

Original Article

Dental students' attitudes and perceptions about intraprofessional collaboration/education



Mohammed A. AlSarhan, BDS, MSc Diplomate of American Board of Periodontology^a,
Razan S. Alaqueely, BDS, MSc, RCSEd^a,
Muhammad Shoaib Ahmedani, M.Sc. Public Health, Ph.D.^a,
Reham N. AL Jasser, BDS, MSc Diplomate of American Board of Periodontology^a,
Dalal H. Alotaibi, BDS, MSc, PhD^a,
Saleh S. Aloraini, BDS, MSc Diplomate of American Board of Periodontology^a and
Syed R. Habib, BDS, FCPS^{b,*}

^a Department of Periodontics and Community Dentistry, College of Dentistry, King Saud University, Riyadh, Saudi Arabia

^b Department of Prosthetic Dental Sciences, College of Dentistry, King Saud University, Riyadh, Saudi Arabia

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المخلص

أهداف البحث: للتحقيق في مواقف وتصورات طلاب طب الأسنان حول التعاون / التعليم المهني الداخلي (التعليم الداخلي) والتعلم المشترك واستكشاف تأثير التعليم الداخلي على التطوير الشخصي والمهني للطلاب المشاركين.

طرق البحث: تم استخدام استبانة مصمم خصيصا في هذه الدراسة المقطعية. تتكون الاستبانة من سبعة عشر سؤالا يستهدف معرفة تصورات الطلاب حول: 1- تفضيل / رأي طلاب طب الأسنان حول التعليم الداخلي؛ 2- خبرة طلاب طب الأسنان حول تأثير التعليم الداخلي على نتائج التعلم والتطوير المهني؛ 3- ملاحظات الطلاب حول أهمية التعليم الداخلي في مختبرات المحاكاة السريرية وإعدادات مكان العمل. قام الطلاب بتقييم كل من العبارات السبعة عشر على مقياس ليكرت من 5 نقاط (النطاق: 1 = لا أوافق بشدة، 5 = أوافق بشدة).

النتائج: تم تحليل ما مجموعه 259 استبانة (معدل الاستجابة = 65%). كان جميع الطلاب على دراية بالتعليم الداخلي في مجال طب الأسنان (متوسط الدرجة = 4.22). فضل الطلاب التعلم التعاوني / المشترك مع زملائهم في الفصل. كان هناك إجماع بين الطلاب حول التأثير الإيجابي للتعليم الداخلي على التعلم المعزز، وتعزيز مهارات الاتصال، وإثراء العلاقات المهنية مع الموظفين الداعمين وكذلك مع المرضى، وتحسين المهارات التحليلية والنفسية الحركية، وفهم المشاكل المعقدة في العيادات، وفهم نقاط القوة والقيود التي تؤدي إلى تحسين الذات وزيادة الكفاءة والإنتاجية.

* Corresponding address: Department of Prosthetic Dental Sciences, College of Dentistry, King Saud University, Riyadh, Saudi Arabia.

E-mail: syhabib@ksu.edu.sa (S.R. Habib)

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الاستنتاجات: كان للتعليم الداخلي تأثير مقنع وقوي وإيجابي وفقا لتجربة طلاب طب الأسنان المشاركين في الدراسة. يوصى بتصميم منهج موحد ووضع مبادئ توجيهية للتعليم الداخلي في مؤسسات طب الأسنان من أجل التفاعل الفعال بين المتعلمين في جميع المراحل.

الكلمات المفتاحية: التعليم؛ التعليم المهني؛ الطلاب؛ الخريجين؛ طب الأسنان

Abstract

Objectives: To investigate dental students' attitudes and perceptions about intraprofessional collaboration/education (IPC/IPE) and shared learning, and to explore the impact of IPC/IPE on the personal and professional development of participating students.

Methods: A custom-designed questionnaire was used in this cross-sectional study. The questionnaire comprised 17 questions targeting to capture the student's perceptions about IPC/IPE using three factors: (1) dental students' preference/opinion about the IPC/IPE; (2) dental students' experience about the impact of IPC/IPE on learning outcomes and professional development; and (3) students' feedback about the significance of IPC/IPE in clinical/clinical simulation labs and workplace setting. The students rated each of the 17 statements on the 5-point Likert scale (range: 1 = strongly disagree to 5 = strongly agree).

Results: A total of 259 responses were analysed (response rate = 65%). All students were aware of IPC/IPE in the

field of dentistry (mean score = 4.22). The students preferred collaborative/shared learning with their own classmates. There was a consensus among students about the positive impact of IPC/IPE on enhanced learning, enhancement of communication skills, and enrichment of professional relationships with supporting staff as well as with the patients. There was also improved analytical and psychomotor skills, understanding of complex problems in the clinic, and understanding of strengths and limitations leading to self-improvement and increased efficiency and productivity.

Conclusion: IPC/IPE had a compelling, powerful, and positive impact according to the experience of the participating dental students. It is recommended that a standardized curriculum be designed and guidelines set for IPC/IPE at dental institutions for effective interactions among students of all stages.

Keywords: Dental; Dentistry; Education; Graduate; Inter-professional education; Students

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Introduction

The vast change in healthcare practice demands rapid updates to professional practice from healthcare providers. One of the major outcomes is to provide patients with high-quality service and management. The challenge starts while preparing healthcare providers with the more extensive capacity to provide thorough patient care under maintained intraprofessional and interprofessional working environments.¹ The World Health Organization initiated an action and framework to encourage implementing this type of education among health science students. The inclusion of interprofessional education (IPE) is a requirement for accreditation of several health professions education studies. Moreover, IPE is a necessary component for preparing students to become members of a collaborative healthcare workforce.²

Interprofessional collaboration (IPC) (collaboration between members of two or more health and/or social care professions to improve the delivery of care) and education are widely described in the literature as key factors that increase the effectiveness of health services. IPE has a positive effect on knowledge about, attitudes towards, and behaviour in IPC and on organizational and patient outcomes.^{3,4} IPC/IPE (collaboration between two or more disciplines within the same profession) and education between primary and secondary care healthcare workers is less well studied, but is becoming important due to the advancing medical/dental technologies and demographical changes, particularly those associated with the COVID-19 pandemic.^{4–6}

To fulfil such training ability and planning treatments, the uniform exposure of students to the necessary clinical cases can build their professional knowledge and management

ability. However, the inadequate number of patients with similar health problems might make the learning process practically impossible. These limitations led to a new concept of utilizing IPC as one of the important learning skills for healthcare students.^{5,7}

IPC is implemented by teamwork distribution among students of different levels in their professional studies to provide complete clinical management and treatment of patients.⁸ This would give students the advantage of learning shared patient care skills during their training, which they can then transfer to their professional practice.⁸ Dental intraprofessional learning (IPL) started in 2006 when formal IPL was tested in seven dental centres. The improvements in facilities and rapid change in medical possibilities necessitate a formal IPL process to be implemented.⁹ IPL is influenced by the amount of interaction among students and the dependency between them.¹⁰ Additionally, the learning process is different than the learning process in the learning outcomes. Tynjala described the process as a way of learning, and the outcome as what is learned.¹¹ The learning process can be formal, which is structured by the institution or is informal where it depends solely on the student.¹² The IPL and IPC are more towards an informal learning process in which students' reactions, opinions, and observations can be expressed by their discussions and reviewing their previous exposures to specific actions. The IPC is claimed to be better with a higher level of communication and collaboration in a healthcare workplace (i.e., medical and dental settings).^{8,13}

Undergraduate/postgraduate training programs, however, do not provide formal training in IPC/IPL; therefore, studies on this subject are scarce.^{4,14} In one of the few studies published on this topic, trainees reported that IPC led to a better understanding of one another's professional roles, responsibilities, and behaviours. They observed that most extraprofessional learning occurs informally in the context of patient care.⁸ To fulfil such training ability and planning treatments, the uniform exposure of students to the necessary clinical cases can build their professional knowledge and management ability. However, the inadequate number of patients with similar health problems might make the learning process practically impossible.^{4,7,15} These limitations led to a new concept of utilizing IPC as one of the important learning skills for healthcare students, in particular for dental school students.^{16,17}

The purpose of this investigation was to explore the level of awareness about the IPE and team-based and shared learning among dental students, as well as to see the impact of IPL on the personal and professional development of students in classroom and clinical settings.

Materials and Methods

This study was a questionnaire-based cross-sectional study.

Study sample

The study comprised both male and female undergraduate dental students studying at the College of Dentistry, King Saud University (Riyadh, KSA). The questionnaire was

emailed to students who completed at least 1 year of clinical training at different academic levels (3rd,4th, and 5th year students) from September to December 2019. Participation in filling out the questionnaire was considered approval/consent for participating in the study. Only completed responses were considered/included in the statistical analyses.

Assessment tool

A custom-designed questionnaire (Table 1) was selected to evaluate students' perceptions/opinions related to IPC/IPE. Some questions/ideas were adopted from previous studies.^{8,16,18} The questionnaire was validated/tested by a pilot study to confirm the consistency reliability (Cronbach's alpha) to determine if the items included contributed to the aim of the study. After validation, the questionnaire was distributed among the students. The questionnaire comprised 17 questions to capture the students' perceptions/opinions about IPC/IPE using three factors: (1) dental students' preference/opinion about the IPC/IPE; (2) dental students' experience about the impact of IPC/IPE on learning outcomes and professional development; and (3) dental students' feedback about the significance of IPC/IPE in clinical/clinical simulation labs and workplace settings. Student's rated each of the 17 statements on the 5-point Likert scale (range from 1 = strongly disagree to 5 = strongly agree). The questionnaire/instrument was chosen for this study because of its convenience, which demonstrated reliability and the ability to assess IPC/IPE perceptions from the student's perspective. No time limit was set for filling out the questionnaire.

Statistical analyses

The actual sample size was determined by G-Power software. With a confidence level set at 95%, power level of 80%, and moderate effect size, the final sample size was calculated to be 180 students. As the study involved only one factor (i.e., sex), descriptive statistics and test of significance were preferred. Initially, Microsoft Excel (version 16; Microsoft Co., Redmond, WA, USA) was used to calculate the mean \pm standard deviation, whereas SPSS, version 23.0 software was used to calculate the t-statistics to determine significant differences among the means.

Results and discussion

A total of 400 dental students were invited to participate in the present investigation to share their feedback and experiences about IPC/IPE through an online survey tool. Of the total population, 285 responses were received, including 26 incomplete or partially filled forms that were excluded from the study analysis. Of the 259 completed questionnaires, 136 and 123 responses were recorded for males and females, respectively, with an overall response rate of 65%. t-statistics were applied to gauge the significance between the responses of male and female students, and did not reveal any significant differences for all questions at $P \leq 0.05$.

Regarding students' preferences about IPC/IPE education, both male and female students stated that learning with fellow students was helpful to develop leadership skills as

Table 1: Questionnaire/research instrument used in the study.

S. No.	Questions
1.	Learning with my fellow students would help me to develop leadership skills as well as to become an effective member of my oral healthcare team.
2.	Team-based learning in clinics would be beneficial for the patients to resolve oral health problems of the patients such as building consensus in diagnosis and treatment planning.
3.	Group learning would enhance my ability to understand patients' problems we deal in the clinics.
4.	Learning with my fellow students would improve my communication skills and professional relationship with the supporting staff as well as with the patients after graduation.
5.	Team-based learning would enhance my analytical and psychomotor skills relevant to the treatment of our patients.
6.	The shared learning would help me to think more positively about dental practice.
7.	The students would learn cooperation, trust, and respect for their colleagues through team-based learning.
8.	Teambuilding skills are essential for students to understand complex problems in the clinics as well as to find effective solutions to address those problems.
9.	The shared learning would help me to understand my strengths and limitations as well as the ways to improve myself.
10.	Learning with my fellow dental students would be an enjoyable experience as well as the best utilization of my time.
11.	It would be highly beneficial and productive for us as dental students to learn together.
12.	I believe that the clinical and laboratory problem solving skills can be better learned while working in a team with my own classmates or fellows.
13.	I would like working on small group projects in a team of students from different academic levels/years.
14.	Shared learning during my BDS studies would help me to become a professionally sound and successful dental practitioner in practical life.
15.	Faculty supervisors in the clinics should encourage shared/group learning and extending support to each other to accomplish the assigned tasks.
16.	I am aware of what my professional role is in the oral healthcare team.
17.	Through shared learning, I will acquire more knowledge and skills as compared to those students who work individually.

well as to form an effective oral healthcare team, as was evident with mean scores of 4.32 and 4.27 on the 5-point Likert scale. Regarding other forms of IPE, female students preferred group learning with a mean score of 4.25, whereas male students preferred team-based learning with a score of 4.31 on the 5-point Likert scale (Table 2).

The dental students' feedback about the impact of IPE on learning outcomes is presented in Table 3 and the comparisons are highlighted in Figure 1. It was evident from the results that the male students attributed the highest ranking (4.26 ± 0.061) to the useful impact of IPC/IPE on understanding and solving complex problems in clinics followed by the impact on

Table 2: Dental students' preference/opinion about intraprofessional collaboration.

Question number	All students			Male students			Female students			t-stat	P value
	N	Mean	SD	n	Mean	SD	n	Mean	SD		
1.	259	4.29	0.73	136	4.32	0.67	123	4.27	0.79	0.53	0.30 ^{NS}
2.	259	4.23	0.83	136	4.31	0.75	123	4.15	0.88	1.60	0.055 ^{NS}
3.	258	4.23	0.82	136	4.21	0.77	122	4.25	0.88	0.194	0.42 ^{NS}

Table 3: Dental students' experience about the impact of intraprofessional education on learning outcomes and professional development.

Question number	All students			Male students			Female students			t-stat	P value
	N	Mean	SD	N	Mean	SD	N	Mean	SD		
1.	259	4.18	0.83	136	4.18	0.80	123	4.19	0.86	-0.10	0.46 ^{NS}
2.	259	4.04	0.82	136	4.04	0.78	123	4.04	0.87	0.034	0.49 ^{NS}
3.	259	4.04	0.86	136	4.02	0.83	123	4.07	0.89	-0.55	0.29 ^{NS}
4.	259	4.02	0.89	136	3.94	0.91	123	4.10	0.86	-1.42	0.079 ^{NS}
5.	259	4.21	0.76	136	4.26	0.71	123	4.15	0.81	1.18	0.12 ^{NS}
6.	259	4.14	0.79	136	4.19	0.74	123	4.09	0.84	1.04	0.15 ^{NS}
7.	258	4.04	0.91	136	4.00	0.89	122	4.07	0.93	-0.62	0.27 ^{NS}
8.	258	4.10	0.83	136	4.04	0.77	122	4.15	0.89	-0.90	0.18 ^{NS}

understanding the strengths and limitations of personal development (4.19 ± 0.063), improvement in communication skills and professional relationship with the supporting staff and patients (4.18 ± 0.068), and enhancement in analytical and psychomotor skills (4.04 ± 0.067) for questions 8, 9, 4, and 5, respectively. Female students associated the highest impact of IPC/IPE (4.19 ± 0.078) with the professional relationship and communication skills attained through learning with class fellows; followed by its impact on solving and understanding

complex problems in the clinic (4.15 ± 0.073); developing mutual cooperation, trust, and respect (4.10 ± 0.078); understanding strengths and limitations for personal improvement (4.09 ± 0.076); and thinking more positively about dental practice (4.07 ± 0.080) for questions 4, 8, 7, and 9, respectively (Table 3).

Table 4 displays the dental students' feedback about the significance of IPC in the clinical and workplace settings. The results revealed that both male and female dental students were aware of their role while

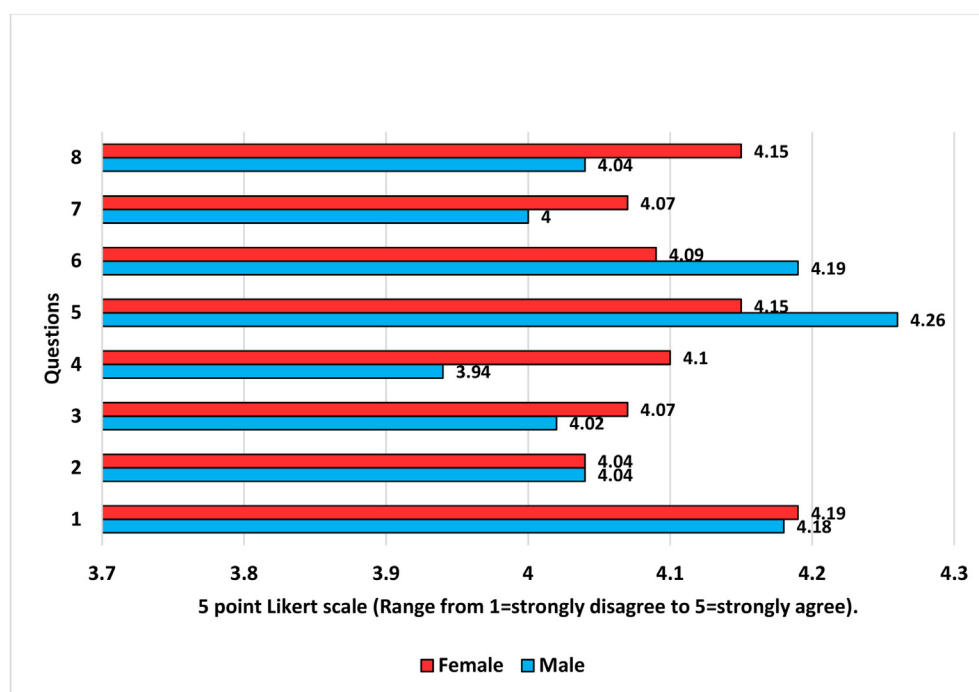
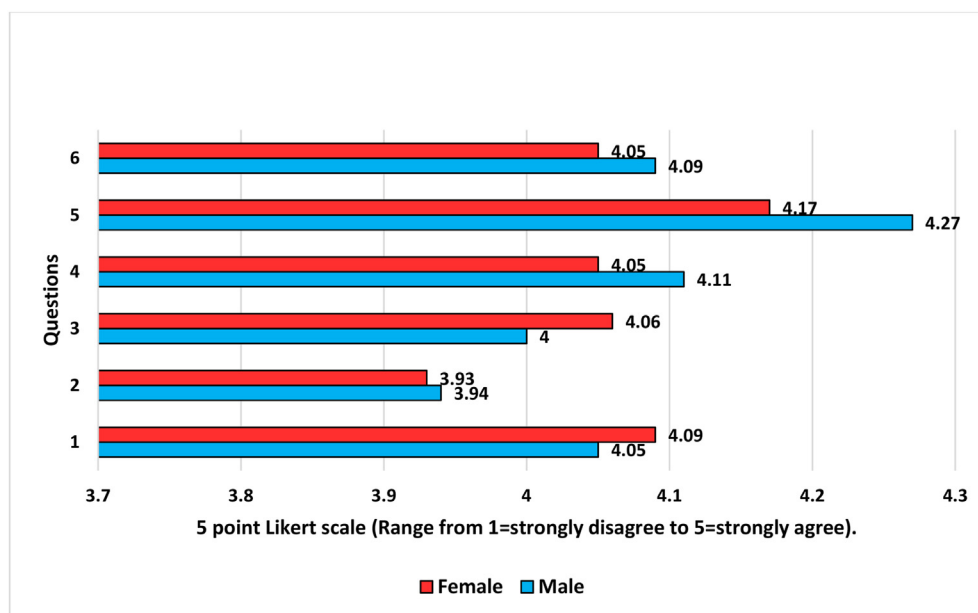
**Figure 1:** Comparison of the responses related to learning outcomes and professional development.

Table 4: Dental students' feedback about the significance of intraprofessional education in clinical/clinical simulation labs and workplace settings.

Question number	All students			Male students			Female students			t-stat	P 0.05
	N	Mean	SD	N	Mean	SD	N	Mean	SD		
1.	259	4.07	0.80	136	4.05	0.77	123	4.09	0.83	-0.38	0.35 ^{NS}
2.	259	3.93	0.94	136	3.94	0.94	123	3.93	0.93	0.123	0.45 ^{NS}
3.	259	4.03	0.78	136	4.00	0.76	123	4.06	0.79	-0.59	0.28 ^{NS}
4.	259	4.08	0.87	136	4.11	0.80	123	4.05	0.95	0.56	0.28 ^{NS}
5.	259	4.22	0.74	136	4.27	0.67	123	4.17	0.81	1.10	0.14 ^{NS}
6.	259	4.07	0.86	136	4.09	0.82	123	4.05	0.91	0.36	0.36 ^{NS}

**Figure 2:** Comparison of the responses related to clinical/clinical simulation labs and workplace setting.

collaborating in teams (4.22 ± 0.046). However, the level of awareness was more pronounced in male students compared to their female counterparts, as indicated by the mean scores of 4.27 ± 0.058 and 4.17 ± 0.073 for question 16 (Table 4).

Table 4 further reveals that the male students attributed the second highest score of 4.11 ± 0.069 to their judgment that their clinical supervisors should encourage group and shared learning among students so that they may support each other to accomplish the assigned tasks. However, the corresponding score of female students for question 15 was comparatively low (4.05 ± 0.086) on the 5-point Likert scale. Both male and female students had the view that clinical and laboratory problem-solving skills can be better learned while working in a team with their own classmates or fellows, as depicted by the mean scores of 4.05 ± 0.066 and 4.09 ± 0.075 for question 12 for males and females, respectively (Table 4). Comparisons between the responses of male and female students are further highlighted in Figure 2.

Discussion

IPC/IPE is regarded as one of the most promising solutions for revamping the healthcare education sector.¹⁹ The

advantages of IPC/IPE are many and may help address some of the major concerns within the currently employed dental education systems worldwide.^{18,19} To acquire the model/practices of IPC/IPE, educators of the healthcare sector must play a role in preparing academic programs in order for the students to work collaboratively.²⁰ Despite the many advancements in IPC/IPE at different levels of implementation, many issues still exist and remain unresolved, particularly in the field of dental education.²¹ The present research study adds to the literature by investigating the opinions and perception of dental students, studying at different levels with respect to their experience about IPC/IPE in the dental school.

IPC/IPE involves collaborative learning among students enrolled or working in different departments or disciplines of the same profession.¹⁸ The literature reveals that the IPC/IPE among dental students enriches their educational experiences, enhances their learning, and supports practice skills.²² The IPC/IPE also significantly improves the understanding of healthcare professionals about their role and responsibilities.^{23,24} Furthermore, it enhances the understanding of shared oral healthcare among students belonging to different disciplines within the same profession.¹⁸⁻²⁴

The present investigation revealed that all participants, irrespective of their sex, prioritized collaborative and shared learning over working individually. Our findings are in accordance with those of Brame et al.²⁵ who reported that 86% of dental students and 97% of dental hygiene students stated that IPE enhanced their clinical skills and relationship during and after graduation.²⁵ The results of the present investigation revealed that both male and female students prioritized IPC/IPE with their own primary and high school classmates compared to team-based and group learning with students belonging to or graduated from other institutions. This is natural because there is a likelihood of enhanced understanding, friendship, and coordination among old classmates compared to those who become classmates at later stages.²⁶ Parker²⁷ reported enhanced learning among students who are classmates and live together compared to those who randomly group together.²⁷ The classroom is a place where students not only learn but interact with each other and develop social relations with each other.²⁸ Such classroom interactions result in the development of positive or negative behaviours, liking or disliking ambitions, and expectations that bring likeminded students closer as friends with strong bonds compared to those who become classmates at the college and university levels.²⁹ There are several factors that influence IPC and shared learning, such as individual characteristics of members, team culture/climate, team processes to manage challenges, building a climate of trust, developing shared goals, and coordination of work processes.^{30,31} Differences in the students' attitudes and perceptions with regard to teamwork mainly appeared related to their year of study. The students' feedback about their preference for IPC/IPE collaboration with their own class fellows was further validated by their answer to question 12, where they disclosed that clinical and laboratory problem-solving skills can be better learned while working in a team with their own classmates or fellows compared to shared or team-based learning with students who joined the team or group at later stages.

An additional essential and vital aspect of the healthcare education systems, in particular dental education which the IPC/IPE can address, is the shortage of faculty at dental schools. The shortage of academic/teaching faculty members in dental schools is increasing and its consequence on students learning outcomes are acknowledged by dental institutions throughout the world including developed countries such as the United States, United Kingdom, and Australia.³² The reasons for the shortage of faculty are multiple depending on the professional, clinical, and teaching conditions in each country, and are beyond the scope of this article.³³ However, these issues must be solved to ensure the highest quality standards in healthcare professional education systems including dental schools. In some dental schools, the existing structure of education has been modified to compensate for missing faculty numbers with junior faculty or even with senior undergraduate students under the supervision of a senior faculty who acts as the team leader.³⁴ These kind of changes aim to highlight the responsibility of the students and the process of IPC/IPE, which enhances the learning process of students and tries to address the human resource shortage. Nevertheless, the opportunity of undergraduate students to obtain the best

possible education from senior faculty cannot be compensated for even after their graduation.³²⁻³⁴

The IPC/IPE not only has a positive impact on the quality of learning of weak (below average) students in the group but also enhances and polishes the communication, leadership, analytical, and psychomotor skills (hand skills) and confidence of the good (above average) students. This certainly helps them handle complex cases/scenarios in the clinic, and the understanding of the strengths and limitations leads to self-improvement and increased efficiency and productivity.^{16,19,22,25}

Despite the several advantages of IPC/IPE, it is still challenging. Both undergraduate and postgraduate programs are designed for students to work collaboratively.²² Here, students are organized into small-scale groups, which are inclined to result in friendships among different levels of students. These friendships may result in compromising the actual learning objectives intended to be achieved by working together and may become interdependent or blurred for weak students.³⁵ Within these groups, the emphasis should be on the role of the course tutor, who ensures group development and hence its success as a potential learning device. Variations regarding different topics/concepts within various subjects/specialties among students may occur.³⁶ The difference of opinion may give rise to conflicts among the students, compromising the quality of the IPC/IPE-associated tasks. Some factors that can affect the interaction and team performance include the individual behaviour/characteristics of the members, group culture, group processes in place for managing a challenge, lack of trust among members, absence of shared goals, and coordination during the different tasks assigned.^{22,25}

The inclusion and participation of dental students from only one dental school in this study was a limitation of the study, as it is not a true representation of the dental students around the globe. In addition, assessment of the students' performance in terms of grading overall skills that were assumed to be acquired after the IPC/IPE-associated tasks would have been interesting. Furthermore, assessment of the students' attitudes, acceptance of the IPC/IPE, and their opinions about the frequency of IPC/IPE-related tasks would have been of value. Nevertheless, this study highlighted some key areas with respect to IPC/IPE, and it will be important for dental educators/researchers to continue their research in terms of student outcomes with this kind of curricular design. Future investigations of the IPC/IPE model should include an increased number of participants as well as students from different dental schools around the world for a true representation of dental students.

Conclusions

Even early in this curricular design, the IPC/IPE had a compelling, powerful, and positive impact on the participating dental students' experience, with more gains anticipated in the future. Overall, the students were aware of the benefits and showed keenness/interest in the IPC/IPE-related model and were willing to be engaged further. It is recommended that a standardized curriculum be designed and guidelines set for IPC/IPE in dental institutions for tailoring appropriate and effective interactions among students of all stages, which will certainly improve the local programs.

Source of funding

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Conflict of interest

The authors have no conflict of interest to declare.

Ethical approval

This study was reviewed and approved by the Institutional Review Board (IRB) of King Saud University Medical city (Ref. No. 19/0588/IRB).

Authors contributions

Conceptualization, M.A. and R.A.; methodology, M.A., M.S.A.; software, S.R.H; validation, R.A., D.A. and S.A.; formal analysis, M.S.A. & S.R.H.; investigation, R.A., M.S.A.; resources, M.S.A.; data curation, R.A., M.A.; writing—original draft preparation, R.A., D.A., S.A.; writing—review and editing, M.A.; supervision, M.A.; project administration, M.A.; funding acquisition, R.A. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

Data availability

The data is available on request from the corresponding author.

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