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ORIGINAL ARTICLE

A 3-year qualitative evaluation of interprofessional team-based clinical education at an Australian dental school

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Abstract

Purpose/Objectives: This article describes a qualitative evaluation of interprofessional (IP) team-based treatment planning (TBTP) involving dentistry, oral health therapy, dental prosthetics, and dental technology students at the Griffith University School of Dentistry and Oral Health (DOH). Using the same data from a recently published article that looked solely at the quantitative evaluation of TBTP, this article focuses on the qualitative evaluation of TBTP. This evaluation explores the contextual meaning related to the previously published aspects of TBTP that contributed positively toward oral health students' IP clinical learning and identifies themes reflecting students' IP clinical experience.

Methods: Thematic analysis of transcripts from nine focus groups, comprised of 46 final year students and open-ended questions collected from 544 students through an online instrument from 2012 to 2014, explored the question: "What is the contribution of IP student team-based processes on students' perceptions of IP learning and practice at DOH?"

Results: Responses from online participants and student focus groups revealed three major themes: useful role learning, communication confidence, and proactive collaborative teamwork. Throughout each of these themes, students stated they possessed a confidence in collaborating with other oral health students as exhibited through an understanding of profession-specific and IP roles, self-assurance in communicating, and teamwork skills.

Conclusion: Aspects of TBTP that contributed positively toward students' IP clinical learning and practice were meaningfully identified.

KEYWORDS
collaboration, dental education, interprofessional education, shared learning, teamwork

1 | INTRODUCTION

An accepted definition of interprofessional education (IPE) refers to at least two professionals learning with, about and from each other collaboratively to positively affect health outcomes.[1] IP teamwork facilitates diverse professions to work together cooperatively and effectively[2,3] with a shared purpose, using complementary

and overlapping skills, with a mutual commitment to problem solving and delivering effective patient-centered care.[2–5] Mutual respect, a willingness to communicate across diverse professions, and an awareness of both profession-specific and complementary roles is vital for IP teamwork.[6–15] This means that each profession must possess appropriate teamwork knowledge, professional skills and proper attitudes, with the belief that with this knowledge, professionals will better engage in safe and effective collaborative patient-centered care.[16–18]

Therefore, IPE must emphasize co-operative education across diverse oral health programs to develop collaborative competence.[1,19–21] Health professional students must learn with, from and about each other through planned teaching and learning practices before being able to effectively collaborate with others when managing patients.[1,22–24] Facilitating effective team-based care during undergraduate clinical practice contributes to student awareness of IP competencies as learning outcomes,[7,25] which are important skills to have developed by graduation.[6–15]

Accrediting authorities expect students to experience IP collaboration and understand the importance of IP competencies in health care.[26–30] Where the impact of IPE in health curricula was evaluated, shared learning increased understanding of clinical problems, and improved team communication and cooperation developed confidence and assisted students to become more effective team members, particularly when problem-solving complex cases.[17,20,31,32]

1.1 | Teams-based treatment planning

An IP teams-based treatment planning (TBTP) program to advance student collaborative experiences in clinics was introduced at the Griffith University School of Dentistry and Oral Health (DOH).[33–35] Within TBTP, students enrolled in the 5-year dentistry (DSc), 4-year dental prosthetics (DP), and both 3-year oral health therapy (OHT), and dental technology (DT) programs were organized into clinical teams to collaboratively plan and manage patients' oral health care. Within this environment, these programs built upon theoretical knowledge and facilitated experiential learning.[34] In Australia, OHTs provide primary oral health care for both children and adults and are dual-qualified in both dental therapy and dental hygiene.[27] Dental prosthetists, being DTs with advanced education, practice as independent clinicians to diagnose, design, manufacture, and fit removable dentures.[28]

At DOH, tutors regularly supervised student team meetings that focused on treatment planning and the sequencing of collaborative treatment for patients requiring dentures.[34] Experiential learning in clinical and laboratory environments was underpinned by individual preparation (skills development and knowledge) and teamwork philosophies.[36] In the DOH context, each team included at least one other oral health discipline (i.e., learning with), and alternate views were considered (i.e., learning about), which resulted in planning care in a collegial and productive manner (i.e., learning from).

Initially TBTP was evaluated from 2012 to 2014 by analyzing quantitative data collected from students through an online survey.[34] This study explored student perceptions about the strengths and barriers of TBTP upon IP practice at DOH.[34] In the context of this study, IP or collaborative practice referred to an IP team process for communication and decision making that enabled the synergistic influence of students' grouped knowledge and skills to influence the provision of oral health care.[37]

For our previously published article on the quantitative evaluation of TBTP, we had performed a psychometric evaluation of the survey measuring TBTP constructs.[35] That survey measured oral health student attitudes, perceptions, and/or experiences concerning shared learning and constructive teamwork, including role understanding, professional identity, collaboration, communication and team effectiveness, in addition to perceptions of IP clinical learning and experiences.[34] These latter terms refer to awareness surrounding IP teamwork and roles, promoting IP communication and decision-making approaches, and developing clinical reflection[38] of student teams engaged within this study. IP clinical learning related to the commonly accepted definition of IP learning (IPL) as learning arising from interaction between members (or students) of two or more professions (in the clinic). This may be a product of IP education or may happen spontaneously (in the clinic) or in education settings.[39]

Our quantitative evaluation found that developing teamwork abilities, learning with and from other oral health students about their IP roles, facilitating improved communication and respect for other oral health students had a positive impact on IP clinical learning and practice.[34] Evaluation has not continued since 2014; however, routine monitoring indicates students remain positive about IPL, indicating sustained value.

The qualitative analysis described in this paper is not to ascertain how or what is learnt when several oral health professionals come together to discuss a case, but rather the purpose is to ascertain the contextual meaning related to aspects of TBTP that contributed positively toward students' IP clinical learning. Hence, this study explored the question: "What is the contribution of IP

student team-based processes on students' perceptions of IP learning and practice at DOH?"

2 | MATERIALS AND METHODS

Ethics approval was received from the Griffith University Human Research Ethics Committee (HREC) for the online survey (GU Ref No: DOH/21/11/HREC) and focus groups (GU Ref No: DOH/10/13/HREC).

2.1 | Methods

Purposive sampling was selected for this mixed methods research.[40] Qualitative component participants, where perceptions were derived from analyzing open-ended survey responses and focus group replies, were recruited from quantitative component respondents. The two open-ended questions that appeared at the end of the online survey from 2012 to 2014 asked students what worked well and what needed improving within TBTP.[34] The 2012 and 2013 survey comprised all enrolled year 3, 4, and 5 DSc students, year 3 OHT and year 3 DT students. From 2014 onward, due to the OHT program being withdrawn,[34] final year DP students were included as they collaborated with DSc students both in the clinic and laboratory. The total study population over these 3 years was 845 students, from which most of the 544 who voluntarily participated offered open-ended responses.[33–35]

Focus groups are identified as a technique to elicit participant perceptions and attitudes[41,42] as participants can relate personal experiences and impressions to their involvement with educational programs.[43] The 2012 survey findings guided development of focus group questions. These questions elicited student perceptions in 2013 and 2014 about adopting IP practice postgraduation across oral health professionals (OHPs) represented by the diverse programs represented in this study. Questions guided discussion about students' appreciation of collaborative roles, confidence in communicating and collaborating with other team members, perceived benefits to their clinical reasoning skills and viability of dental practice through adopting IP processes post-graduation. Focus groups were conducted with final year oral health students in 2013 and 2014 as all had experienced TBTP. Given their imminent graduation, they were well placed to offer opinions. In 2013 the focus group population included year 5 DSc, year three OHT and year 3 DT students ($N = 108$). In 2014 it comprised year 5 DSc, year 3 DT and final year DP students ($N = 86$).[44]

Table 1 contains the final year student focus group questions.

2.2 | Data collection

Prospective data were collected at similar points in time annually between 2012 and 2014 (online survey) and during 2013 and 2014 (focus groups). Invitations with survey links were distributed near the end of the academic years 2012–2014. The online survey was accessible for 1 month during which time reminders were sent. Participation was voluntary and password protection safeguarded confidentiality and single participation.[34]

An invitation to participate in focus groups was emailed in October 2013 and 2014 to final year oral health students. Students who accepted were allocated to a group comprising of students from their program. This was deemed less threatening to facilitate open discussion and identify common themes.[43] Focus groups were conducted over 1 hour at mutually convenient times during a 2-week period in late October 2013 and 2014. The same questions were discussed with nine program-specific focus groups (five in 2013, four in 2014), each comprising of six to eight participants. In total, 46 students participated in nine focus groups (23 in 2013, and a further 23 in 2014).

To avoid interviewer bias, an external facilitator with no prior IP experience guided each focus group. Demographic data collected included gender, program, age, and ethnicity to assess representation each year. Reflections by the facilitator following each focus group recorded impressions and procedural variations.

2.3 | Data analysis

Transcripts were manually indexed and coded independently by the external facilitator. Content categories were identified and logically ordered into main themes according to thematic analysis principles.[45,46] Central themes were established through an iterative process of organizing, shaping, summarizing, and searching for similarities between categories and themes.[41,47] Transcripts and central themes were shared by the facilitator with a sample of participants to provide comments and verification via email.

Separate to the facilitator, investigators then confirmed consistency across interpretations and meanings by stepping back to reflect on de-identified participant statements[48] to establish meaning and accurate representation of underlying contexts.[45,49] The ensuing thematic analysis, supported by a series of quotes, focused on interpreting identified themes relative to the literature to provide insights both to this qualitative evaluation and to previously published quantitative findings.[41,50]

TABLE 1 Focus group questions (GU ref number: DOH/10/13/HREC).

For each of the following questions please tick one option only.

1. What is your gender?
2. What is the programme and year level in which you are enrolled?
3. In which of the following age brackets do you belong?

   18–20 years 21–25 years 26–30 years 31–35 years 36 years and older

4. To which ethnic group do you most identify?

   Nonindigenous Australian Indigenous Australian Asian Middle Eastern European North American South American African Other

Discussion questions

1) Do you feel confident in understanding when, where and how other oral health care professions play a part in providing care for patients? Why/Why not?
   a. (Prompt—What did you learn about the work of your own profession in interprofessional oral health care teams?)
   b. (Prompt—In what way did the teams' process change your perception of other oral health care disciplines?)
2) Upon graduation—Do you think it will be necessary to collaborate as part of an oral health team to treat a patient or complete a case? Why/Why not?
   a. (Prompt—Please tell me what good points there are about working as part of an oral health care team?)
   b. (Prompt—Please tell me what bad points there are about working as part of an oral health care team?)
   c. (Prompt—What about the patient? Do you think their satisfaction with the level of care received will have anything to do with being treated by a team of oral health care professionals? If yes—What might that be?)

For questions 3 and 4 ask participants to write their score from 0 to 10 against the question number on the original form given at the commencement of the focus group that collected demographic information—this form can be given to the facilitator at the end of the focus group (This will preserve anonymity).

3) On a sliding scale from 0 to 10 where 0 represents the lowest rating and 10 represents the highest rating, how would you rate your overall confidence in being able to communicate with other oral health care professionals in regards to a patient? Please explain your rating *(facilitator to record answers—the participant will not write their answer or names on the demographic form handed in at the end of the focus group).*
4) On a sliding scale from 0 to 10 where 0 represents the lowest rating and 10 represents the highest rating, how would you rate your overall confidence in being able to collaboratively treatment plan for patients/cases with other oral health care professionals? Please explain your rating *(facilitator to record answers—the participant will not write their answer or names on the demographic form handed in at the end of the focus group).*
   (Prompt—would you feel confident in discussing possible treatment plans with a person in another oral health professionals and drawing conclusions from suggestions discussed [even if they were not your suggestion]?)
5) Do you think that your ability to understand clinical problems has improved by working with students in other oral health care programs through the teams' process? Please explain how that has or has not helped.
6) By adopting an interprofessional teams' process in managing your patients/cases when you graduate—do you think it will have any benefit to the practice/laboratory where you might be employed? What might those benefits be? How might it be detrimental?
7) Would you say that by being part of the interprofessional teams-based treatment planning process as a student at Griffith has helped you prepare for clinical practice/work? How has the process helped your confidence/what would you personally change or improve in the process to provide you with more confidence as a graduate?
8) Any other comments?

Thank you for your participation

3 | RESULTS

3.1 | Online survey insights

A participation rate of 64.4% (544 from a population of 845) across all 3 years with the survey has previously been reported where the study samples were deemed representative.[34] From these participants, 346 text responses (63.6%) were recorded for the two open-ended questions.

Over 53% of responses ($N = 186$ from 346) indicated that collaboration with other students was the main aspect of TBTP that worked well, as represented in the following quote:

> "*having monthly meetings with the dental technician and OHT students to talk about how to handle clinical situations between team members helped me appreciate how each of us could work together to treat patients better*" (DSc student, 2012).

Collaboration broadened students' knowledge about treatment planning and how their practice was integrated as illustrated by the following:

> "*sharing case study discussions with team members helped to broaden our knowledge of what to do in certain situations, even though*

TABLE 2 Participation rates by program for focus groups involving final year oral health students during 2013 and 2014.

Study population programs (2013)	Focus groups ($N = 5$)	Focus group participants ($N = 23$)	Final year study population ($N = 108$)*	Participation rate
Dental science (DSc)	2	10	88	11.4%
Dental technology (DT)	2	9	16	56.3%
Oral health therapy (OHT)	1	4	4	100.0%
Study population programs (2014)	**Focus groups ($N = 4$)**	**Focus group participants ($N = 23$)**	**Final year study population ($N = 86$)***	**Participation rate**
Dental science (DSc)	2	10	67	14.9%
Dental technology (DT)	1	6	12	50.0%
Dental prosthetics (DP)	1	7	7	100.0%

**Source*: Office of Planning and Financial Services, Griffith University, 2013 and 2014 (Griffith University Office of Planning and Financial Services 2015).

we were not directly involved with that patient" (DT student, 2013).

Over 23% of responses ($N = 81$) alluded to TBTP facilitating IP referral and its importance to communication, role sequencing, and timely completion of treatment plans. The following quotations reflect these contributions to improved care:

> "*having patients circulated between team members ensured that students understood what was required of them as part of a treatment plan and were better able to perform tasks according to their scope of practice*" (OHT student, 2012), and "*referring patients to the OHTs was simple and enabled faster completion of treatment plans*" (DSc student, 2013).

However, 41 students (11.8%) became frustrated when some peers retained patients instead of appropriately referring to other team members as evident in this quote:

> "*…TBTP…needs more rules to avoid students hogging patients to meet their own assessment requirements. Monitoring is needed to avoid patients being lost to the clinic*" (DSc student, 2014).

3.2 | Focus group findings

Table 2 illustrates focus group participation rates by program of enrolment.

Twenty-three of the 108 final year students enrolled in 2013 (21.3%) participated through five focus groups. In 2014, 23 of the 86 final year students (26.7%) participated in four focus groups. In both years, the participation rate from DSc students was much lower compared to other oral health programs. In 2013, the general distribution for gender, age and ethnicity was similar between focus groups and their study populations. In 2014, the age representation of participants was similar; however, there was an overrepresentation of females, and students identifying as Asian.

Thematic analysis pertained to aspects of IP shared learning associated with positive clinical oral health learning and experience,[34,35] namely learning about roles and responsibilities of other oral health professions, enhanced communication with patients and colleagues, improved student written communication skills, positive perceptions about other oral health care professionals and teamwork skills.[34,35]

Table 3 lists three main themes from students about their perceptions and experiences in collaborative clinical roles during 2013 and 2014. Similar responses are collated with representative quotes.

A theme labeled "useful role learning" (41 like responses from 72 recorded, 56.9%) arose mostly from DSc ($N = 19$, 26%) and OHT ($N = 12$, 17%) student statements. This theme reflected the awareness of profession-specific and overlapping roles including understanding the rationale for sequential collaborative contributions in the clinic. Students noted this as a positive outcome from TBTP.

Two disapproving themes were named/identified. The first one was "disrespecting professional roles" (15 like responses, 21%), with 10 statements contributed by DT students (14%). The second theme was "negative TBTP experiences" (11 like responses, 15%), with eight statements contributed by DT students (11%). These students perceived that the DSc students had limited knowledge about the IP roles that DTs and prosthetists provided and cited instances when treated with disrespect.

Table 4 identifies three main themes relating to student confidence in communicating over both 2013 and 2014.

TABLE 3 Perceived student insights concerning interprofessional roles during 2013 and 2014.

Positive theme	Number of like responses by program	Representative quotations
Useful role learning	DSc 19 (both years), DT 12 (both years), OHT 4 (2013), DP 6 (2014)	*As a dentist, we are required to lead, help, and involve our auxiliaries, and we have learnt how to do this well which certainly reflects a future aspect of our career* (DSc student, 2013) *I can contribute according to my expertise with a treatment plan. Through the TBTP process, I know what I can do and how I fit in as part of the treatment plan* (OHT student, 2013) *Most of the treatment planning is by the dentist, but from our side we know what we can do in the laboratory and advice we can give in the clinic* (DT student, 2013) *I have no problems being part of a treatment planning group. I am comfortable speaking with dentists now I understand what each of us can do* (DP student, 2014) *I have been very fortunate on outplacement in dealing with a lot of difficult and complicated patients (disabled, oncological patients etc.). Have seen a lot more patients on outplacement compared to university and I got a lot of experience in treatment planning with other professionals mainly through appreciating each other's role, which has been extremely beneficial* (DSc student, 2014)
Negative themes	**Number of like responses by program**	**Representative quotations**
Disrespecting professional roles	DSc 1 (both years), DT 10 (both years), OHT 3 (2013), DP 1 (2014)	*Dental students don't know our role and the benefits of having us there, or our limitations* (OHT student, 2013) *Dental students are there to work with us, rather than us supporting them* (DP student, 2014)
Negative TBTP experiences	DSc 2 (both years), DT 8 (both years), OHT 0 (2013), DP 1 (2014)	*I had 16 dental students that I was working with, and only one was respectful* (DT student, 2013) *Dental students don't care what we know, don't consider us, and they only interact with us for their grades. I feel like they demean dental technology students* (DT student, 2014)

The theme "communication confidence" dominated the responses (29 like responses from 50 recorded, 58%) with the majority recorded by DSc (N = 13, 26%) and DT (N = 10, 20%) student statements. Being cognizant about profession-specific and other professions' scope of practice through TBTP underpinned many students' confidence to communicate clearly and concisely with students in other oral health programs. Another theme provided mostly by DSc students (six statements) was named "graduate development" (10 like responses, 20%) as students perceived IP communication skills and knowing how to collaborate with diverse OHPs enhanced both employment prospects and practice sustainability.

The third theme labeled "uncertain communication abilities" (12 like responses, 24%) comprised seven responses (14%) from DT, OHT and DP students. These students perceived that their limited knowledge compared to dentists restricted them from initiating written communication. Five responses (10%) from DSc students indicated they could not perceive themselves translating communication abilities learnt at university into the workplace as they felt inadequate to interact with experienced practitioners.

Table 5 identifies two main themes when students were asked about collaborative teamwork including their perceptions about other OHPs during 2013 and 2014.

When probed about collaborating in a team to provide patient care after graduation, a major theme named "pro-active collaborative teamwork" was identified (83 like responses from 107 recorded, 77.6%) with the majority attributed to DSc (N = 33, 31%) and DT (N = 27, 25%) student statements. Students from all programs believed they acquired communication and problem-solving skills through regular team meetings and interactions in the clinic thereby gaining IP confidence for future employment. Many students perceived limitations regarding any one profession's skills would be addressed through working with other OHPs, resulting in complementary skills to enhance health outcomes. Students reported the capacity to address complex problems lay in collaborating with other OHPs when managing patients in real world practice, rather than didactic learning. IP referral was perceived

TABLE 4 Perceived student insights concerning interprofessional communication during 2013 and 2014.

Positive themes	Number of like responses by program	Representative quotations
Communication confidence	DSc 13 (both years), DT 10 (both years), OHT 2 (2013), DP 4 (2014)	*I wouldn't have a problem contacting another oral health professional with any issue. I know my scope of practice—what I can and cannot do.* (OHT student, 2013) *I am very confident. As a part of the TBTP program, it has been helpful to practice professional communication with the OHTs and technicians.* (DSc student, 2013) *We now have enough knowledge about a lot of denture issues to be able to communicate with dentists and improve patient care.* (DT student, 2014)
Graduate development	DSc 6 (both years), DT 2 (both years), OHT 1 (2013), DP 1 (2014)	*The teams process learned at university will improve communication with colleagues, other health care workers and with patients. I think the practice I work in will run more smoothly if I know how to work with other oral health professionals, what and who to refer to and where to seek or provide advice—not only in the lab, but everywhere generally.* (DSc student, 2013) *The TBTP process has helped me relate patient needs to my lab-work and having interaction with dental students in the clinic. This will be good for job prospects* (DP student, 2014)
Negative theme	**Number of like responses by program**	**Representative quotations**
Uncertain communication abilities	DSc 5 (both years), DT 4 (both years), OHT 1 (2013), DP 2 (2014)	*I would not be confident in suggesting particular types of treatment in referrals as I might not sound professional.* (DT student, 2013) *When it comes to oral surgery and other dental specialties it is more difficult—especially writing referrals, because we haven't been taught that and haven't had a lot of interactions with these specialties* (OHT student, 2013) *I know I don't know everything! Moving to an outside setting will need some coaching as I find it terrifying* (DSc student, 2014)

as an opportunity to learn from other OHPs about collaborative management and where patients received a range of complementary services to optimize their oral health.

A negative theme titled "ineffective teams" (37 like responses, 34.5%) was derived mostly from DSc ($N = 16$, 15%) and DT ($N = 12$, 11%) student responses. Perceptions about untimely referrals delaying completion of treatment plans and students failing to make IP referrals for self-serving reasons were recorded by students in all programs. A minority of DSc students (six like responses, 6%) disclosed they could not comprehend advantages from collaborating with other OHPs and considered IPE a low priority. Ten responses (9%) from DT, OHT, and DP students expressed concern about being able to meaningfully contribute to treatment planning as they had limited or no exposure to certain dental disciplines (e.g., oral surgery) compared to DSc students.

4 | DISCUSSION

This study, through open-ended statements and focus groups, explored impressions connected with team-based processes commonly used to advance IPL and practice. A quantitative evaluation of TBTP found role learning with and from other oral health students, improved communication skills and teamwork abilities including respect for other oral health students were all significantly associated with positive clinical oral health learning and experiences.[34,35] As conclusions from that evaluation related mostly to dentistry students,[34] this study further investigated the impact of TBTP on OHT, DT, and DP students.

From responses in this study three major themes emerged: (a) useful role learning, (b) communication confidence, and (c) pro-active collaborative teamwork.

An appreciation of profession specific and potential overlapping roles and implications for such overlap was expressed through collaborating with students in other oral health programs. Such increased awareness was perceived as a positive outcome. Moreover, being ignorant of these roles was considered a barrier to IP collaboration. Most accounts of role appreciation and understanding role sequencing that built confidence in communicating clearly with other OHPs originated from DT, OHT and DP students. These cohorts believed they

TABLE 5 Perceived student insights concerning collaborative teamwork and other oral health professionals during 2013 and 2014.

Positive themes	Number of like responses by program	Representative quotations
Pro-active collaborative teamwork	DSc 33 (both years), DT 27 (both years), OHT 8 (2013), DP 15 (2014)	*We can't do everything for a particular patient as we have limitations in our own profession—so it is good to be able to work as part of a team to achieve the best patient outcomes* (OHT student, 2013) *It is all about repetition with team interactions. Practice makes perfect. I have improved my abilities in how to manage situations and how to solve problems with a dentist. No need to panic because you have support there* (OHT student, 2013 *It is important to understand the complete process in treating a patient. We don't learn this in our courses, but we do learn it in the team-based process* (DSc student, 2013) *Because we now have some experience talking to students in other oral health programs, we can do it when we start working. Team players are something that employers are looking for (*DSc student, 2013) *There are really good outcomes when there is great collaboration—makes it easy when dental students come down and discuss a case with you, so you better understand what is required* (DT student, 2013) *Communication and treatment planning have been big things learnt from the TBTP process. It makes us feel more important, especially when involved in the clinic by giving opinions on treatment and patients. When the dentistry students ask for your opinion, it makes you feel important*. (DP student, 2014) *When we interact with the dental students, we get a better understanding of what procedures to refer and what information we require from them* (DP student, 2014) *Patients can get a range of services through a team of professionals treating them. I am sure patients would be happy to get the full treatment* (DP student, 2014)
Negative themes	**Number of like responses by program**	**Representative quotations**
Ineffective teams	DSc 16 (both years), DT 12 (both years), OHT 6 (2013), DP 3 (2014)	*We need an even spread of patients. We feel confident performing the most common dental procedures; however, we have not seen cases needing team care a lot. I have noticed that some students keep holding on to interesting cases instead of appropriately referring parts of their treatment* (DSc student, 2013) *I learnt about dentistry from other dental students, but not so much from students in other oral health programs* (DSc student, 2013) *If there were complications (i.e., needing oral surgery, implants etc.), it would be hard for us to understand how that affects the treatment plan and how we could be involved* (OHT student, 2013) *There is a lack of experience regarding all types of treatments at university. We're not sure of what is the best treatment for some cases* (DT student, 2014) *Referrals between different oral health professions that are delayed can negatively affect patient care as can being told different advice by different professionals* (DP student, 2014)

better understood their profession-specific roles and their limitations while gaining valuable experience collaborating as team members with final year DSc students who had returned from outplacement. The literature supports the assertion that collaboration enhances role clarity.[4] However, a minority of these students perceived that their clinical knowledge was limited, which could adversely affect their confidence to collaborate with more knowledgeable dentists. This view emerged through isolated instances where this cohort felt they were treated with disrespect where certain DSc students had limited knowledge of IP roles and/or did not view them as equal members of the oral health care team. Poorly understood team guidelines[32] may have contributed to team conflict and these poor outcomes. However, most DSc students gained confidence through treatment planning with other OHPs on the many complex outplacement cases. When students learnt to collaborate across profession-specific borders, they built relationships and advanced their capability.

Shared learning models are known to improve communication and teamwork.[18,31] The existing literature recognizes effective communication as foundational to IP teamwork, specifically communication that is cognizant of team roles so collaborations are appropriately targeted to specific team members.[6,12,13,15] When elaborating about communication over 50% of focus group responses were recorded by DT, OHT, and DP students. These cohorts identified effective IP referral as an important aspect of communication and teamwork where students better understood the sequencing of their profession-specific roles. Through IP referral, timely completion of treatment plans resulted. This potentially enhanced patient satisfaction with the level of care received. Adherence to referral protocols enhances the quality of patient notes thereby facilitating collaborative care.[11] Untimely referrals, a consequence of poor IP practice, were perceived to delay the completion of treatment plans. This was clearly evident when some DSc students retained patients to perform procedures themselves for self-serving reasons (e.g., to expedite assessment requirements) instead of initiating an IP referral. Consequently, guidelines for IP referral protocols based on patient needs have been developed.

TBTP was recognized by participants in all programs as a platform where students in diverse oral health programs could meet as a team to problem-solve various treatment options and advance their understanding of clinical practice. Students in the DT, OHT and DP programs perceived those skills developed through activities with DSc students substantially improved their understanding of clinical problems and ability to develop treatment plans. Specifically, students learnt when to seek assistance from different OHPs. Students appreciated opportunities to learn directly from one another and build confidence in collaborating around care provision.[4,15,22] However, a minority of DSc students perceived that their prequalification years should be dedicated to learning about profession-specific skills required to practice instead of IPE. These students considered IPE an interference to their dental skills education and therefore a low priority.

4.1 | Study limitations

Since approximately 90% of open-ended responses were provided by DSc students, the low representation of DT, OHT, and DP students and subsequent lack of analysis by students in each of these oral health programs is a limitation, along with the low participation of final year students in focus groups. However, DT, OHT, and DP focus group participation was high indicating that meaningful information could be derived for these programs comprising small numbers of students.[34] Combining qualitative findings from both open-ended questions and focus groups provided in-depth information not obtained from the quantitative evaluation so that the impact of TBTP on these cohorts could be evaluated. The poor DSc representation in focus groups may be attributed to half this cohort attending outplacements or seeking extra clinical sessions to complete requirements necessary for graduation. However, the information collected from DSc focus group participants supplemented the high number of open-ended statements received from this cohort. While the intentions of graduating DSc students to adopt IP processes postgraduation may not have always been congruent with the intended outcomes of the program, this was not the case with DT, OHT, and DP students. Further exploration of DSc student behaviors postgraduation would be useful to determine any change once students commence employment.

The replacement of four OHT with seven DP students in 2014 altered the mix of professional representation resulting in a selection bias. The over-representation of students identifying as Asian and those as female would also contribute toward a selection bias. The over-representation of Asian students at the expense of non-indigenous Australians was minor with female participants being over-represented by an excess of only eight students over 2 years (17%).[44] However the magnitude of proportional representation by each ethnic and gender group remained comparable to final year demographic distributions. The impact of selection biases may be deemed minimal as this study primarily sought to identify the contextual meaning related to quantitative findings and not generalize to other settings.

Social desirability can influence self-report responses (i.e., providing information believed others would deem favorable). However, this bias may have had minimal impact as open-ended responses were anonymous and some unfavorable feedback was received.

4.2 | Implications from findings

Since 2014, TBTP processes have sustained continuous improvements based on reported feedback. These improvements include an IP learning continuum before students engage in TBTP where first year students must view videos that promote IP roles and demonstrate IP communication. Then in succeeding pre-clinical years students engage in a simulated professional team experience.

Tutor training currently focuses on improving mentoring skills in group work toward developing relationships/respect, managing team conflict and IP clinical problem-solving skills within student teams instead of clinical skill refinement. Guidelines for working together in teams

inclusive of referral protocols are now established and monitored regularly.

Since these developments were implemented, students no longer report being treated with disrespect nor declare that collaborative practice is unimportant. Regular monitoring of student IP knowledge, attitudes, and behavior has been positive indicating sustainability of the current TBTP process in assisting students attain IP competency.

5 | CONCLUSION

This qualitative study elicited meaning related to students' understanding of IP roles, effective sequencing of those roles in providing safe and effective care, and enhanced confidence in managing clinical problems through mutual problem-solving. This contributed positively toward effective IP clinical learning and experience through TBTP to enable IP competency upon graduation.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no competing interests. The authors listed in this manuscript have contributed to the design and implementation of this project including preparation of the manuscript. The authors alone are responsible for the content and writing of this paper.

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