Rubrics for Practical Endodontics

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Assessment of acquired knowledge, affective processes and professional skills represents a cornerstone in various educational disciplines and dental education is no exception [1]. A student is not able to refine those skills without acknowledging delinquencies. A well-structured assessment is key for improving quality of dental education.

Assessing students in applied fields such as dentistry represents an ongoing challenge for assessors due to the subjective nature of practical work. One instructor's definition of perfect could be another's definition for disastrous. Therefore, questions related to grading and assessments are common among faculty members due to lack of professional training especially amongst junior clinicians and researchers who are new to this career path.

O’Donnell et al. [2] proposed that one way to objectify the assessment process could be through the use of rubrics: "scaled tools with levels of achievement and clearly defined criteria placed in a grid". Rubrics establish clear rules for evaluation and define the criteria for performance. Such clear rules provide faculty members with guidelines standardizing the grading process. Students on the other hands can understand the rationale behind their mark. Consequently, students can identify the level at which they stand according to the provided rubric and hence can tackle points of weakness. Rubrics can also be utilized by students to self-assess their work. Self-assessment has been shown to enhance active learning and improve practical skills [3]. It is evident that accurate self-acknowledgment of flaws can lead to high dexterity in any subject area especially those requiring high level of practical skills, going about such flaws will only be a matter of time and practice for the student (Figure 1; Tables 1 and 2).

The purpose of this article is to present the rubric implemented at Beirut Arab University, Faculty of Dentistry, Division of Endodontics for assessing dental students’ progress towards competence in practical endodontics which was developed at three grid level and as described in the educational literature.
# Figure 1  Access Cavity Assessment [4-8].

| Points | Proper (1) | Partial (1/2) | Improper (0) |
|--------|------------|---------------|--------------|
| **SITE** |            |               |              |
| Ant.   |            |               |              |
| PM     |            |               |              |
| Mo U   |            |               |              |
| Mo L   |            |               |              |
| **SIZE** |            |               |              |
| Ant. & Post. | +1 | Middle M breed (MM3/3) of the Palatal/ Lingual surface. | Occusal surface away from the MM1/3 | Any other surface than the Palatal/Lingual |
|        |            | Center of the Occlusal surface | Occusal Surface but shifted away from the PROPER | Any other surface than the Occlusal |
| Mo U   |            | Metal rim of the Occlusal surface, slightly shifted to the Buccal. | Metal rim of the Occlusal surface, slightly shifted to the Buccal. | Metal rim of the Occlusal surface, slightly shifted to the Buccal. |
| Mo L   |            | Metal rim of the Occlusal surface, slightly shifted to the Buccal. | Metal rim of the Occlusal surface, slightly shifted to the Buccal. | Metal rim of the Occlusal surface, slightly shifted to the Buccal. |
| **SHAPE** |            |               |              |
| U      |            |               |              |
| Ca     |            |               |              |
| PM     |            |               |              |
| Mo     |            |               |              |
| **EXTENSIONS** | |               |              |
| Ant    |            |               |              |
| PM     |            |               |              |
| Mo U   |            |               |              |
| Mo L   |            |               |              |

- **N.B.:** Perforation that will affect the treatment plan (Un-reparable) will be considered as fatal mistake
- **U:** Upper; **L:** Lower; **Mo:** Molars; **PM:** Premolar; **Ca:** Canine; **I:** Incisor; **MM 1/3:** Middle Middle One Third; **M:** Mesial; **D:** Distal; **B:** Buccal; **Li:** Lingual; **La:** Labial; **C:** Cervical; **RP:** Reference Point; **WL:** Working Length; **EWL:** Estimated Working Length; **IF:** Initial File; **MAF:** Master Apical File; **MC:** Master Cone
Table 1 Mechanical Preparation Assessment [4-8].

| Points | Proper (1) | Partial (1/2) | Improper (0) |
|--------|------------|---------------|--------------|
| Working length (WL) | 0.5–1 mm short of the radiographic apex | Short up to 2 mm | Short more than 2 mm or Over: beyond the anatomical apex |
| Reference Point (RP) | Rubber stopper seated perpendicular to a reliable repeatable point | File must be moved to reach the reliable repeatable point | Reference point Not Identified |
| Apical Seat | Forceful tapping on the MAF up to the W.L., confirms the resistance form. | Forceful tapping on the MAF pushes it beyond the W.L. | Gentle tapping on the MAF pushes it beyond the W.L. |
| Smoothness of the preparation | Dragging the file along the circumference of the root canal walls, gives the tactile sense of SMOOTHNESS | Dragging the file along the circumference of the root canal walls, gives the tactile sense of ROUGHNESS on One of the side walls. | Dragging the file along the circumference of the root canal walls, gives the tactile sense of ROUGHNESS on Two or More the side walls. |
| Taper | The spreader of size not less than 25 or B, must be able to enter 1-2 mm short of the working length along the side of the Master cone. | The spreader of size not less than 25 or B, cannot penetrate more than 3 mm short of the working length along the side of the Master cone. | Inability to insert any size of spreader along the side of the master cone more than 3 mm short of the W.L. |
| Maintaining the original shape of the canal & Curvature | Absence of Canal transportation, zipping, stripping, ledges or perforations. | Ledge or zipping | Stripping, Zipped foramen and or any other type of Perforation. |

N.B.: Initial File (IF) is the first file that binds to the apex after coronal flaring; Master Apical File (MAF): Is 2-3 sizes larger than the IF; and Perforations are considered FATAL mistakes

Table 2 Obturation Assessment [4-8].

| Points | Proper | Partial | Improper |
|--------|--------|---------|----------|
| Master cone selection | | | |
| Size | Similar to the MAF | 1 size smaller or larger than the MAF | Size is far from the MAF |
| Visual | The selected MC is clearly marked at the reference point | The mark of selected MC is 0.5-1 mm ahead of the RP. | The selected MC mark is beyond RP, or more than 1 mm ahead. |
| Tactile | Tug back at the working length | Slight resistance to removal only. | No tug back at all. |
| Radiographic | The MC is 0.5-1 mm coronal to the radiographic apex | The MC is at the radiographic apex or 1.5 - 2 mm coronal | The MC is beyond the radiographic apex or More than 2 mm coronal to the radiographic apex |
| Length | The filling is at the W.L | The filling is 1-2 mm shorter or longer than the WL | The filling is more than 2 mm shorter or longer than the WL |
| Homogeneity | No radiolucencies within the filling | Sight radiolucencies but in non-critical areas. | Many radiolucencies within the filling or Sight radiolucencies but in critical areas. (Like the Apical Foramen) |
| Condensation | No radiolucencies between the filling and the canal walls & Reflects properly tapered canal preparation | Sight radiolucencies between the filling and one of the canal walls | Many radiolucencies between the filling and the canal walls or Does not reflect properly tapered canal preparation. |
| Adaptation to the walls | Proper cleaning of the pulp chamber from gutta-percha and sealer | Gutta-percha removed from the pulp chamber but sealer not properly cleaned | Gutta-percha and sealer not removed from pulp chamber at all. |

N.B: Final Obturation x-ray must be taken without rubber dam AFTER placement of temporary filling
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