First exposure of undergraduate students to removable prosthodontics concepts: opinions, attitudes and current trends in teaching

Nesreen Salim[1], Sandra AlTarawneh[1], Motasum Abu-Awwad[1]

Abstract

Objectives: The aim of this study was to investigate the opinion of undergraduate students regarding the different taught preclinical and technical steps in complete denture (CD) and removable partial denture (RPD) courses. And to assess the difficulty of the prosthodontic courses in comparison with other preclinical courses such as conservative and endodontic courses.

Materials and methods: a questionnaire was distributed to 203 third year dental students. The questions were about the didactic and practical exercises for both CD and RPD.

Results: In CD course, 47.2% reported balanced occlusion as the most difficult theoretical topic and exercise to understand, 50% thought the most difficult step in balanced occlusion was to obtain balance on the non-working side, while 2.5% reported custom tray fabrication to be most difficult step. Morning lectures, afternoon labs, and live demonstrations were favoured by the majority. In RPD course 38.8% reported RPD design as the most difficult exercise and the second most difficult theoretical topic, followed by surveying, primary impression and custom tray construction. Kennedy class IV was the most difficult to design and adjacent occlusal rest seats were the most difficult to prepare. There was significant correlation between students' practical marks and their opinion of practical course difficulty (coefficient 0.179, *P*= 0.035, for RPD) (coefficient 0.348, *P*= 0.000, for CD). The correlation coefficient between the students' theoretical and practical marks was 0.132 and *P*= 0.099 was insignificant. Response rate was 88.6%.

Conclusions: Removable prosthodontics is one of the most difficult preclinical courses which requires a well-established and continuously updated curriculum. Therefore, continuous assessment of teaching methods is of paramount importance.

Keywords: Removable prosthodontic education, Preclinical dental education, Survey, Curriculum, Complete dentures, Partial dentures.

(J Med J 2021; Vol. 55 (3):131-144)

Received	*Accepted*
2020-05-27	*April, 27, 2021*

1. Introduction

According to the World Health Organization (WHO), edentulism is considered a disability; and despite the reduction in the rate of edentulism, the number of edentulous individuals remains high as a result of the increase in the number of population[1,3]. The need for treating edentulous patients with conventional complete dentures will continue to be a burden especially in developing countries[4,5]. Therefore, removable complete (CD) and partial denture (RPD) prosthodontics constitute a significant part of dental schools' curriculum[1].

1 Faculty of Dentistry, University of Jordan

Corresponding Address:
Salim, AlTarawneh, Abu-Awwad
Department of .
Email: n.salim@ju.edu.jo

The preclinical prosthodontics curriculum is highly important, considering that the number of persons over the age of 65 years is expected to double by the year 2030, with the percentage of those needing treatment with complete dentures remaining almost constant[6]. As a result, knowledge and clinical skills in treating patients with edentulism will be even more important in the decades to come[1]. Dental schools worldwide continue to provide preclinical and clinical courses related to complete and partial dentures. However, there is a wide variation of the content and methods of teaching among different dental schools[5,7-12].

There is a need for an extensive efforts generally to ensure that new graduate students continue to be able to offer a complete denture service to the public[7,8]. Considering that the need for conventional CDs and RPDs as a treatment modality will remain required. It is the dental school's challenging responsibility to assure that graduates are capable of performing these procedures with confidence[5,7,8,13].

The Issue of inadequately prescribed and designed removable partial dentures (RPD) has been recognized for decades now[12,14,15]. This is partially due to the lack of a detailed focus on this topic from the educators' side[12]. Likewise, leaving the design part to the dental technician to do instead of the dental practitioner, could be another reason[11,12].

Previous surveys have shown variability in the amount and content of teaching received by the dental students[11,12,16]. Clinical and technical steps in RPD programs vary from one school to another, yet a large percentage of schools agree on many topics and steps. Some dental schools identified differences in some aspects such as the use of custom trays for final impressions and types of artificial teeth used, and similarities in some other aspects such as teaching of border molding for edentulous areas of RPD final impressions, the use of wax relief on teeth and edentulous areas, and delegation of framework fabrication and flasking of the RPDs to the laboratory technician[11,12,16].

According to results from previous surveys on RPDs education[11,12,16], it seems that educators should follow a systematic approach in teaching RPD design principles in detail to enable the dental graduates to practice design and to write a proper instructions to the laboratory technicians. There have been attempts to make pedagogical approach for preclinical courses for RPD more interesting to students by utilizing a team based learning[17], student self-assessment[18], and videotaped and live demonstrations[19]. All of which showed positive results in students understanding for the topic and served as a better predictor for future learning capabilities[17,18,20].

Assessment methods are also variable among different schools[8,21]. According to a survey assessing students' competency in removable prosthodontics[8], it was found that continuous assessment and internal examinations are the most common methods of evaluation. Regarding the assessment of students' competency in complete denture construction in British dental schools, only one school has a degree examination in prosthetic dentistry although four schools have a section of the final exam, and in a further three schools' students are at risk of being examined in the final examination as they did not get enough training[8]. A blended approach of traditional and electronic delivery of course material has also been reported with positive results[21].

The aim of this study was to report on third year dental students' assessment of the prosthodontics preclinical course provided at the University of Jordan. The study explores students' perception in regards to details of the taught exercises and teaching pedagogies (lectures, audio-visuals), in addition to relating the responses to their performance in prosthodontics course and other practical preclinical courses.

2. Materials and Methods

This study was granted an ethical approval by the Dental School at the University of Jordan Ethics Committee prior commencement. The study was conducted among third year dental students at the

University of Jordan giving a sample size of 180 participants, all students in the third year at this school were included.

The study consisted of two parts; part I constituted a series of evaluations of competencies (marking) related to the preclinical and technical tasks of complete denture (CD) and removable partial denture (RPD) construction. Part II was survey-based to gauge students' opinions and attitudes regarding the taught exercises in preclinical prosthodontic course and the level of difficulty of the course from their perspectives. Finally the marks of preclinical exercises in part I were correlated to the difficulty scores given by students in part II.

Part 1:

The evaluated competencies included thirteen exercises covering different steps of CD construction and ten exercises covering different steps of RPD construction. Each exercise was evaluated by two supervisors and averaged mark was taken (out of 10 for each exercise). The evaluations of the prosthodontic preclinical skills were compared to the students' perspectives regarding course difficulty, and to their performance in endodontics and conservative preclinical courses.

The preclinical exercises (evaluated competencies) for CD construction were: making primary impressions using impression compound, producing primary cast, making special try using light-cured acrylic, beading and boxing, constructing upper and lower wax rims, registration of jaw relation, mounting, setting maxillary anterior and posterior teeth, setting mandibular anterior and posterior teeth, and creating balanced occlusion and festooning.

The preclinical exercises (evaluated competencies) for RPD construction were: making primary impressions using alginate, producing primary cast, surveying, preparing guiding planes and rest seats on jumbo anterior and posterior teeth, preparing guiding planes and rest seats on acrylic anterior and posterior teeth, design of Kennedy class I, II, III, and IV RPDs, and custom tray construction.

Part II:

The questionnaire was designed, based on previous studies[11,12]. The questions were revalidated by an experienced prosthodontist (NAS). Additionally, a pilot study was performed on 25 subjects to evaluate the questionnaire clarity. The questionnaire was modified accordingly. The final questionnaire comprised of demographic details, 14 close-ended multiple-choice questions about CD and 14 questions about RPD to assess students' opinions and attitudes regarding the taught exercises in preclinical prosthodontic course and the level of difficulty of the course from their perspectives. The questionnaire was accompanied by a covering letter signed by the main investigator, explaining the aims and the objectives of the study and indicating that all information would remain confidential and anonymous. Questionnaires were individually distributed to the students who were working in different groups and collected at the same day from a general designated area to maintain anonymity. Students were informed of their right not to complete the questionnaire or any specific question within the questionnaire and informed consent was obtained. Questions in the questionnaire dealt with the following aspects:

- Demographic: one question
- Description of tasks and exercises (Practical): seven questions including the preferred time for lab and the preferred teaching method
- Description of theoretical experience: three questions including the preferred time of the lecture
- Difficulty of the course: three questions

Statistical analysis

The data collected and analyzed using Statistical Package for the Social Science software (SPSS version 20; IBM, Armonk, NY).

Categories were given a numerical code and corresponding labels to ease computation and to avoid possible confusion. The sample characteristics, and findings underwent

descriptive analysis and the results presented in percentages. A Spearman's correlation test and an Independent Sample T-test were used at the $P<0.05$ level of significance.

3. Results

Response rate details:

The questionnaire was disseminated to 203 students. There were 180 usable responses (63 males, 117 females) which accounted for 88.6% response rate[22,23]. Usable responses were the ones who partially or completely filled the questionnaire. Non-respondents included those who did not respond or returned blank copies.

Responses to the practical part questions:

A descriptive analysis of the data was carried out (Figure 1). The most difficult practical exercise reported by the students was achieving balanced occlusion during teeth setting (47.2%). This was followed by teeth setting in general (28.9%), jaw relation registration and mounting (12.6%), wax-up and festooning (5%), stock tray selection and primary impression (3.8%) and finally the custom tray construction (2.5%). There were no differences detected between females and males. Both genders agreed on the same sequence.

The most difficult part of teeth setting was reported to be setting of maxillary posterior teeth (36.5%). This was followed by setting mandibular posterior teeth (32.1%) and setting lower anterior teeth (18.5%). The easiest part of teeth setting was reported to be upper anterior teeth (12.1%) (Figure 2).

The most difficult part in achieving balanced occlusion, which was reported by (50%) of the students, was getting contact on the non-working side. This was followed by getting contact on the working side (27.3%) and on protrusion (22.7%). Achieving the curve of Wilson was reported to be more difficult by (68.2%) compared to achieving the curve of Spee (31.8%) as seen in Figure 2.

The most difficult practical exercise reported by the students For RPD was RPD design (38.8%). This was followed by surveying (30.9%), primary alginate impression (21.6%) and custom tray construction (8.6%) (Figure 3). There were no differences detected between females and males. Both genders agreed on the same sequence.

Students reported indirect retention to be the most difficult RPD design principle to understand (36.8%). This was followed by reciprocation (22.1%), indirect support (20.6%), bracing (16.9%), direct retention (2.9%) and direct support (0.7%). The results were shown in Figure 4.

Kennedy classification class IV was reported as the most difficult Kennedy classification to design (38.8%). This was followed by class I (27.3%), class II (17.3%) and class III (16.5%).

The most difficult rest seat to prepare was reported to be the inverted V (66.9%). Followed by adjacent occlusal rest seats (10.3%), ball rest seat (8.8%), and incisal hook (5.9%). The occlusal rest seat and the cingulum ledge were both reported by 3.7% of the students, and only 0.7% reported the incisal ledge.

Responses to theoretical part questions:

Achieving balanced occlusion was reported to be the most difficult theoretical part to understand by 47.2% of the students (Figure 1). This was followed by processing and flasking of the acryl (20.1%), jaw relation registration (17%), teeth setting (9.4%), secondary impression (3.1%) and primary impression (2.5%). This sequence was similar for males and females.

In RPD, the students reported the most difficult topic to understand to be RPD processing (41.7%), followed by the principles of RPD design (37.1%), surveying (12.9%), and examination and case selection (7.9%) (Figure 3). Similar sequence was reported for males and females.

Preferences for lecture and laboratory times and methods of teaching:

The majority of the students (73.7 %) preferred the lecture time to be in the morning, (19.2%) preferred the lecture to be in the afternoon, while the rest were indifferent to the lecture time. Of all the students, (64.3 %)

preferred the laboratory session time to be in the afternoon while (27.4 %) preferred a morning laboratory session. The rest were indifferent to the lab time. Most of the students (76.7%), preferred the lectures to be given before the laboratory sessions. Of all the the students (61.8%) preferred a live demonstration while (30.6%) preferred a recorded video demonstration. Only (7.6%) preferred no demonstration at all.

Responses to difficulty of the course questions and correlation with students' marks:

Students who reported the theoretical part to be more difficult than the practical part were (51.9%) of the sample, while (48.1%) of the sample reported the practical part to be more difficult.

The majority of the students reported the course difficulty to be average (44.9%) to difficult (42.3%). While (7.1%) only reported it to be very difficult and (5.8 %) reported it as easy or very easy.

Spearman's correlation coefficient was evaluated to assess any association between students' practical average marks and the practical course difficulty. The correlation coefficient was .348 (P-value = .000), this was statistically significant.

Comparing the course difficulty with other preclinical dental courses:

According to the students' responses to the survey, the removable prosthodontics course was reported to be more difficult (61.3%) than the conservative (27.7%) or the endodontic courses (10.9%).

According to the students marks, a paired sample t-test revealed no significant difference between the average marks for the prosthodontic preclinical practical course and the conservative preclinical practical course (Mean difference = .681, P-value = .412 [95% CI = -.967 to 1.48]). However, a paired sample t-test revealed significant difference between the average marks for the prosthodontic preclinical practical course and the endodontic preclinical practical course. (Mean difference = -4.11, P-value = .000 [95% CI = -.967 to 1.48]).

4. Discussion

For the next 20 years, unmet prosthodontic needs will continue to grow and outstrip service availability. Set and reversible partial denture treatments will continue to be required by a significant portion of the population, according to practicing dentists[24]. The provision of removable dentures is a basic and important skill that a dentist should master to be able to treat edentulous patients[25]. The General Dental Council requires all new graduates to be competent at 'designing effective indirect restorations and partial dentures[26], as poorly designed and constructed dentures can damage oral tissues[27]. Furthermore, there are now legal, ethical, and educational guidelines that require dental practitioners to clearly and adequately design RPDs[28]. Despite all these regulations, fundamental problems with the design and fabrication process of a variety of prostheses in general dental practice persist, and this mainly related to educational issues[11]. Therefore, dental education programs must continually evaluate their removable prosthodontic curriculum to ensure that the dental health needs of the society and the goals and objectives of the commission on Dental Accreditation of the ADA are being met[29].

Improving the undergraduate removable prosthodontics curriculum is highly important to address this problem and to overcome the weaknesses in providing partial and complete prostheses[7,30,31]. This study addressed and shed light on the level of difficulty of different skills in CD and RPD construction from students' perspectives, and provided recommendations to improve the teaching procedures in prosthodontics at undergraduate level as no previous studies have considered this issue. Moreover, no researches investigated the attitude and opinions of undergraduate dental students at preclinical training in their first exposure to different skills and concepts of CD and RPD by using prosthodontic curriculum survey, which is a

useful tool in assessing and improving prosthodontic education[29].

Student's opinion on the preclinical courses from different aspects was investigated in this study. Results showed that among the CD construction steps, achieving balanced occlusion during teeth setting was the most difficult practical exercise and theoretical part to understand. Concepts of balanced occlusion are difficult to understand and to apply at this stage. This highlights the need to increase time devoted to teach this topic and to introduce more technologies and aids to explain this concept. On the other hand, custom tray construction was the easiest practical exercise and primary impression was the easiest topic in theory. These two last mentioned steps are straightforward and do not involve any complicated concepts which makes them easy to understand and to apply. Importantly, the difficult steps in constructing CD is different when comparing theory to practical. For example the second most difficult practical step was teeth setting; however, jaw relation was the second most difficult topic to understand in theory. This is in accordance with a previous study in which the undergraduate students felt less confident to understand jaw relation recording[32].

The most difficult practical exercise reported by the students in RPD was RPD design. This may be because designing needs a solid knowledge of physics and biomechanics. This was followed by surveying, primary alginate impression and custom tray construction. Regarding RPD design principles, indirect retention was reported by students to be the most difficult subject to understand. This was followed by reciprocation, indirect support, bracing, direct retention and direct support. Kennedy classification class IV was reported as the most difficult Kennedy classification to design. Our results cannot be compared to any previous studies as this is the first study to sequence the step in RPD construction according to their difficulty. However in a previous study when vocational trainee asked which part of making a cobalt chromium RPD they found most difficult, (70%) of the respondents reported designing and surveying were the most difficult steps[11].

For theoretical part, the most difficult topic to understand was RPD processing, followed by the principles of RPD design and surveying. Processing and flasking are purely laboratory steps, and there is a clear trend toward the increased use of technicians' help for the completion of laboratory-related tasks[16]. This trend is supported by the fact that the majority of the United States of America's (USA) dental schools (93%) do not require students to flask their RPD cases[16]. This is also consistent with a previous survey of preclinical RPD curricula of USA dental schools that found a majority of schools (91%) did not require processing of RPDs by students in the laboratory[10]. These schools are focusing more on teaching their students to become competent in clinically relevant skills rather than laboratory-related skills[33]. Therefore, principles of RPD design are considered more important to dedicate more time in the curriculum, where designing is the duty and responsibility of the clinician as stated clearly by Guidelines in implant and prosthetic dentistry[28]. Likewise, a study of clinical CD programs revealed that (80%) of dental schools were not requiring students to flask their CD cases[34].

The current curriculum for CD and RPD in the dental school under study is applying the same standards that have been published by The British Society for the Study of Prosthetic Dentistry[35]. Continuous assessment and internal examination are the most common methods of testing undergraduate students' competence in prosthetic dentistry, this was also the method applied by the examiners in the dental school under study. The average duration of a preclinical course in removable partial dentures in our school is 64 contact hours which is nearly the same as that of UK and Ireland dental schools and even higher than the average of USA dental schools (55h)[10, 12].

In the current study, the majority of the students preferred the lecture time to be in the morning rather than in the afternoon, which is the best time for learning. And the majority

preferred the laboratory session time to be in the afternoon as this task can be achieved in the afternoon where they do not need high cognitive function. Moreover, most of the students in this study preferred the lectures to be given before the laboratory sessions, as they prefer to be oriented by receiving theoretical knowledge before enhancing practical application and to enable the students to correlate the procedure to the lecture. These results are in line with previous studies which showed that students learn more in the morning than later in the school day[36-38]. Analyzing how the time of the day affects students' productivity and efficiency and rearranging the order of performed tasks throughout the school day can be a vital focus of policymakers to increase the efficiency of teaching[38]. Accordingly, rearranging school schedules is a critical strategy leading to increased academic performance[36, 38].

Live demonstration was the preferred teaching technique by the majority. Few students preferred demonstrations using videos instead. Several authors reported that students perceived clinical videos as not preferable to live demonstrations but they were good supplementary material for self-study due to revision convenience and effectiveness for clinical session preparation[19,39,40]. However, it has been reported previously that both teaching methods live and video developed a similar level of understanding of the principles of exercise, although the students preferred the live demonstrations[19,41,42]. This preference could be explained by increasing the perception of confidence in dental students when treating patients requiring removable partial dentures but this method is time consuming[43]. Moreover, in a previous study for teeth preparation, students preferred the video-clips to the live demonstrations, as videos have the advantage that they can be reviewed at home[44,45]. Videotaped recordings have been used as a teaching tool for many years; a major advantage of videotaped demonstrations is that they enable better visualization and it can be used as a reference for self-directed student learning[19]. Moreover, videotaped demonstration has been shown to be more effective than the traditional lecture as a means of teaching clinical skills[46].

According to the current study, the majority of the students reported the course difficulty to be average to difficult. And very small percentage reported it to be very difficult. In a previous study, the students considered preclinical prosthodontics as a very difficult subject to understand because it is difficult to visualize and also difficult to correlate theory with practical aspects because of lack of clinical exposure coupled with use of conventional methods of teaching[47]. Students' evaluations of courses and teaching in the form of end-of-course surveys are common in higher education, and they provide a primary basis for evaluating teaching effectiveness[48]. However, course evaluations of teaching are also controversial[48], where students may use them to punish teachers for difficult courses and reward them for easy ones[49]. It is also believe that students' evaluations are influenced by their expected grades[14,50]. Interestingly, there was a positive correlation between students' practical average marks and the practical course difficulty evaluation in this study. This finding is in line with a previous study that showed students gave higher evaluations in courses where they expected to earn higher grades[14].

Regarding the students' marks, the prosthodontics preclinical practical course wasn't significantly more difficult than conservative course, P=0.412. However, prosthodontics preclinical practical course was significantly more difficult than endodontic course, P=0.000. Which confirms that removable prosthodontics is one of the most difficult preclinical courses and needs a well-established curriculum to overcome these difficulties.

Survey studies are a research tool that provides information about opinions, attitudes and behavior of respondents[22,23]. However, it is known that such a research tool should involve not only a carefully planned and prepared set of questions and a representative sample size, but also optimize response rates[22,23]. It was reported that a response rate of (80%) or over

is good and (70-79%) is acceptable for dental surveys [22]. In this study, an overall response rate of (88.6%) was achieved for third year students. Thus, the results of this study can be considered to be representative of dental students in university of Jordan.

5. Conclusion

1- Both clinical and technical exercises are highly important at each stage in constructing CD and RPD and this put the technical exercises into context and improved students' understanding.

2- Balanced occlusion in CD was the most difficult topic both practically and theoretically and RPD design was the most difficult topic both practically and theoretically which may indicate the need to increase time devoted in the curriculum to teach these topics.

3- The most difficult Kennedy classification to design was class IV. This was followed by class I, class II and class III. The most difficult rest seat to prepare was reported to be the inverted V. Followed by the adjacent occlusal rest seats, ball rest seat, incisal hook. occlusal rest seat, cingulum ledge and the incisal ledge was the easiest.

4-Most of students preferred the morning lectures and afternoon laboratory sessions. Importantly, most of the students preferred the lectures to be given before the laboratory sessions. Live demonstrations were the preferred teaching method by the majority of students compared to video demonstrations.

5- The majority of the students reported the course difficulty to be average to difficult. Interestingly, there was a positive association between students' practical average marks and their evaluation of practical course difficulty.

Accordingly, these results should be considered and highlighted when a curriculum for practical and theory is to be established, and to be used as a teaching guide to concentrate on the most difficult steps and to dedicate more time in the curriculum. Focusing more on teaching students to become competent in clinically relevant skills combined with thorough knowledge of laboratory -related skills.

Figures

Figure 1. Percentage of students reported the difficulty of a. Practical complete denture (CD) exercises, b. Theoretical CD topics.

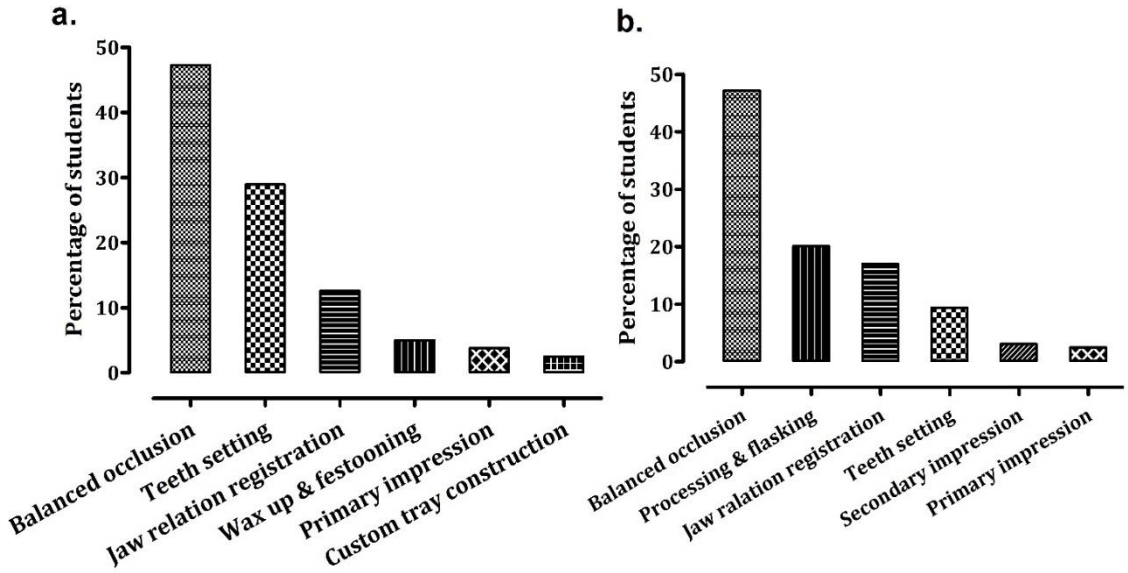


Figure 2. Percentage of students reported the difficulty of a. Teeth setting, b. Achieving balanced occlusion, c. creating compensating curves.

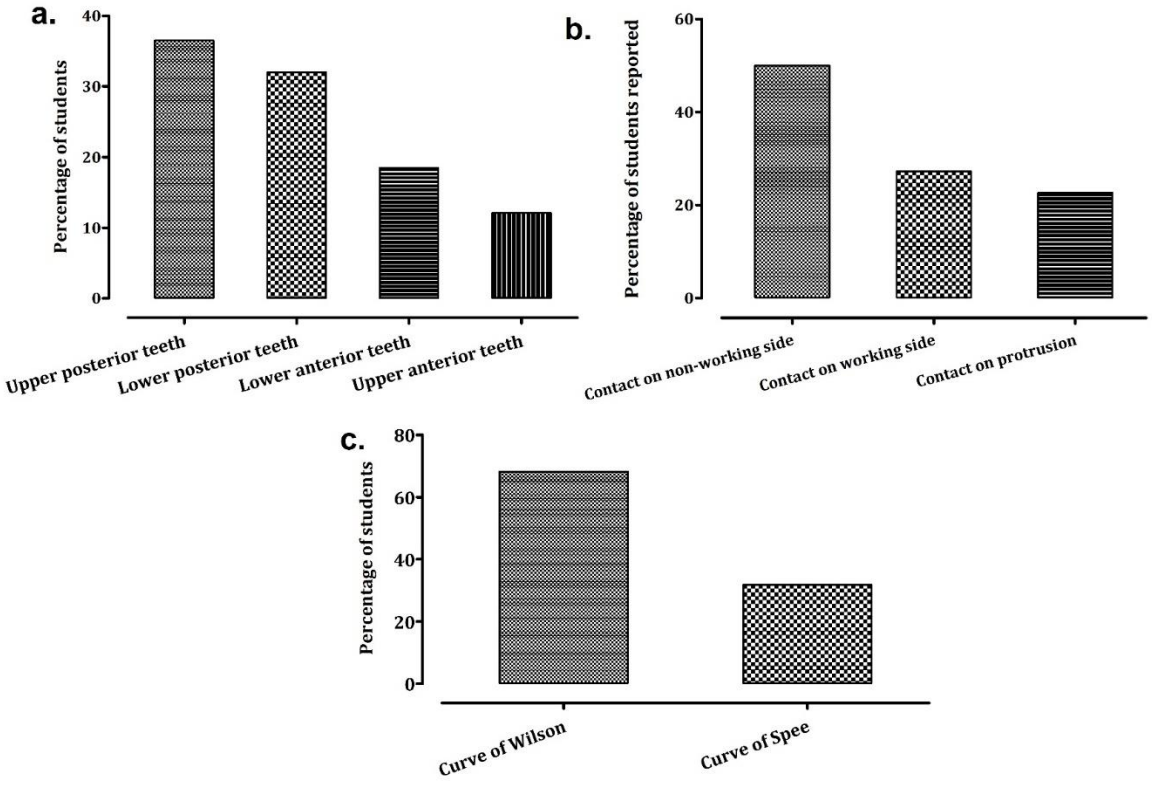


Figure 3. Percentage of students reported the difficulty of a. Practical removable partial denture (RPD) exercises, b. Theoretical RPD topics.

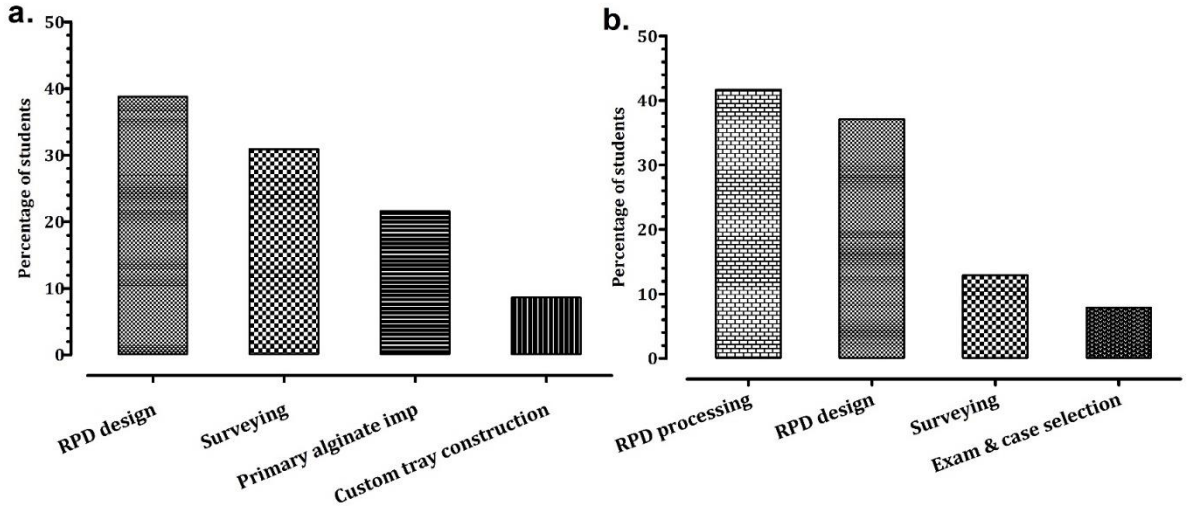
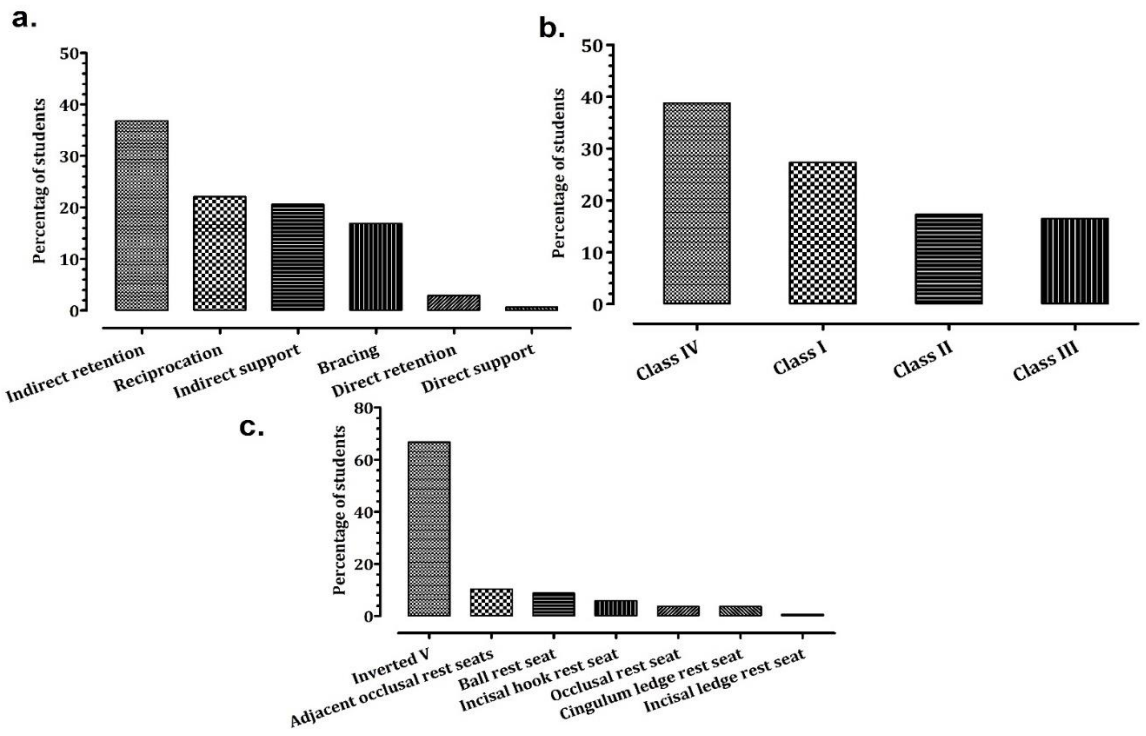


Figure 4. Percentage of students reported the difficulty of a. RPD design concepts, b. RPD Kennedy classifications, c. Rest seat preparations.



References

1. Douglass CW, Shih A and Ostry L. Will there be a need for complete dentures in the United States in 2020? J Prosthet Dent. 2002; 87: 5-8.
2. Felton DA. Complete Edentulism and Comorbid Diseases: An Update. J Prosthodont. 2016; 25: 5-20.
3. Slade GD, Akinkugbe AA and Sanders AE. Projections of U.S. Edentulism prevalence following 5 decades of decline. J Dent Res. 2014; 93: 959-965.
4. Abid A, Maatouk F, Berrezouga L, Azodo C, Uti O, El-Shamy H, et al. Prevalence and Severity of Oral Diseases in the Africa and Middle East Region. Adv Dent Res. 2015; 27: 10-17.
5. Carlsson GE and Omar R. The future of complete dentures in oral rehabilitation. A critical review. J Oral Rehabil. 2010; 37: 143-156.
6. Meskin L and Brown J. Prevalence and patterns of tooth loss in U.S. adult and senior populations. Int J Oral Implantol. 1988; 5: 59-60.
7. Clark RK. The future of teaching of complete denture construction to undergraduates. Br Dent J. 2002; 193: 13-14.
8. Clark RK, Radford DR and Juszczyk AS. Current trends in complete denture teaching in British dental schools. Br Dent J. 2010; 208: E10; discussion 214-215.
9. Petropoulos VC and Rashedi B. Current concepts and techniques in complete denture final impression procedures. J Prosthodont. 2003; 12: 280-287.
10. Rashedi B and Petropoulos VC. Preclinical removable partial dentures curriculum survey. J Prosthodont. 2003; 12: 116-123.
11. Lynch CD and Allen PF. Why do dentists struggle with removable partial denture design? An assessment of financial and educational issues. Br Dent J. 2006; 200: 277-281; discussion 267.
12. Lynch CD and Allen PF. The teaching of removable partial dentures in Ireland and the United Kingdom. Br Dent J. 2007; 203: E17.
13. Honey J, Lynch CD, Burke FM and Gilmour AS. Ready for practice? A study of confidence levels of final year dental students at Cardiff University and University College Cork. Eur J Dent Educ. 2011; 15: 98-103.
14. Mukherji S, Rustagi, . Teaching evaluations: Perceptions of students and faculty. J Coll Teach Learn. 2008; 5: 45-54.
15. Basker RM and Davenport JC. A survey of partial denture design in general dental practice. J Oral Rehabil. 1978; 5: 215-222.
16. Petropoulos VC and Rashedi B. Removable partial denture education in U.S. dental schools. J Prosthodont. 2006; 15: 62-68.
17. Haj-Ali R and Al Quran F. Team-based learning in a preclinical removable denture prosthesis module in a United Arab Emirates dental school. J Dent Educ. 2013; 77: 351-357.
18. Chambers DW and LaBarre EE. The effects of student self-assessment on learning in removable prosthodontics laboratory. J Dent Educ. 2014; 78: 668-680.
19. Packer ME, Rogers JO, Coward TJ, Newman PS and Wakeley R. A comparison between videotaped and live demonstrations, for the teaching of removable partial denture procedures. Eur J Dent Educ. 2001; 5: 17-22.
20. Echeto LF, Sposetti V, Childs G, Aguilar ML, Behar-Horenstein LS, Rueda L, et al. Evaluation of Team-Based Learning and Traditional Instruction in Teaching Removable Partial Denture Concepts. J Dent Educ. 2015; 79: 1040-1048.
21. Faraone KL, Garrett PH and Romberg E. A

blended learning approach to teaching pre-clinical complete denture prosthodontics. Eur J Dent Educ. 2013; 17: e22-27.
22. Locker D. Response and nonresponse bias in oral health surveys. J Public Health Dent. 2000; 60: 72-81.
23. Parashos P and Messer HH. Questionnaire survey on the use of rotary nickel-titanium endodontic instruments by Australian dentists. Int Endod J. 2004; 37: 249-259.
24. Douglass CW and Watson AJ. Future needs for fixed and removable partial dentures in the United States. J Prosthet Dent. 2002; 87: 9-14.
25. Wolfaardt JF, Tan HK and Basker RM. Removable partial denture design in Alberta dental practices. J Can Dent Assoc. 1996; 62: 637-644.
26. General Dental Council.Preparing for Practice Revised Edition 2015; GDC: London, UK, 2015.
27. Owall B, Budtz-Jorgensen E, Davenport J, Mushimoto E, Palmqvist S, Renner R, et al. Removable partial denture design: a need to focus on hygienic principles? Int J Prosthodont. 2002; 15: 371-378.
28. British Society for the Study of Prosthetic Dentistry. Guidelines in Prosthetic and Implant Dentistry. Quintessence Publishing Company.
29. Goodacre CJ. Predoctoral fixed prosthodontics education. J Prosthet Dent. 1990; 64: 319-325.
30. Coates AJ, Moore KR and Richards LC. Removable prosthodontics: a survey of practices and attitudes among South Australian dentists. Aust Dent J. 1996; 41: 151-158.
31. Christensen GJ. Are prosthodontics a vital part of dentistry? J Am Dent Assoc. 2002; 133: 647-648.
32. Papadiochou S, Kotsiomiti E and Pissiotis AL. Comparative Assessment of a New Holistic-Oriented and an Old Specialty-Specific Undergraduate Curriculum in Removable Prosthodontics: A Study Based on Senior Students' Perceptions. J Prosthodont. 2016; 27: 550-559.
33. Maxson BB and Nimmo A. Quality assurance for the laboratory aspects of prosthodontic treatment. J Prosthodont. 1997; 6: 204-209.
34. Petropoulos VC and Rashedi B. Complete denture education in U.S. dental schools. J Prosthodont. 2005; 14: 191-197.
35. Clark R, Radford D and Juszczyk A. Current trends in complete denture teaching in British dental schools. Br Dent J. 2010; 208: E10-E10.
36. Dills AK, and Rey Hernandez-Julian. Course Scheduling and Academic Performance. Econ Educ Rev. 2008; 27: 646–654.
37. Parolia A, Mohan M, Kundabala M and Shenoy R. Indian dental students' preferences regarding lecture courses. J Dent Educ. 2012; 76: 366-371.
38. Pope NG. How the time of day affects productivity: Evidence from school schedules. The Review of Economics and statistics 2016; 98: 1-11.
39. Kon H, Botelho MG, Bridges S and Leung KC. The impact of complete denture making instructional videos on self-directed learning of clinical skills. J Prosthodont Res. 2015; 59: 144-151.
40. Nikzad S, Azari A, Mahgoli H and Akhoundi N. Effect of a procedural video CD and study guide on the practical fixed prosthodontic performance of Iranian dental students. J Dent Educ. 2012; 76: 354-359.
41. Vaughan M and Marks JN. Teaching interviewing skills to medical students: a

comparison of two methods. Med Educ. 1976; 10: 170-175.

42. Katz S, Koerber LG and Olson BL. Teaching oral biology laboratories to large numbers of students by video tape. J Dent Educ. 1977; 41: 97-100.
43. Packer ME, Scott BJ and Davis DM. An assessment of the influence of clinical demonstrations on the confidence of undergraduate dental students, when treating patients requiring removable partial dentures. Eur J Dent Educ. 1999; 3: 133-139.
44. Jeffrey N. Brown ZEMJWC. A Comparison of Learning Outcomes in Culinary Education: Recorded Video vs. Live Demonstration. Journal of Hospitality & Tourism Education 2013; 25: 103-109.
45. Smith W, Rafeek R, Marchan S and Paryag A. The use of video-clips as a teaching aide. Eur J Dent Educ. 2012; 16: 91-96.
46. Beswick W, Cooper D and Whelan G. Videotape demonstration of physical examination: evaluation of its use in medical undergraduate teaching. Med Educ. 1982; 16: 197-201.
47. Shigli K, Jyotsna S, Rajesh G, Wadgave U, Sankeshwari B, Nayak SS, et al. Challenges in Learning Preclinical Prosthodontics: A Survey of Perceptions of Dental Undergraduates and Teaching Faculty at an Indian Dental School. J Clin Diagn Res. 2017; 11: ZC01-ZC05.
48. BrckaLorenz A, McCormick, A., & Peck, L. Exploring how course evaluation outcomes are collected, shared, and used. the Association for Institutional Research Annual Forum. Orlando, FL2014.
49. Babcock PM, M. (2010). . Leisure college USA: The decline in student study time. 2010. American Enterprise Institute.
50. Sojka J, Gupta, A. K., Deeter-Schmelz, D. R.. Student and faculty perceptions of student evaluations of teaching: A study of similarities and differences. College Teaching. 2002; 50: 33-39.

تعرض الطلاب الجامعيين لأول مرة لمفاهيم مادة الاستعاضة السنية المتحركة في أول مرحلة: آراء، سلوكيات، والاتجاهات الحالية في التدريس

نسرين عبدالرحمن عبدالله سالم1، ساندرا كامل الطراونة1، معتصم أبو عواد1

1. كلية طب الأسنان، الجامعة الأردنية، عمان، الأردن

الباحث المسؤول
د.نسرين عبدالرحمن سالم
كلية طب الأسنان ، الجامعة الأردنية

الملخص

الأهداف :الهدف من هذه الدراسة تقصي آراء الطلبة غير الخريجين فيما يتعلق بالخطوات ماقبل السريرية والفنية لمساق الطقم المتحرك الكامل ومساق الطقم المتحرك الجزئي. ولتقييم صعوبة مادة الاستعاضة السنية المتحركة بالمقارنة مع مساقات ماقبل السريرية الأخرى مثل: مساق مادة الاستعاضة التحفظية ومادة علاج العصب.

المواد والطرق: لقد تم استخدام استبيان تم توزيعه على 203 من طلاب السنة الثالثة، وكانت الأسئلة تتعلق بالخطوات المتعلقة بالجزء العملي والنظري للمساقين لمساق الطقم المتحرك الكامل ومساق الطقم المتحرك الجزئي.

النتائج: في مساق الطقم المتحرك الكامل 47.2% ,من الطلبة ذكروا أنَّ الإطباق المتوازن كان أصعب خطوة للفهم نظرياً وعملياً، 50% يعتقدون أن أصعب جزء في الإطباق المتوازن هو تحقيق توازن على الجانب غير العامل في الإطباق، بينما هناك 2.5%وجدوا أنَّ عمل القالب الخاص هو الأصعب، المحاضرات الصباحية والمختبرات المسائية والشرح العملي المباشر كانت المفضلة من الأغلبية، ومساق الطقم المتحرك الجزئي، 38.8 % ذكروا أن وضع تصميم للطقم الجزئي المتحرك هو الأصعب من الناحية العملية وثاني أصعب خطوة نظريا، يتبعها في الصعوبة المسح ، الطبعة الأولية وعمل القالب الخاص .تصنيف كندي الرابع كان الأصعب في التصميم وكان تحضير الفجوات على سطح الاطباق هو الاصعب في التحضير. كان هناك ارتباط كبير بين علامات الطلاب في الجزء العملي وآراءهم في صعوبة المادة، وكانت العلاقة بين علامات الطلاب في الجزء العملي والجزء النظري ضعيفة، معدل الاستجابة كان 88.6 %.

الاستنتاجات: مادة الاستعاضات السنية المتحركة من أصعب المساقات ما قبل السريرية والتي تتطلب تطوير مستمر للخطة الدراسية، ولذلك فأن التقييم المستمر لطرق التدريس لهذه المادة في غاية الأهمية.

الكلمات الدالة: تدريس الاستعاضات السنية المتحركة، تدريس طب الأسنان ما قبل السريري، الدراسة الاستقصائية، خطة دراسية، طقم متحرك كامل، طقم متحرك جزئي.