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Evaluation of Tooth Preparations in Dental Education: a Collaborative Protocol

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Objectives Dental educators usually assess student preparations visually, using several indicators such as the conicity of the walls or the shape and finish of the cervical margin. However, this procedure creates problematic issues concerning time, precision and reproducibility for the evaluators. The aim of this work is to present the progress of an inter-university and collaborative project aiming to address this issue with an automated protocol.

Methods A 3-step collaborative workflow is defined between 5 universities: -Design and manufacturing of a multiple digitization base (24 preparations); -Comparative assessment of scanners used for preparations Digitization: a tabletop scanner (E4 3SHAPE®), an intraoral scanner (TRIOS 3SHAPE®) and a low-cost new generation scanner (REVOPOINT®); -Programming of an automated preparation measurement software. In the present abstract, results regarding the quality of the STL files will be presented. The three scanners are compared and evaluated with aim to estimate: -Their ability to scan the entire preparations on a base allowing multiple scanning; -Having sufficient precision to assess the quality of the cervical margin, tissue reduction thickness and the preparation walls conicity.

Results The E4 3SHAPE® laboratory scanner allow an overall better scanning, but REVOPOINT® also allow good reproduction of shapes and details, while the TRIOS 3SHAPE® scanner don't seem suitable for this protocol. A higher mesh density is observed in the laboratory scanner in comparison to the REVOPOINT®, which offered an easier analysis of the cervical limit. Additional parameters such as scan strategy, learning curve and cost of the device are also investigated in this study.

Conclusions Different scanning base designs could be adapted depending on the type of tooth and the manufacturer. This protocol offers standardized digitization of preparations. The REVOPOINT® represent an original alternative, being more accessible than a laboratory scanner for teaching staffs. A repositioning and measurement algorithms will be the next step of this project to enable rapid and automatic evaluation of preparations.