



Original article

## COMPARATIVE ASSESSMENT OF LEARNING OUTCOMES OF SECOND YEAR STUDENTS IN THEIR FPD EDUCATION

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### SUMMARY:

The objective of the authors is to analyse the results of students in their second year of study in Dental Medicine in regards to their fixed partial dentures (FPD) education.

**Material and methods:** The article is based on an analysis of the work of 94 students in second year in the Faculty of dental medicine Sofia (56 females, 38 males), who were rated using a test and practical work marks during the submission of the FPD's that they fabricated during the 4th semester practices.

**Results:** The analysis indicates that only 2% of the students that were assessed with a mark "average 3" or "good 4" have found up to four correct answers in their tests. The percentage of students who's practical work was assessed with marks "very good 5" or "excellent 6" and gave five or more correct answers to the test is 83%. With 15% of the student, a major discrepancy between their theoretical knowledge and practical results was noticed.

**Conclusion:** Further researches are needed regarding the introduction in the educational program in Introduction of Prosthetic Dentistry in the Faculty of Dental Medicine of brief test examination in the specific topics.

**Keywords:** comparative analysis, FPD, dental education,

### INTRODUCTION

The main goal of the education in Introduction of Prosthetic Dentistry is that the students acquire basic theoretical knowledge and practical skills. The students get familiar with the basic construction principles and the prosthetic restoration technology.

The loss of one or more natural teeth leads to a partial edentulism. The entity of the dental arches and the occlusal and articulation balance of the masticatory system are both disrupted. In the treatment of partial edentulism FPD's, RPD's [removable partial dentures or combination of both might be used [1].

Bridges should be able to reproduce the shape and function of the missing teeth and to meet the generally accepted prophylactic, functional and aesthetic criteria [1, 2].

The pontic is fabricated according to the construction principles, with reduced diameter creating a straight

line connection between the supporting teeth. The pontic profile has to respect the topography of the tooth loss [1, 3, 4]. The FPD should be carefully shaped so that it restores correctly the static and dynamic occlusion [5, 6].

The position and shape of the interproximal contacts are of an utmost importance for maintaining the periodontal health [5, 6]. A good separation is needed in the papilla area [4]. The FPD's have to fit perfectly to the supporting teeth preparation margins. According to the literature, the internal gap between the FPD and the supporting tooth should be within the range 20-100µm. Tooth surfaces that are prepared but not covered by a FPD increase the caries risk. Wide and unprecise margins of the construction are believed to be plaque-retentive and mechanically irritating for the marginal gingiva [5, 7, 8].

The external surface of the bridge should respect the natural teeth morphology. When the prosthetic construction has undercontoured lingual and buccal surfaces, without a pronounced crest ridge, the food bolus is able to cause a mechanical irritation of the marginal periodontium. Overcontouring, on the other hand, can cause plaque deposition and reduce the physiological self-cleaning function of the tongue and cheek [5].

In the aesthetic zone, the prosthetic constructions have to be sculptured to match the natural contour, position, size and colour of the teeth [4, 7].

When the requirements for correct planning and constructing are followed, the meticulous execution of the technological steps is an important factor, needed for the fabrication of FPD's that meet the prophylactic, functional and aesthetic treatment indications.

The assessment criteria and marking range applied for the ranking of the FPD's is similar to the one applied when the student's RPD's with minor differences considering the different nature of the constructions. The latter was already discussed in a previous paper [9]. The assessment criteria regarding the ability of the students to reproduce the appropriate morphology of the restored teeth are the same as the ones applied for their practical work in the two previous semesters and were already discussed in a previous study [10].

### OBJECTIVE

The objective of the present paper is to study and analyse the results of the second year dental medicine stu-

dent education in the field of Introduction of prosthetic dental medicine regarding the fixed partial bridgework dentures.

## MATERIAL AND METHODS

The study was performed during the winter semester of the 2015/2016 Academic year in the Faculty of dental medicine, Medical University – Sofia. Ninety four students in the second year of study (58 females, 38 males), were distributed a test consisting in the following 9 questions regarding fixed prosthetic constructions:

### 1. How do the bridges transfer the chewing pressure to the oral structures

- By loading the periodontium of the natural teeth
- By loading the bone and mucosa in the edentulous area
- By using both of the above-mentioned mechanisms

### 2. The coordination with the FPD's is effectuated by

- The periodontium-muscle reflex
- The mucosa-muscle reflex
- By using both of the above-mentioned reflexes

### 3. The biological anatomy-physiological base of the bridges comprises

- The abutment teeth
- The periodontium
- Both

### 4. The elements of the bridge are:

- The abutment teeth and the biological base
- The abutment teeth and the pontic
- Both of the above mentioned elements

### 5. What is the definition for the term "Abutment tooth.?"

### 6. What is the definition for the term "Connector.?"

### 7. What is the definition for the term "pontic":

### 8. In which shapes can the pontic be sculpted:

- Saddle-shaped non-hygienic
- High hygienic
- Hearth-shaped hygienic
- Tangential (aesthetic semi-hygienic)

### 9. The pontic must connect the abutment teeth following:

- The shortest possible distance
- The longest possible distance

The practical skills of the students were assessed during the submission of their semestrial practical work when each student was assigned with a mark (from 2 to six, where 2 means "not pass", and 6 is the highest and

means "excellent.

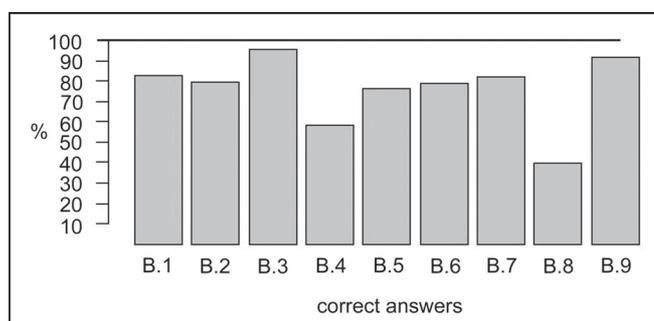
The main criteria for the assessment of the submitted four-unit bridges are: good reproduction of the morphologic characteristics of all the units of the FPD, precise modeling and reproduction of correct static and dynamic contacts, tight interproximal contacts, correct modeling of the pontic profile, good separation, cleaning and polishing, good adaptation to the preparation margin of the working model and uniform thickness at the marginal area of the connectors and successfully restored esthetics.

The obtained results were processed with a software product for statistical analysis "R" (<https://www.r-project.org/>). The statistical method that were applied were frequential and percentage analysis, correlation analysis, disperse analysis and 2 tests and graphic methods for data presentation.

## RESULTS

The obtained results indicate the following distribution of the tests answers - the number of the correct answers is 644, the incorrect answers number is 118, the number of the incomplete answers is 62, where students have in a greater or lesser extend answered to the asked questions. The distribution of the correct answers is represented in Figure 1.

Fig. 1. Distributions of the correct answers from the test



Legend:

- B1** - correct answers to question No. 1,
- B2** - correct answers to question No. 2,
- B3** - correct answers to question No. 3,
- B4** - correct answers to question No. 4,
- B5** - correct answers to question No. 5,
- B6** - correct answers to question No. 6,
- B7** - correct answers to question No. 7,
- B8** - correct answers to question No. 8,
- B9** - correct answers to question No. 9.

Data indicate similar percentage of distribution to the answers to question No.1 and question No.2 – 83% and 80% accordingly. Only 5 students were not able to answer these questions, while 12% (for question No.1) and 15% (for question No.2) circle an incorrect answer. The percentage of the right answers to question No.3 is high – 96% from the students correctly determine the

anatomy-physiological base of the bridge. The percentage of students that are unable to name the elements of the FPD's is significant (42%).

Next questions (from No.5 to No.7) require the definition of the terms "abutment teeth", "connector" and "pontic". The right answer distribution is 77%, 79% and 82% accordingly.

Obviously, the greatest difficulty the students met with the answer of question No.8: In which profiles can the pontic be sculpted. The data indicates that only 39% from the students are familiar and can make the difference between the different types of pontic profiles, that were listed as possible answers. The rest 61% (57 students) are not able to name the correct answer or only circle one of the several correct answers.

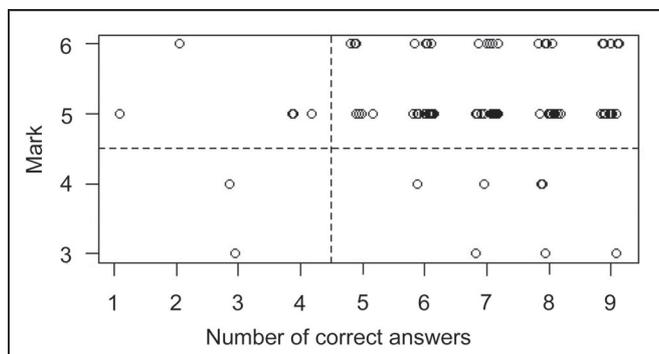
The percentage of the students that were able to give a correct answer to question No.9 is 92% - "the pontic should connect the abutment teeth following the shortest possible distance between them".

The results from the statistical analysis indicate that no statistically significant correlation can be driven out of the present data regarding the distribution of the answers of the questions in the test. The latter means that the test is properly structures and no duplication of the questions was admitted.

The obtained results from the practical student's work indicates the following distribution - 3 students obtained an excellent "6" mark, 17 students - 5,50 mark, 34 - 5.00, 19 - 4.50, 11 - 4.00, 4 - 3,50, 6-3.00.

Figure 2 present the statistically significant correlations ( $P < 0,0001$ ) between the practical work assessment and the result of the test. Horizontally the number of the correct answers are indicated (from one to 9 correct answers). No student has a "0" as a number of correct answers. Vertically the practical work assessment mark are noted as follows: 3-mark "average"; 4-mark "good"; 5-mark "very good"; 6 - mark "excellent."

**Fig. 2.** Correlation between practical work marks and the theoretical knowledge assessed with the test



The analysis indicates that only 2% of the students with a mark on the practical work 3 - "average" or 4 - "good" have given up to four correct answers to the test.

The students who's practical work was assessed with "very good-5", or "excellent-6" had five or more correct answers to the test. With 15% of the students, a major discrepancy between their theoretical knowledge and practical skills was noted.

## DISCUSSION

The education in Introductions of Dental Prosthetics is built upon the principle of coordination and mutual complementation of theoretical knowledge and manual skills. To obtain a good balance between theory and practice, students have to perform their practical tasks with a profound understanding of the theoretical basics. The latter is the utmost goal of the professors presenting the theoretical lectures and the assistant professors leading the practical exercises for the students.

The results from the presented test indicate on one side the necessity of even more thorough emphasize upon the theoretical preparation in the Introduction of Prosthetic Dental Medicine and the necessity of knowing and correctly handling the specific terminology and the understanding of its meaning. Only 58% answer correctly to question No.4, meaning that despite the high percentage of correct answers to questions No.5, 6 and 7, the students find difficult to define terms like "abutment tooth", "retainer" and "pontic and differing it from "biological anatomical-physiological base of the FPD restoration".

Another matter of an utmost importance is teaching students the skills to correctly plan a FPD and understanding the different mechanisms to transmit the chewing pressure and the reflexes, responsible for the neuromuscular coordination. Only 17 % of the students that attended the test displayed some misunderstanding of this important matter.

An important emphasis in the teaching process is the necessity to realise the different indications, advantages and disadvantages of the different pontic profiles, as an important prerequisite for the preparation of the students to start working with patients in the clinical practices. The results of the test indicated that 27% are unable to choose between the profiles listed in the test, while 34% didn't answer that question at all.

## CONCLUSION

In conclusion a necessity exists for the introduction in the University education in Prosthetic dentistry of a sequence of short tests based upon the teaching material in a specific chapter or dedicated to a specific topic or problem. On one hand the regular test examinations can be used as a powerful motivation tool to constantly revise the newest lecturing material. On the other hand it allows for a transformation of the lectures as an educational form from a relatively passive knowledge accumulation into far more interactive and intriguing process involving student's attention and interest in a far bigger extend.

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*Please cite this article as:* Dimova-Gabrovska M, Joncheva I, Gerdzhikov I, Chakalov I. Comparative assessment of learning outcomes of second year students in their FPD education. *J of IMAB*. 2017 Apr-Jun;23(2):1616-1619. DOI: <https://doi.org/10.5272/jimab.2017232.1616>

Received: 27/04/2017; Published online: 29/06/2017



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