required a pre- to post-matched sample, this subset comprised the data for the current study report.

Table 1 summarises the number of students from each profession and the percentage of males and females for both those enrolled in the course and the questionnaire respondents, along with the mean age of the sample. As can be seen in this table, the number of students from each profession ranged from 3 in dietetics to 41 in medicine. Participant ages ranged from 20 to 53 with a mean age of 26 (SD=7.43). The age group 20–26 accounted for 70.5% (n=62) of the total sample. The next largest age group 27–30 included 12.5% (n=11) of the population. The majority of the sample were females (81%, n=72).

Table 2 presents the results of the pre- to post-unit delivery UWEIQ scores. As seen in this table, the students

Table 2: UWE Interprofessional Questionnaire pre- and post-unit results

UWE-scale	Mean pre-unit (standard deviation)	Mean post-unit (standard deviation)	t	df	Sig.
IP-learning	15.49 (4)	15.88 (4.5)	-.76	87	.445
IP-interaction	34.17 (3)	32.00 (3.5)	6.48	87	<i>p</i> <.001
IP-relationship	19.44 (3.9)	17.22 (2.9)	5.65	87	<i>p</i> <.001
IP-communication/teamwork	23.08 (2.9)	23.17 (2.9)	-.42	87	.671

Table 3: Confidence in understanding professional roles

Profession	Mean pre-unit (standard deviation)	Mean post-unit (standard deviation)	t	df	Sig.
Occupational therapy	3.44 (1.3)	4.73 (0.8)	-8.72	87	<i>p</i> <.001
Social work	3.57 (1.3)	4.44 (1.0)	-6.80	87	<i>p</i> <.001
Nursing	4.17 (0.9)	4.86 (0.9)	-5.92	87	<i>p</i> <.001
Psychology	3.77 (1.3)	4.69 (1.0)	-6.56	87	<i>p</i> <.001
Medicine	4.58 (0.8)	5.03 (0.6)	-4.76	87	<i>p</i> <.001
Dietetics	3.78 (1.0)	4.61 (0.9)	-6.16	87	<i>p</i> <.001
Pharmacy	4.13 (0.9)	4.66 (0.7)	-4.67	87	<i>p</i> <.001
Physiotherapy	4.11 (0.8)	4.66 (0.8)	-5.03	87	<i>p</i> <.001
Speech pathology	3.27 (0.9)	3.74 (0.8)	-4.67	87	<i>p</i> <.001

attitudes towards interprofessional interaction improved significantly from pre- to post-unit (34.17 to 32, $p=0.00$) along with their attitudes to interprofessional relationships (19.44 to 17.22, $p=0.00$). There was no significant change from pre- to post-unit delivery in their attitudes to interprofessional learning or their self-assessment of their communication and teamwork skills.

Table 3 presents the mean pre- and post-unit delivery scores for the questions relating to students' confidence in understanding the roles of nine different professions. As seen in this table, student confidence in their understanding of the roles of other health professions increased significantly for all professions from pre- to post-unit.

Discussion

While the need for IPE and the potential positive outcomes in relation to changes in students attitudes, knowledge and skills is well recognised (e.g., Hammick, Freeth, Koppel, Reeves, & Barr, 2007), the higher education sector is challenged by the many logistical barriers associated with its delivery. Online learning has enormous potential to solve many of the logistical problems of implementing IPE; however, the application of online learning to IPE is still in its infancy. A number of studies have reported some positive student evaluation of asynchronous online IPE (e.g., Miers et al., 2007; Santy et al., 2009); however, few have explored the inclusion of synchronous online IPE in its delivery (Carbonaro et al., 2008;

Waterson, 2011). Deakin University's online IPE unit is unique in that it provides health professional students with the opportunity to learn with, from and about each other in a fully online mode, using both asynchronous and synchronous technology. The aim of this study was to examine the extent to which Deakin's online asynchronous and synchronous delivery of IPE is effective in improving students' attitudes and knowledge associated with IPCP.

The results of this study suggest that the fully online IPE unit was effective in improving students' perceptions of interprofessional interaction and their attitudes towards their own interprofessional relationships. It was also demonstrated that the unit was effective in increasing the students' confidence in understanding the roles of other health professionals. No significant changes were seen for the students' self-assessment of their communication and teamwork skills or attitudes towards interprofessional learning. It is interesting to note that pre-unit, the students already had positive attitudes to interprofessional learning as indicated by a mean of 15.49 on this subscale (scores of 9–22 indicating positive attitudes) and remained positive following their involvement in the unit (mean of 15.88). Unlike the interprofessional learning subscale, there does appear to be room for improvement in students self-assessment of communication and teamwork skills with both pre- and post-unit delivery (23.08 and 23.17 respectively) mean test scores falling in the neutral score range (21–25). Carbonaro et al. (2008) similarly reported improvement in students' attitudes associated with IPCP as

measured by the UWEIQ; however, unlike the current study, they also included a face-to-face component in addition to the synchronous and asynchronous components. Likewise, Waterston (2011) included a face-to-face component; however, the use of synchronous technology was not compulsory for the students nor did the researchers quantitatively examine attitudinal change. The findings of the current study, therefore, build on this previous work by demonstrating that a combination of asynchronous and synchronous online delivery of IPE can have positive effects on students' perceptions of interprofessional interaction, their attitudes towards their own interprofessional relationships and their confidence in understanding the roles of other health professionals, without a face-to-face component. More generally, these results may indicate that the online format of IPE improves student awareness of IPCP, increases the perceived value of IPE and IPCP, and thus facilitates an environment conducive to the internalisation, endorsement and, ultimately, future use of IPCP.

Several limitations to the study findings reported in this paper should be noted. Completion of the questionnaire was voluntary, and while large numbers of students completed the questionnaire pre-unit, response rates for students completing both pre- and post- unit delivery was lower (18%). It is, therefore, possible that the opinions reported may not be representative of students from each cohort surveyed. In addition, it needs to be acknowledged that the results are based on self-report and hence expressed attitudes may

not correlate with actual behaviour. Another limitation is the absence of a control group to compare the actual effect of exposure to IPE on student IPCP attitudes. Finally, due to uneven and, in some cases, small representation from the different professions (e.g., ranging from n=3 in dietetics to n=41 in medicine), differences between professions were not examined in this study. With a larger sample size, examining these differences would be valuable since previous studies show significant differences in the attitudes of students towards IPE and IPCP on the basis of professional background (e.g., Curran et al., 2010; Morrison, Boohan, Moutray, & Jenkins, 2004; Tunstall-Pedoe, Rink, & Hilton, 2003).

While this study demonstrated that fully online IPE can be effective in improving some attitudes associated with interprofessional collaborative practice, more work is needed in the area of online IPE. This study included both asynchronous and synchronous components, although it did not examine the relative effects on attitudes and confidence of each of these components individually. In addition, future qualitative work is needed to focus more closely on the teaching and learning experience of both asynchronous and synchronous online communication mediums. This should focus on the experience of online IPE delivery for students and facilitators and, more specifically, on the experience in each of these distinct mediums. Previous studies have considered the experience in asynchronous delivery from the students' (e.g., Miers et al., 2007) and facilitators' (e.g., Solomon & King, 2010) perspective, but none have

explored the experience of synchronous delivery, or compared the experience of the two mediums. Similarly, no studies have considered the specific facilitator skills required to facilitate synchronous IPE delivery.

Fully online IPE overcomes many of the logistical barriers of implementing face-to-face IPE. This study suggests that fully online IPE may be an effective medium to provide students with the opportunity to work together and learn with from and about each other, improve their IPCP attitudes and, in doing so, ultimately improve client care.

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