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Research Article

### MANUAL SKILL TRAINING OF 2<sup>ND</sup> YEAR STUDENTS AT THE FACULTY OF DENTISTRY BY USING SIMULATORS AT VARIOUS LEVELS OF REALISM

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#### Abstract:

*The article presents the results of teaching research of the students at faculty of dentistry by the manual skill of the preparation the cavity of the first class by Black on simulators at different levels of realism. Three groups of students in ten people each were trained by three different methods: training only on manikin phantom head, training only on a simulator, training on a manikin phantom head and on a simulator. Accordingly to the found results teaching on a simulators of a different levels of realism should be complex, so the authors examine different combinations of exercises directed to achieve the best result. The proposed concept training the manual skill of the drilling could be the main for creating the standard program in high schools.*

**Keywords:** simulator, MOOG Simodont Dental Trainer, manual skills, learning curve.

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**INTRODUCTION:**

Using of the simulation technologies in medicine, especially in the dentistry, spreads extremely fast. The reason of their increased demand became necessity of high quality health care and necessity of fast learning by students of manual skills. Creation and introduction of the new material- technical base, development of new algorithms and standards of treatment, all this significantly increases the efficiency of the provision of dental care. [1,2]

Nowadays exist simulators of seven different levels of realism:

- 1) Visual (anatomical model or computer textbook)
- 2) Tactile (manikin phantom head, simulator manual skill)
- 3) Reactive (manikin phantom head, manikin with electronic controller, an economic simulator)
- 4) Automatic (manikin with a computer controller, video system of surgical training)
- 5) Hardware (addition model or trainer medical equipment)
- 6) Interactive (robot simulator upper class patients, a virtual simulator with feedback)
- 7) Integrated (system of interacting simulators and robots). [3]

As part of pre-clinical training students of Dentistry by working on simulators, practicing many of the skills which needed in the future for the treatment of patients. [4,5,6,7] Different simulators allow to master the manual skills of the students at the faculty of Dentistry at a different learning curve. Training of the manual skill of drilling take sufficiently long time to process. As a result the development of new learning algorithms by the manual skill of drilling, is actual for today. [ 8,9,10 ]

**Aims of the research**

Research of efficiency of training drilling skill by first class cavities by Black on simulators at the different levels of realism.

**MATERIALS AND METHODS OF THE RESEARCH:**

For the research were selected 30 students of the faculty of Dentistry at 2<sup>nd</sup> year between the age 17-19 years old. The main criterion of selection process of students was no previous experience of drilling. Then students were divided into three groups: first group

«I» (interactive level of realism- virtual simulator with feedback) training of drilling took place just on simulator MOOG Simodont: students were drilled on a simulator different shapes cavities. In the second group «I+T» (interactive and tactile level of realism- virtual simulator with feedback and manikin phantom head) training started on a virtual simulator with feedback (also drilled different shapes cavities), and then on a plastic plates and on a manikin phantom head. In the third group «T» (tactile level of realism) students trained just on a manikin phantom head and on plastic plates.

The At the stage of training, all groups of students performed a series of similar tasks: drilling on manikin phantom head or on virtual simulator with feedback cavities of various shapes and depth.

The final stage for all three groups was – drilling teeth first class by Black by using a manikin phantom head.

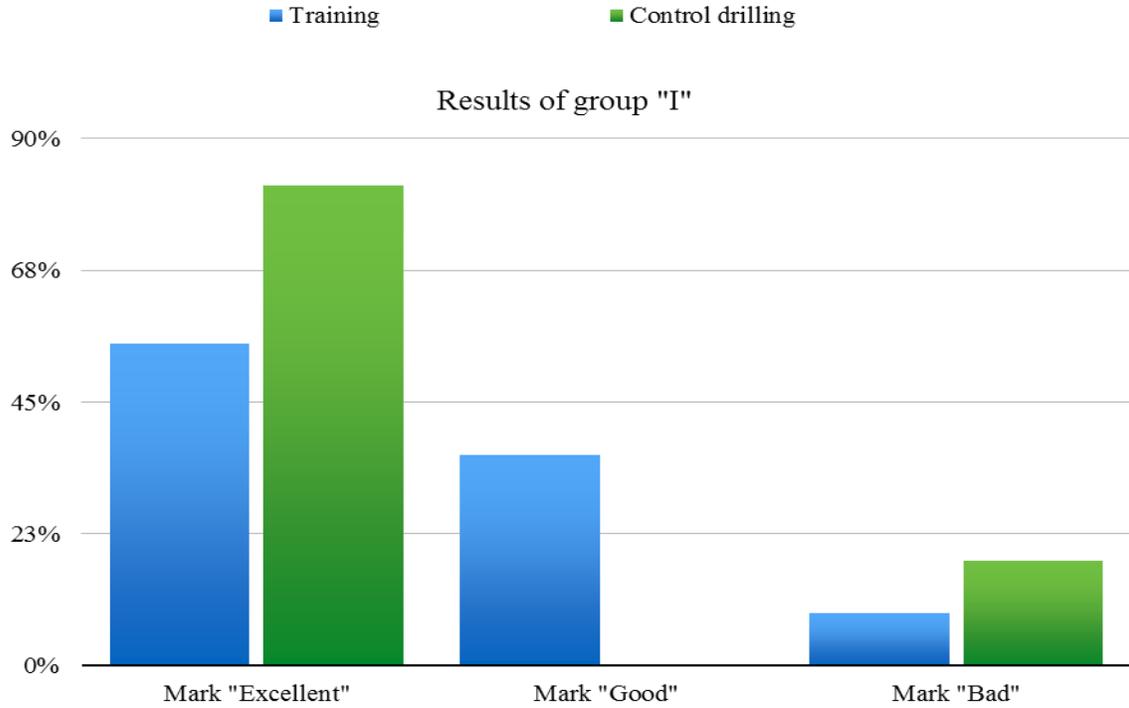
Marking criterions: marks set by tree-point system: one point- is “bad” (mistakes in preparation of boundaries of the cavity and a cavity depth), two points- is “well” (mistakes in preparation of boundaries of the cavity or a depth of cavity), three points- is “excellent” (no outputs beyond the borders of cavity and on the border of drilling).

Also we fixed time which needed for teaching drilling skill for each group. Then in each group we selected students who received a score of 3 points, and defined the time spent on training by the manual skill as "excellent" in each group.

**RESULTS AND DISCUSSION:**

At the stage of training in group "I" the mark "excellent" got 55% of students, the mark "good" - 36%, the mark "bad" got 9% of students.

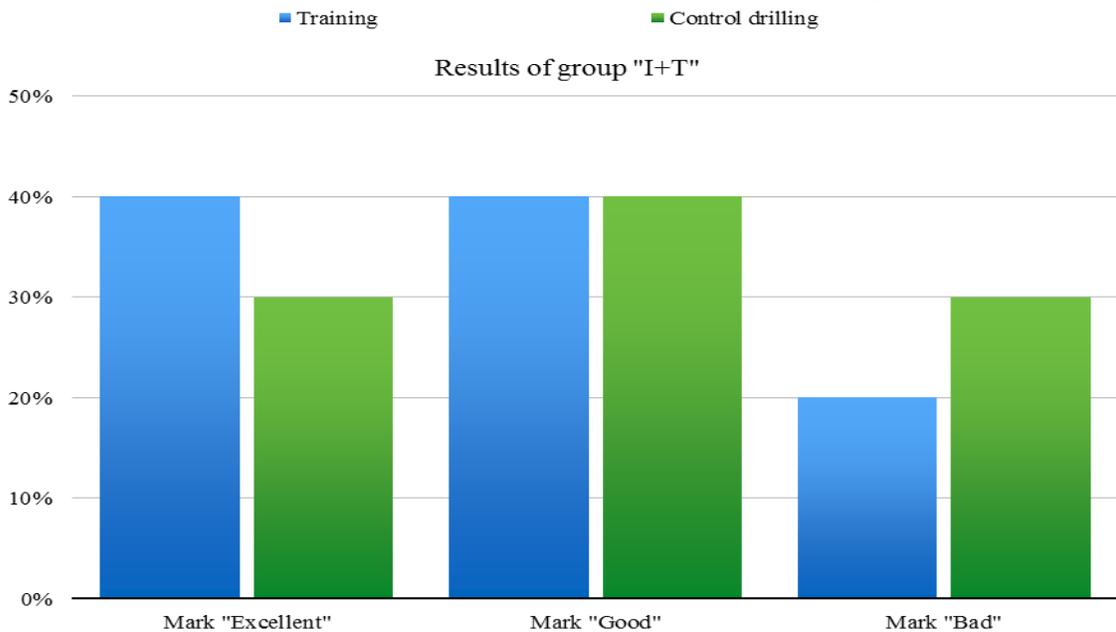
Accordingly to the results of control drilling in group "I" the mark "excellent" got 82% of students, "bad" - 18%. There was no mark "good" at the stage of control drilling. In this way, some of students during the transition from manikin phantom head of one level of realism to the other level needed more time for adaptation. (Fig. 1)



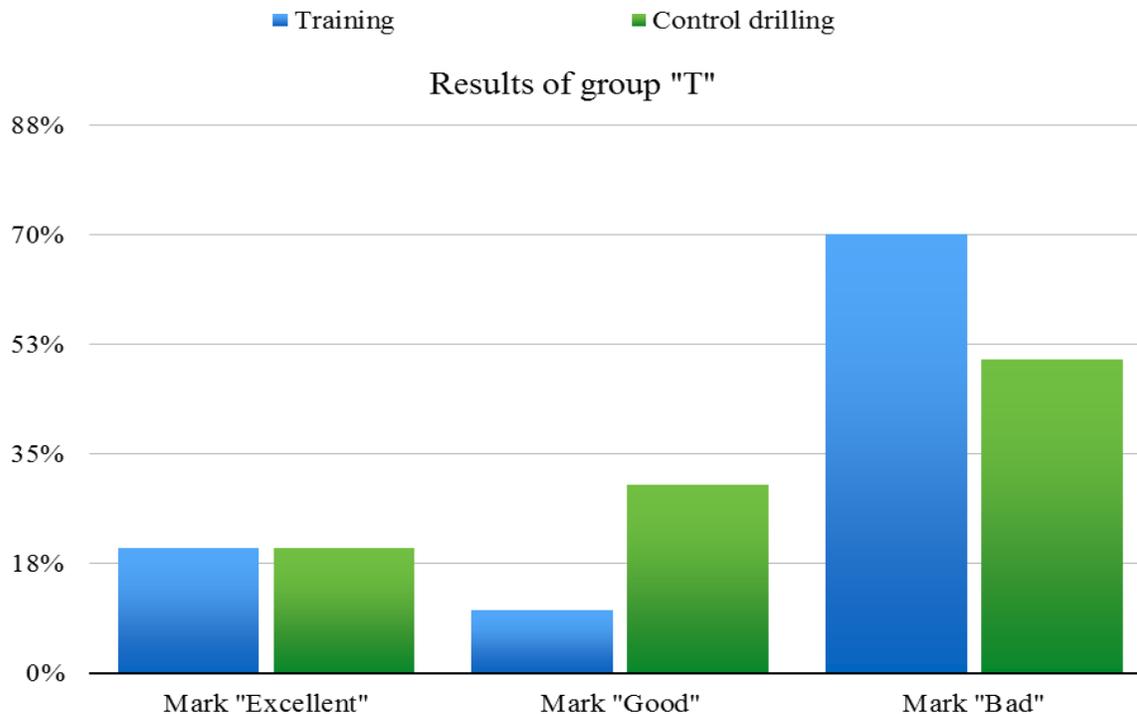
**Fig. 1: Results of "I".**

In group "I+T" (virtual simulator with feedback+ manikin phantom head) at the stage of training the mark "excellent" got 40% of students, the mark "good" - 40%, the mark "bad" got - 20% students.

Accordingly to the results of control drilling in the same group "I+T" the mark "excellent" got 30% of students, "good" -40% of students, "bad" - 30%. In this group we can see increase of mark "bad" during the transition from simulator of one level of realism to the other level too. (Fig.. 2)



**Fig.2: Results of group "I+T".**



**Fig .3: Results of group "T".**

At the stage of training in group "T" the mark "excellent" got 20% of students, the mark "good" - 10%, the mark "bad" got - 70% of students.

Accordingly to the results of control drilling in group "T" the mark "excellent" got 20% of the students, the mark "good" - 30% and the mark "bad" got - 50% of the students. (Fig.3)

For teaching the manual skill for the mark "excellent" in group "I" on the average takes 25 minutes, in group "I+T" - 50 minutes, a in group "T" - 3 hours.

### CONCLUSION:

As the result of conducted research it reveals, that for teaching the manual skill of drilling cavities first class by Black, shows smallest learning curve on the virtual simulator interactive level. However, during the transition from simulator interactive level of realism to the simulator of tactile level of realism, students needed more time for adaptation for transition into real conditions of drilling. Therefore, we proposed a new scheme of studying skills preparation: first stage – simulator of tactile level of realism, than simulator of interactive level of realism for decreasing learning curve obtained skill, and transition into real conditions of preparation.

### REFERENCES:

- 1.Yin M.S., Haddawy P., Suebnukarn S., Rhienmora P. Automated outcome scoring in a virtual reality simulator for endodontic surgery. *Comput Methods Programs Biomed*; 2018 Jan;153:53-59. doi: 10.1016/j.cmpb.2017.10.001. Epub 2017 Oct 7.
- 2.Plessas A. Computerized Virtual Reality Simulation in Preclinical Dentistry: Can a Computerized Simulator Replace the Conventional Phantom Heads and Human Instruction? *Simul Healthc*; 2017 Oct;12(5):332-338. doi: 10.1097/SIH.0000000000000250.
- 3.Gorshkov M.D., Fedorov A.V. Klassifikaciya simulyacionnogo oborudovania [Classification of simulation equipment]. *Virtualnie tehnologii v medicine=Virtual technologies in medicine*. 2012 - № 2 (8) - pp.23-35. (In Russ.)
- 4.Alinier G. A typology of educationally focused medical simulation tools. *Med Teach*; 2007 Oct;29(8):e243-50. doi: 10.1080/01421590701551185.
- 5.Weller J.M., Nestel D., Marshall S.D., Brooks P.M., Conn J.J. Simulation in clinical teaching and learning. *Med J Aust*. 2012 May 21;196(9):594.
- 6.Gallagher A.G., O'Sullivan and G.C. *Fundamentals of Surgical Simulation: Principles and Practice*. Springer. 2011.
- 7.Quinn F., Keogh P., McDonald A., Hussey D. A study comparing the effectiveness of conventional training and virtual reality simulation in the skills

acquisition of junior dental students. *Eur J Dent Educ*; 2003 Nov;7(4):164-9.

8.de Azevedo R.A., Correa M.B., Torriani M.A., Lund R.G. Optimizing quality of dental carving by preclinical dental students through anatomy theory reinforcement. *Anat Sci Educ*; 2017 Nov 20.

9.Jungnickel L., Kruse C., Vaeth M., Kirkevang L.L. Quality aspects of ex vivo root canal treatments done

by undergraduate dental students using four different endodontic treatment systems. *Acta Odontol Scand*; 2017 Oct 29:1-6.

10.de Boer I.R., Wesselink P.R., Vervoorn J.M. Student performance and appreciation using 3D vs. 2D vision in a virtual learning environment. *Eur J Dent Educ*; 2016 Aug;20(3):142-7.