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COMMENTARY

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3D printed patient individualised models versus cadaveric models in an undergraduate oral and maxillofacial surgery curriculum: Comparison of students' perceptions

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Dear Editor,

Thank you for the opportunity to comment on the letter to the editor regarding our recently published study "3D printed patient individualized models versus cadaveric models in an undergraduate Oral and Maxillofacial Surgery Curriculum."[1]

First of all, we thank the authors for the interest in our research and for commenting on our published study and will give our opinion about the several mentioned topics:

The use of cadaveric simulators is an excellent way to train ongoing surgeons during their residency. However, our published article focuses on the education of undergraduate dental students. Usually, cadaveric simulation training surgery is rather irrelevant in undergraduate education since it is expensive, not generally available, and there is no need to train undergraduate students at such a high level by using, for example, human cadaver models.

The use of 3D-printed individualised patient models for the training of basic surgical skills in OMF surgery offers for the first time a more realistic way to train typical practical skills like intraoral suturing or performing an osteotomy of impacted third molars on a comparable patient anatomy without using a cadaveric model and gives dental students an insight in the working spectrum of an OMF surgeon. The evaluation and comparison of 3D-printed individualised patient models with cadaveric (pig mandible) models as described in our study were not performed to validate those models against cadaveric models.

As we mentioned, our publication aimed "to provide an exemplary description of the fabrication and implementation of 3D-printed individualised patient models in a hands-on course for 4th year dental students."[1] Furthermore, we tried to investigate how experienced students evaluated the simulation reality compared to cadaveric models and how cost efficient both types of models were. Therefore, the main purpose of this pilot study was not to validate 3D-printed models as training tools for surgical skills but rather to present an easy and cost-efficient workflow for the fabrication of surgical simulators with the help of 3D printers and provide an example for the curricular implementation of such simulators. We could demonstrate that these models had some advantages in terms of operation reality compared to cadaveric models as the students' evaluation showed and were exceptionally cost efficient.

Moreover, we did not try to validate the models as the creation of any type of (construct, concurrent or predictive) validity would have required any kind of performance measurement, which obviously did not take place due to the limited curricular and in vivo time frame of our study. A previous similar misinterpretation motivated the authors to write a quasi-identical letter to the editor to the present one regarding a publication on the design and fabrication of a generic 3D-printed silicone cleft-palate model.[2,3] Just like Riedle et al,[2] we did not create any type of face validity since students were not asked to provide feedback on the educational intervention itself and

were not asked to assess their learning progress while working on both types of simulators but rather evaluate the simulation reality of both types of simulators. Nevertheless, we agree that there is a need for in vitro studies that also assess the (construct, concurrent or predictive) validity of a 3D-printed simulator. We are currently working on various projects regarding this topic.

The author criticised that health professionals cannot reliably assess their own performance, making self-evaluated satisfaction or progression an outcome of little to no use in research on simulation-based training. This statement is correct but has no relation to our publication as we did not investigate any type of self-evaluated learning progress in our study.

We support the author with regard to the need of a life-like situation for effective simulation. However, the author seems to obviate the fact that several aspects of the 3D-printed individualised patient models provide these properties. For example, the fact that the 3D-printed individualised patient models can be mounted in a phantom head which limits the degree of motion and thus creates a life-like situation. Moreover, the 3D-printed individualised patient models provided a life-like anatomy compared to animal cadaveric models and showed to be realistic in their haptic feedback.

As the author suggested, we will continue conducting future studies on 3D-printed models using the corresponding methods established by the scientific community and validated through a peer-review process.

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[Correction added on 03 August 2020, after first online publication: Projekt Deal funding statement has been added.]

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