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STUDY ON THE STUDENTS ATTITUDE TOWARD DIGITAL TECHNOLOGY IN DENTISTRY

Diana Diaconu-Popa, Monica Tatarciuc, Anca Vitalariu

1. Associate Professor, Oral Implantology, Removable Dentures and Technology, Faculty of Dentistry, University of Medicine and Pharmacy ”Grigore T..Popa”, Iasi

2. Professor, Oral Implantology, Removable Dentures and Technology, Faculty of Dentistry, University of Medicine and Pharmacy ”Grigore T..Popa”, Iasi

3. Professor, Oral Implantology, Removable Dentures and Technology, Faculty of Dentistry, University of Medicine and Pharmacy ”Grigore T..Popa”, Iasi

Corresponding author: tatarciucm@yahoo.com

Abstract

This study was conducted to asses the knowledge level and the attitude on the digital technologies among the dental students. The study included 123 students from the Faculty of Dental Medicine Iasi, Dental Technique Specialization, 61 from the second year and 62 from the third year. An original questionnaire was used, including 10 questions, regarding the impact of the large-scale implementation of digital technology in dentistry and, in particular, in dental laboratories. A significant percentage of dental students said that they heard about CAD/CAM and 3D Printing methods. Most consider these technologies to represent the future of prosthodontics, but at the same time believe that the widespread implementation of digital technologies would have a negative impact on the number of employees in dental laboratories. These modern methods are currently all available, but not fully integrated. Education influences dental practice and dental schools need to become more involved in the training of students, in order to be able to use these technologies in their future practice.

Key words: digital dentistry, dental students, CAD-CAM technologies, 3D Printing method

INTRODUCTION

Digital technologies represent a strategy for the future, which has opened a new path, both in dental medicine and dental technology. These modern methods are constantly moving in new directions, to provide innovative products and systems, with the highest quality standards. With their help, perfect clinical restorations can be achieved, with high biocompatibility, no secondary reactions, excellent esthetics and a better cooperation between dentists and dental laboratories [1,2,3].

The digital development in dentistry brings the need for an entirely new set of skills for dental professionals. Consequently, dental education has to increase their focus on how to educate students for these new demanding.

Also, more researches on the clinical behavior and biomechanical parameters of new dental materials will be necessary for dental professionals to increase their knowledge regarding the application of new techniques [4,5].

The possibility of implementing dental prosthesis, on both natural teeth and implants, using fully digital workflows is a reality, and the advantages of the digital method are not only in terms of the new range of materials that can be used, but also allow tracking of the entire technological working flow, from impression to design, to complete prosthetic device realization [6,7]. Digital dentistry includes the broad array of technologies that bring the communication, documentation, manufacture and delivery of dental treatment under the umbrella of computer-based algorithms.

Subtractive and additive technologies offer the advantage of unlimited design flexibility

and the development of complex prosthetic works only in a few steps.

The advantages of digital technologies over the conventional procedures consists in the superior accuracy due to the superior reproduction of the details, the reduction of the working time and the manufacturing costs [8,9].

Considering the advantages of digital dentistry and digital equipment, they will allow a smoother and more flexible workflow, will reduce costs and working time, will improve accuracy and the level of predictability in dental treatments [10,11]

The main motivations for accepting or rejecting a new technology include the relative advantages they offer compared to classic methods, and these can be grouped into time advantages, financial advantages, and clinical advantages [12]

The present study aims to analyze the dental students' knowledge and attitude on the implementation of additive and substrate digital technology in current laboratory practice.

MATERIAL AND METHOD

The study included 123 students from the Faculty of Dental Medicine, Dental Technical Specialization, 61 on the second year and 62 on the third year. The students were asked to specify the year of study and their age. An original questionnaire was used, with 10 questions, in order to analyze the students' knowledge and attitude regarding the use of digital technology in dentistry and, in particular, in the dental laboratories. (Table I).

Table I The questionnaire for the 2nd and 3rd year dental students

1. Do you work or practice in a dental laboratory? Yes (period) No
2.Do you have any knowledge of CAD-CAM technology? Yes No
3. What materials can be processed using CAD-CAM technology? a. ceramic b. polymers c. alloys / metals
4.What types of prostheses can be made using CAD-CAM technology? a. fixed prostheses b. partial dentures c. full dentures
5. What materials can be processed using 3D Printing technology? a. ceramic b. polymers c.alloys/metals
6.What types of prostheses can be made using 3D Printing technology? a. fixed prostheses b. partial dentures c. full dentures
7.Do you consider useful to introduce digital technology in the dental technology ? Yes No
8.Do you consider these digital methods to help the dental technician? Yes No
9. Do you think digital technologies will replace the dental technician in the future? Yes No
10. Do you think that the widespread implementation of digital technologies would have a negative impact on the number of employees in dental laboratories? Yes No

RESULTS AND DISCUSSIONS

The repondents' age was between 18 and 29 years, with an average of 20 years for the second year (30 students) and an average of 21 years for the third year (34 students).

After analyzing the answers it was found that out of the total of 123 students, 82 work already in a dental laboratory (fig. 1) for a period between one month and one year (students of the second year), and for a period

between 2 months and 2 years (for third year students) (fig.2).

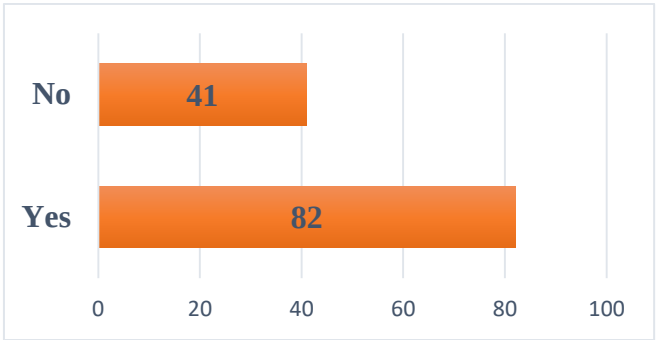

Fig.1. The number of students who practice or work in dental laboratories

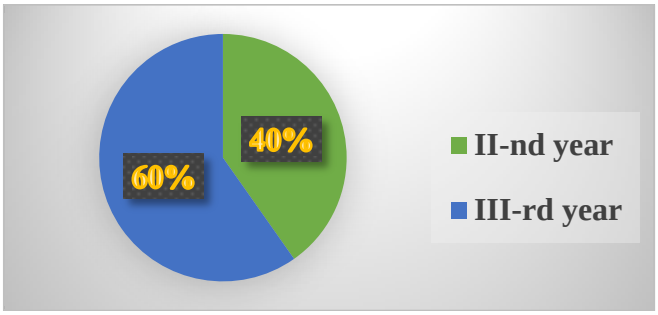

Fig.2. The distribution of students who practice or work in dental laboratories

All respondents, (100%), said they had knowledge about digital CAD-CAM subtractive technology, but a small number knew all the materials that can be used to make dental prostheses ussing this method (fig.3.a, fig.3.b).

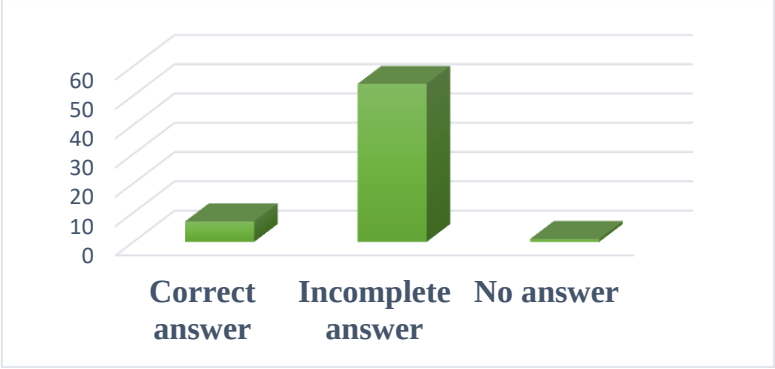

Fig. 3.a. Second year students' answers regarding the materials that can be used in CAD-CAM technology

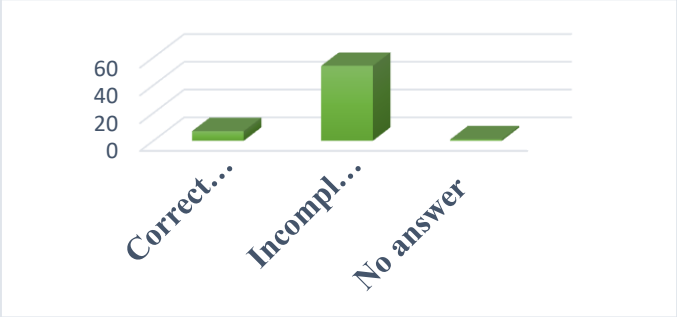

Fig.3.b. Third year students' answers regarding the materials that can be used in CAD-CAM technology

Also, the answers for the question nr.4 show that a small number of students know all types of prostheses that can be made using CAD-CAM subtractive technology (fig.4.a, fig.4.b).

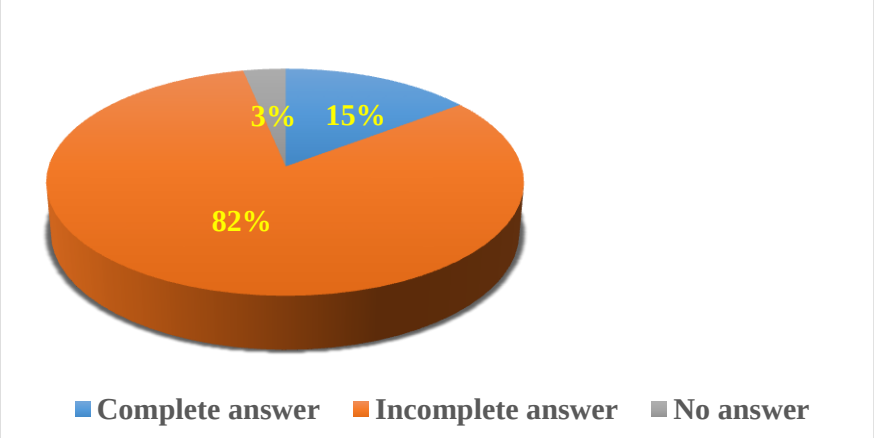

Fig.4.a. The answers of the second year students regarding the types of prostheses that can be realized by the CAD-CAM technology

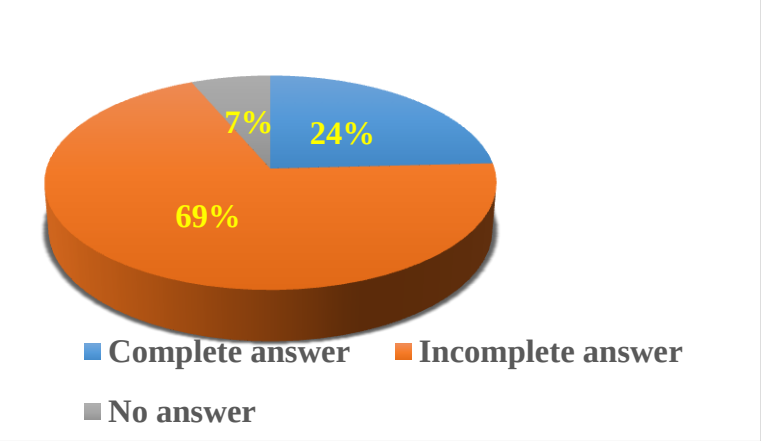

Fig.4.b. The answers of the third year students about the types of prostheses that can be realized through the CAD-CAM technology

As for 3D Printing technology, students partially knew the categories of materials used to make dental prostheses using this method.

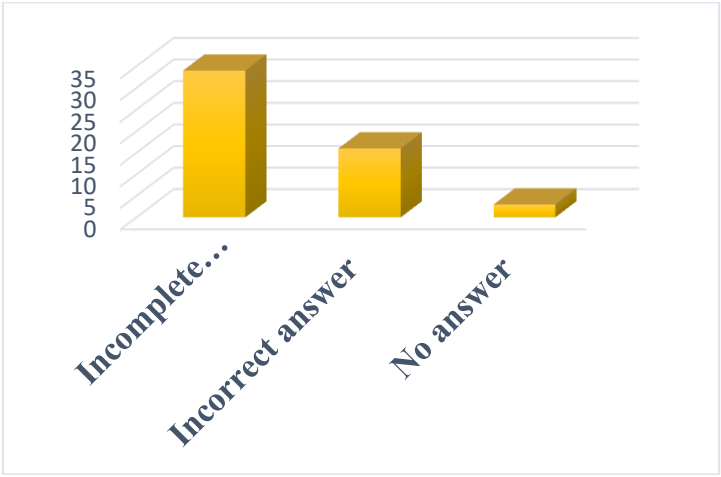

Fig.5 a. The answers of the students of the second year regarding the materials that can be used in 3D Printing technology

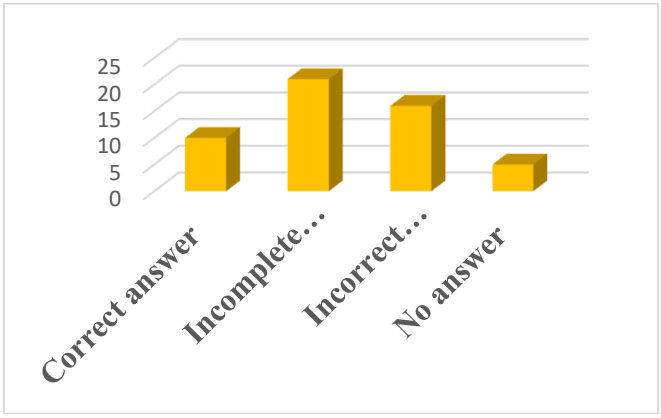

Fig. 5b The answers of students of the Third Year are divided into the materials that can be used in 3D Printing technology

Even regarding the types of prostheses made by 3D Printing technology the students of the two years of studies do not have complete knowledge (fig.6a, fig. 6b).

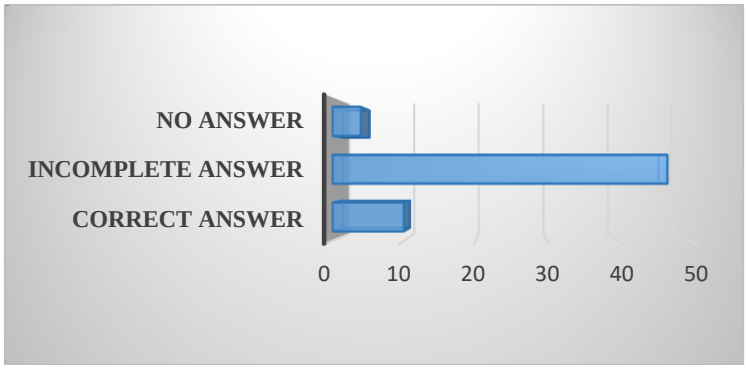

Fig. 6.a The answers of students of the second year regarding the types of prostheses that can be realized by 3D Printing technology

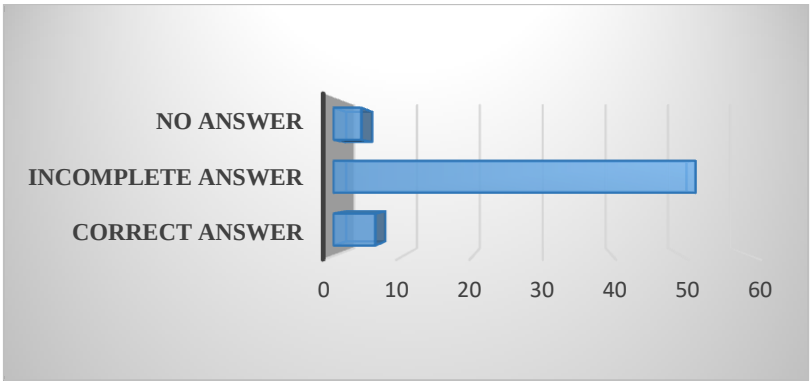

Fig.6 b.The answers of the students of the Third Year divided the types of prostheses that can be realized by 3D Printing technology

Of the 123 respondents, 120 (97%) noticed that it useful to introduce the digital technology in the current laboratory practice (59 from the second year and 61 from the third year), two students replied that the implementation of these methods is useless (2%) and one student did not answer the question (1%) (fig.7)

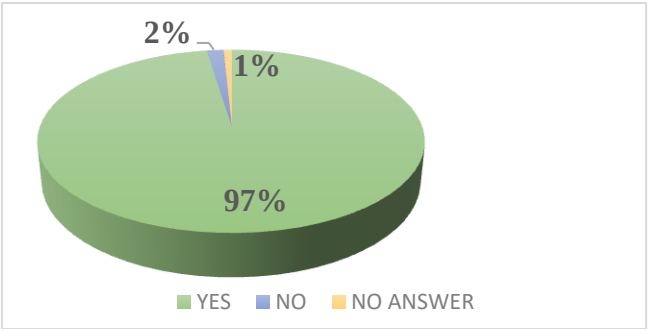

Fig.7. Students answers regarding the usefulness of introducing digital technology in laboratory practice

111 students (90%) considered that digital technologies are a real help in the dental technician's activity, and 12 respondents (10%) do not found these methods useful (fig.8).

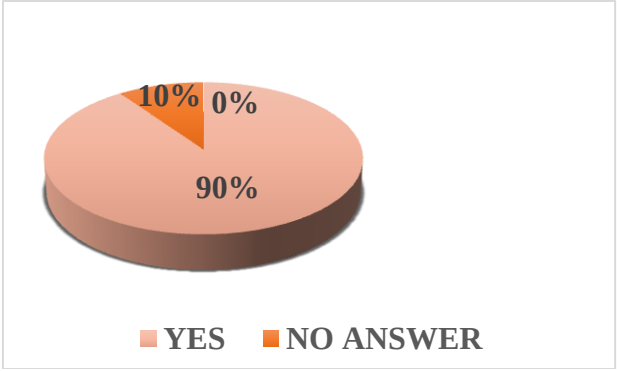

Fig.8. Students answers regarding the efficiency of the laboratory activity by applying digital technologies

Thirtyfive respondents (28%) considered that digital technologies will replace the dental technicians in the future, and 82 (67%) did not consider these alternatives a threat to the technicians. Six students (5%) did not answer that question (fig. 9).

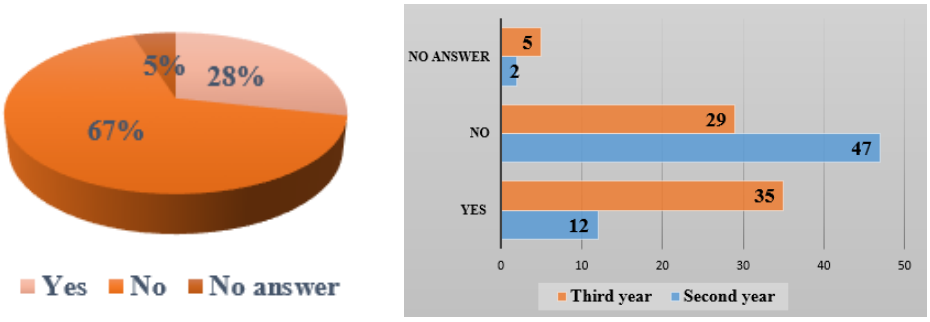

Fig.9. Opinions regarding the future replacement of dental technicians as a result of the implementation of digital technologies

Although it is useful to introduce digital technology into mainstream practice, 65 (58%) students felt that these methods would have a negative impact on the jobs in dental laboratories, 41 (36%) said that the techniques will not affect the jobs for technicians and 6 (6%) did not answer this question (fig.10).

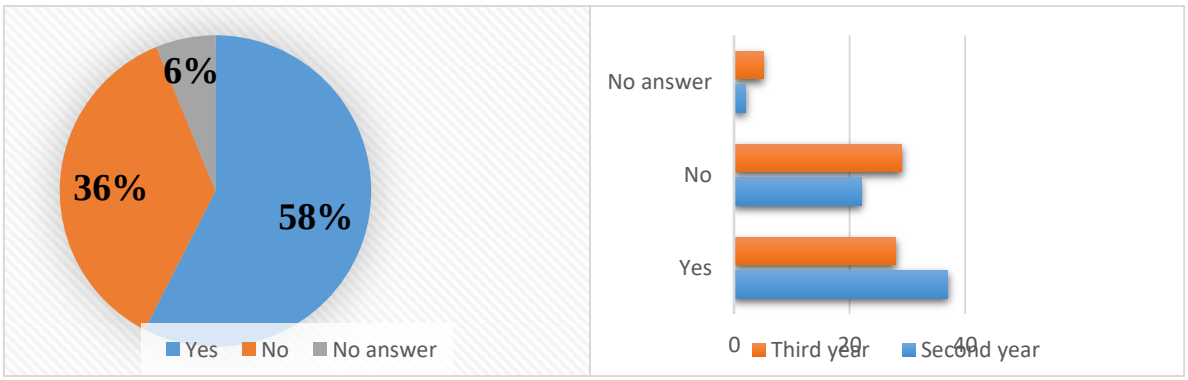

Fig. 10 Opinions regarding the future impact on dental technicians jobsas a result of the implementation of digital technologies

Analyzing the results it was found that 97% of the respondents answered that digital technologies are useful for most aspects of dental practice, due to the significant reduction of the working stages, because increase sharing of patient information, reduce the appointments, reestablish the risk of occurrence of errors and decrease material losses.

Obstacles that impede the acceptance of digital technologies include cost, lack of comfort with technology, software incompatibility, unclear guidelines.

Following the reduction of the number of laboratory steps and the digitalization of the process of obtaining dental devices, 36% of the students believe that these methods will have as result the decrease of the number of jobs for dental technicians.

Although most students practice in dental laboratories,and absolutely everyone knows theoretically the digital technologies -

CAD-CAM and 3D Printing-, just a small percentage (10%) know all the materials used in these technologies; also, 15% of second year students and 24% of third year students know all types of prostheses that can be obtained by these methods.

CONCLUSIONS

Within the limits of this study and referring only to our study group, the second and third year, dental technique specialization, we can conclude that students are familiar with the modern methods and materials used in CAD-CAM and 3D Printing technologies and consider them useful for their future activity in dental technique laboratories.

At the same time, most of them express concern that with the introduction of digital technologies, the role of dental technicians may be diminished. This research suggests that efforts should be made to improve students' knowledge base on these future methods in dental prosthetics [13,14].

All these modern technologies allow the elimination of many laboratory steps, which greatly reduces the risk of errors. In addition, these methods are using industrially manufactured materials, with a more homogeneous internal structure and a mechanical resistance that is significantly higher than the usual materials used in the laboratory [15].

These technologies are currently all available, but not fully integrated. Education influences dental practice and dental schools should be more concerned about training students on the use of digital technology in dentistry.

The familiarity of students with digital technology is a key feature that may positively influence the adoption of digital technology in the broader community of interest [16]. Technology affords to improve self-assessment and can even provide for a virtual learning environment. Consequently, dental students gain objective and visual feedback that permits enhanced self-assessment

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