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PROSPERITAS VESTRA FINIS NOSTRA!

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Review

By Assoc. Prof. Dr. Desislava Konstantinova, PhD, Department of Dental Material Science and Propaedeutic of Prosthetic Dental Medicine, Faculty of Dental Medicine, Medical University "Prof. Dr. Paraskev Stoyanov"- Varna, 9000, Tsar Osvoboditel Blvd №84, e-mail: dr.konstantinova@gmail.com, **member of a scientific jury, included by order of the Rector of MU-Varna № P – 109-559/06.12.2021**

Subject: Dissertation work "*APPLICATION OF TEMPORARY RESTORATIONS OBTAINED THROUGH 3D LASER STEREOLITHOGRAPHIC PRINTER*" for awarding the educational and scientific degree **"Doctor"** in scientific specialty "**Orthopedic dental medicine"**, professional direction **7.2. Dental medicine,** field of higher education **7. Healthcare and sports.**

Author: Dr. Delyan Krasimirov Georgiev, PhD student in free training at the Department of Dental Material Science and Propaedeutic of Prosthetic Dental Medicine, Faculty of Dental Medicine, Medical University "Prof. Dr. Paraskev Stoyanov"- Varna.

Scientific supervisor: Assoc. Prof. Dr. Stoyan Georgiev Katsarov, PhD.

1. **General presentation of the procedure**
   The presented set of documents on paper and electronic media is in accordance with the requirements of Article 69 of the Regulations for the development of the academic staff of MU - Varna.
2. **Short biographical data about the doctoral student**
   Dr. Delyan Krasimirov Georgiev was born on April 21, 1989 in the city of Varna. He graduates his education at the "Ivan Vazov" Language School in Plovdiv in 2008. Afterwards he graduates at the Medical University of Plovdiv in 2014 and acquires a Master's degree in Dental Medicine. In 2019 he acquires a specialty in prosthetic dentistry. Since 2016 Dr. Georgiev has been a full-time assistant at the Department of Dental Materials Science and Propaedeutic of Prosthetic Dentistry, Faculty of Dental Medicine, MU-Varna.
   He is a member of the Bulgarian Dental Association.
   He declares that he is fluent in written and spoken English, Russian, Turkish and German.
3. **Relevance of the topic and expediency of the set goals and objectives**
   The problem of fabrication, application and qualities of temporary structures is well known for prosthetic dental specialists, but on the other hand the introduction of modern methods makes it debatable in the professional literature. In fact, there is no consensus on the effectiveness and aesthetic characteristics of mass-produced "rapid methods" of

temporary structures in dental practices. In this sense, the topic of the presented dissertation is relevant and significant from a clinical and theoretical point of view. The aim is clearly stated and the tasks are selected and performed correctly by using modern methods.

4. Knowledge of the problem

Dr. Delyan Georgiev shows in-depth theoretical knowledge on the developed topic, which is ascertained from the bibliographic reference located on 20 pages (includes 270 sources). The exhibition is presented concisely and understandably in a good scientific style.

The doctoral student has made a detailed literature review, covering 37 pages of the dissertation and has formulated the unsolved problems after acquaintance and critical analysis of the used literature.

The aim of the dissertation of Dr. D. Georgiev is ***"to study the possibilities for application of temporary structures made by 3D printing on a laser stereolithographic printer."***

To achieve this goal, Dr. Georgiev has set the following **four tasks**:

1. Investigation of the influence of the color of printed, provisional restorations type egg shell made from transparent resin Dental LT Clear ®, at different wall thicknesses.
2. Development of recipes for resins, reproducing proportionally and properly the color standards, logically related to the theory of color formation.
3. Comparative analysis of bending strength of the newly obtained resins in the second task.
4. Creating a method for increasing the bending strength of printed temporary restorations through software modification of digital files.

5. Research methodology

According to **the first task**, an experimental setup was prepared to study the potential influence of rails of different thicknesses on color standards. With the help of specialized software and 3D printing, two types of test bodies are modeled and manufactured with veneer design and thickness of their vestibular walls, 0.5 mm and 0.8 mm respectively. Utilising the VITA Easyshade® device, measurements of each color were made during its "masking" in both thicknesses. The color of the standard without faceting was also measured as a control.

According to **the second task**, 3 types of composite resins have been combined in different proportions. The resulting mixtures were stirred until the color of the resins was homogenized and placed in a clear plastic mold for subsequent photopolymerization in a Form Cure® apparatus for 60 minutes at 60 ° C. After the end of the polymerization process, the color of each sample was determined using a VITA Easyshade® V.

For **the third task**, ten color combinations have been selected, corresponding to the respective tone of the VITA Classic or VITA 3D Master color scheme. Three hundred test specimens have been produced in order to test tensile and compressive strength. They were divided into ten groups, depending on the color obtained from the recipes from task 2. The results are registered, processed and recorded using specialized software. The bending strength has been calculated by a mathematical formula.

Under **the fourth task**, dentition defects were created on the FrasacoTM training model for upper and lower jaw and with the help of specialized 3Shape Dental System® software two bridges were modeled between the respectively prepared bridge supports. To accomplish the task, they were modified and exported as a stl-file and analyzed using 3Shape 3D Viewer.

The specialized software SPSS v. 20.0 for Windows has been used for statistical analysis of the data from the conducted researches.

The material is sufficient to derive **reliable and representative results**. The methodologies are modern and adequately related to each of the set tasks. Dr. Georgiev has skillfully used well-established laboratory approaches and digital technologies entering everyday practice, which allow solving the tasks of the dissertation at a high scientific level.

6. Characteristics and evaluation of the dissertation and contributions

The PhD thesis of Dr. Georgiev is properly structured and contains all main elements: introduction, literature review, conclusions from the literature review, aim and tasks, material and methodology, results and discussion, conclusions, contributions, bibliography and applications. Dr. Georgiev has presented it on 144 pages. It is illustrated with 84 figures (including diagrams) and 3 tables. The bibliography includes 270 sources, 7 of which in Cyrillic.
The results have been comprehensively analyzed and critically discussed.
The thesis of Dr. Delyan Georgiev ends with a conclusion, naturally arising from the discussion of the results and summaries made by them.

7. Contributions and significance of development for science and practice

I accept all of the contributions presented by Dr. Georgiev.

8. Evaluation of the dissertation publications

Four publications related to the thesis are presented, popularizing the results of the dissertation, which quantitatively and qualitatively meet the legal requirements. Dr. D. Georgiev is the first author in three of them.

9. Personal participation of the dissertation

I believe that the conducted experiments and the analyzes related to them, as well as the presented contributions are a personal work of Dr. Georgiev with instructions from his scientific supervisor - Assoc. Prof. Katsarov.

10. Abstract

The abstract meets the Requirements of The Law for the Development of the Academic Staff in the Republic of Bulgaria (LASRB) and the Regulations for its application and the Regulations of MU - Varna.

11. Personal impressions of the PhD student

I have known Dr. Delyan Georgiev since the beginning of his teaching career in the Department of Prosthetic Dentistry at the MU - Varna. I am impressed by his desire to improve and enrich his knowledge and skills in the field of prosthetics, as well as his desire to pass on what he learned to his students. Dr. Georgiev is responsible not only in his work, but as a person. I believe that this is a confirmation for his development as a highly qualified specialist.

12. Critical remarks and recommendations

I believe that Dr. Georgiev's dissertation would benefit if it was free of the abundance of punctuation and grammatical errors.

I also recommend a more precise arrangement of the bibliographic reference, which has been written in different styles. In addition, in 73th, 79th and 246th place in the list of used sources, among those in Latin, there are also Bulgarian authors whose works have been published in Cyrillic.

The arrangement and presentation of some figures is confusing, for example Fig. 61 is commented on p.92, and is presented on p.95.

These notes and recommendations do not reduce the value and achievements of the dissertation and do not affect my positive assessment of it.

Conclusion:

The dissertation work developed by Dr. Georgiev is an up-to-date topic and the contributions made **meet the requirements of the Requirements of The Law for the Development of the Academic Staff in the Republic of Bulgaria (LASRB) and the Regulations for its application and the Regulations of MU - Varna.** After the analysis

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I evaluate positively the dissertation "**Application of temporary restorations obtained through 3D laser stereolithographic printer"** and its scientific contributions and **I will vote categorically "yes"** for the award of **educational and scientific degree "Doctor"** in the doctoral program **"orthopedic dental medicine"**, professional field 7.2. Dental Medicine, field of higher education 7. Health and sports **of Dr. Delyan Krasimirov Georgiev.**

04.02.2022
Varna

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Assoc. Prof. Dr. Desislava Konstantinova, PhD