A novel scale to measure students’ perceptions of exemplars in a dental school.

Introduction:
Exemplars are an effective strategy for initial cognitive and psychomotor skills acquisition and promoting students’ self-regulation. Yet, there is limited evidence about students’ use and perception of exemplars in dental education. Therefore, this study aims to develop a scale to measure students’ perception of exemplars in an Australian Dental School.

Materials and methods:
Phase I assessed the relevant literature and students’ responses to an interview. Four themes were identified for developing a 19 items questionnaire rated by an expert panel. Phase II piloted the questionnaire amongst a group of 30 students. Phase III analysed psychometric and qualitative open-ended questions data obtained from a large group of students.

Results:
The principal axis factoring resulted in one single factor that explained over 62% of the variance and had an alpha of .88. The number of questions were reduced from 19 to 6 items with loadings of 0.72 or above for each item. Students reported exemplars are beneficial for their learning and to visually guide them to understand procedures and their intended outcomes. This prompts them to think and mentally prepare before performing. Students further reported using exemplars provided by their courses almost as often as exemplars they search in social media.

Conclusion:
Well developed exemplars could play a key role in enhancing learning and could assist teaching. Understanding students’ use and perception of exemplars will help educators to develop and evaluate appealing exemplars. Therefore, this study developed a new instrument to measure students’ perception of exemplars, verified its reliability and validity.

Keywords: exemplars, evaluative judgement, questionnaire, self-regulation, validation, psychometric
Introduction

Educators develop and curate exemplars as part of their teaching strategies. At the same time, current advances in information and communication technology allow learners easy access to a plethora of learning resources outside the University 1 2. Although not all learning resources are exemplars, it can be argued that many resources are seen as exemplars to be emulated. This is despite students’ struggling to judge their scientific value2. Exemplars of dental performance and their outcomes illustrating different levels of quality or competence 3,4 have been proposed as an effective strategy for initial cognitive skills acquisition 5 and to promote students’ self-regulation that in turn results in better academic performance 6. Within the social cognitive theory, the role of exemplars in self-regulated learning is explained by Zimmerman and Kisantas as a four stages process: Observation, emulation, self-control, and self-regulation 7. First, students observe and learn the salient aspects of a skill cognitively without needing to perform. Second, students commence the process of internalising the skill by emulating the exemplar 5. Third, the learner performs a new task independently applying the ideas gained from the previous process, self-control. Finally, learners self-regulate by adapting their skills to different contexts 8. Learning from exemplars can be explained from two paradigms we labelled as Exemplars of outcomes and Exemplars of processes.

Exemplars of outcomes:

A growing body of literature indicates that assessing exemplars of academic work, particularly written work, promotes students’ self-efficacy, self-monitoring and, to some extent, self-regulation 6,9. Evaluating exemplars of typical levels of quality or competence is a strategy where students appraise the quality of exemplars and discuss their judgements with peers and tutors. This helps to clarify marking criteria and their use, and allows students to grasp tacit concepts that cannot be defined in the criteria 3. This strategy gives students a point of reference for meaningful feedback 10 because students can experience and understand how teachers/experts use criteria and determine standards before their own work is assessed 3,11. Consequently, appraising exemplars develops students’ evaluative judgement skills preparing them to become proficient assessors of their own work, independent from their teachers, and self-regulated learners 4,12-18.

Learners value exemplars as they promote understanding of what is required to achieve 10 by showing salient aspects of quality 3. Understanding exemplars can be enhanced with
explanations and students actively participate in the appraisal of exemplars. An indicator of active engagement is dialogue between students and teachers. This helps students to understand and teachers to explain concepts defining quality that can be learnt with practice only \textsuperscript{13,17,18}. A student who understands what quality looks like would be more likely to articulate questions and engage in conversations on how to achieve the expected standard of quality. Once students learn to identify quality, activities need to help students to acquire the ability to produce it \textsuperscript{15,16,19}.

**Exemplars of processes.**

Exemplars showing a process to achieve outcomes is reported to enhance learning. A pedagogical strategy described in the literature is ‘worded out examples’. This consist of an expert’s solution of a problem the learner is expected to study and emulate \textsuperscript{20}. Usually, it follows three steps: 1) Receiving general instruction on concepts and principles. 2) Studying a definite problem, the solution steps undertaken and the final solution. 3) Solving other similar problems \textsuperscript{21}. The success of this strategy depends mostly on the student’s ability to articulate the explanation within that example \textsuperscript{22,23}.

Pass and van Gog (2006) argue that using exemplars in this manner are effective for instructing complex problem-solving skills. This method decreases extraneous cognitive load and enable more working memory resources to be used in activities that facilitate learning. The benefits of using worded out examples for problem solving have been demonstrated in diverse disciplines such Medicine \textsuperscript{24,25}, Psychology \textsuperscript{26}, Education \textsuperscript{27,28}, Secondary schooling \textsuperscript{23,29-31}, Engineering \textsuperscript{32,33}, Mathematics \textsuperscript{34,35}, Chemistry and Biology \textsuperscript{21}. Examples of process can extend to psychomotor skills performance with Nicholl et al. (2016) reporting that teaching a psychomotor skill task should begin with a demonstrator showing a pre-determined number of task elements since breaking down a task into steps or sub-tasks reduces the cognitive load on working memory and improve the performance of technical skills when learning a new and complex psychomotor skill. \textsuperscript{36}

This provides the learner a mental model or schema of the skill to be developed and a template for self-assessment. After visualising the task and before performing it, verbalisation or self-
declarative instruction is an important cognitive strategy when acquiring and learning psychomotor skills. It is important to notice that while not widely discussed in dental education literature, cognitive factors affecting learning procedural skills are reported as highly relevant and of growing interest in medical surgical skills.

In dental education, exemplars are used extensively, but studies about their use are scarce. The limited literature suggests that exemplars facilitate understanding of the marking process, enhance feedback and promote dialogue between students and teachers. Little is known about their perceived benefits. A measure of perceptions of exemplars would help investigate the relationship between students’ perceptions of exemplars and their benefits. Therefore, the aim of this study is to develop an instrument to measure students’ perception of exemplars that will enable teachers and course designers to further investigate these important learning resources.

Materials and methods:

**Phase I: Questionnaire development:**

This study followed the recommendations of Artino et al. (2014):

1) Literature review: A review of the literature resulted in one instrument used to explore if students perceived exemplars to support self-regulated learning. Grainger et al. (2018) validated a 14-item questionnaire by including open ended questions, which we adapted to fit the purpose of this study. There were four themes identified in the literature regarding students’ perceptions of exemplars: Perceived value, explicit support, engagement, and quality.

2) Interviewing students: The main objective of this stage was to identify students’ language when talking about exemplars and concepts that may have not been found in the literature review. One researcher individually interviewed 8 students enrolled in second and fourth years. The conversation followed a script to avoid leading students’ answers. Although students have been exposed to exemplars of processes and outcomes, the interview allowed the researchers to understand the source of the exemplars and to develop and frame questions based on the vocabulary that students found easy to follow.
3) 19 survey items were outlined: 4 items for the themes ‘Perceived value’, 4 for ‘Explicit support’, 5 for ‘Quality’, and 7 for ‘Engagement’. They were written in a clear unambiguous language for students, based on the results from the interviews with students. Responses were made on a scale ranging from 1= “Not at all”, 2= “Slightly”, 3= “Moderately”, 4= “Quite”, 5= “Extremely”. (Table 1) (Appendix 1).

4) Expert content validation method: Validating a measure is a continuous process that should commence with the evaluation of its validity. To determine the extent to which the questionnaire measures what is supposed to measure, nine full time dental educators with no less than 5 years’ experience were identified and invited to evaluate how representative the questions were of the themes. Each expert was provided with a form instructing them to: 1) rate the level of representativeness of each question using a four-point scale, 2) indicate the level of clarity of each question, 3) evaluate the comprehensiveness of the entire measure and if any item should be removed. Table 2 shows a section of the form provided to the experts. Six experts returned the questionnaire. This information was used to calculate Interrater Agreement (IRA) and Content Validity Index (CVI).

Interrater Agreement assess experts’ reliability in their ratings. A four-point scale was used to calculate for representativeness and clarity. The scale was then dichotomised with 1 (no representative) and 2 (Major revisions) combined and 3 (minor revisions) and 4 (representative) combined. IRA was calculated as number of items with 100% agreement divided by the total number of items. $13 \div 17 = .76$. IRA = .76

The Content Validity Index (CVI) was calculated based on the representativeness of the measure. Counting the number of experts who rated the item as 3 (minor revisions) or 4 (representative) and dividing that number by the total number of experts. This shows the proportion of experts who deemed the item as content valid. All Items show a CVI not lower than 83.3%. Table 3.

**Phase II: Pilot questionnaire.**

Questionnaires were distributed via email and data collected using Microsoft Forms. The pilot questionnaire included 19 items about students’ perceptions of exemplars and questions on demographics, exemplars used (source, type and discipline) and two open questions. 33 out of 100 students who were invited completed the pilot questionnaire. 17 were male, 15 female and 1 preferred not to say. The average age was 26.4 ($SD=5.7$). 13 were school leavers,
1 had a previous vocational training, 16 a bachelor’s degree and 1 a masters’ degree. All students were enrolled in a pre-clinical course as part of their 2nd Year dentistry program. The items on students’ perceptions of exemplars yielded good internal consistency reliability, Cronbach’s alpha was .82.

**Phase III: Psychometric and open questions analysis**

After the pilot, only minor modifications such typos and grammatical errors were required. To assess the psychometric properties of the questionnaire, a larger cohort was recruited. Students enrolled in 2nd, 3rd, 4th and 5th year of a dental program in an Australian University were invited via email to complete the questionnaire towards the end of their 2nd trimester after obtaining ethical clearance Ref No: 2019/455. The instrument was administrated online using LimeSurvey™ (GmbH Carsten Schmitz). The survey was confidential, and participants were gifted a coffee voucher.

**Psychometric statistical analysis**

Principal axis factoring method of extraction in exploratory factor analysis was used to examine the underlying factor structure of the data. Statistical analysis, independent t-test, was conducted to further investigate the final items.

**Open questions**

Two open questions at the end of the questionnaire were intended to investigate aspects of using exemplars that may have been overlooked in the questionnaire: “What is specifically beneficial about having exemplars of dental procedures?”; “Please tell us an occasion when using an exemplar helped your learning. Why?”. Students’ answers were analysed in two cycles: First cycle coding involved summarising the data using Excel™ to count the frequency of topics mentioned by students. Second cycle analysis involved the topics being grouped and summarised in main themes 52.

**Results**

A total of 221 out of 412 (53%) invited students participated, but 28 incomplete questionnaires were removed. Therefore, data from 194 (47%) questionnaires were analysed.
**Demographic Details**

There were 101 female, 88 male students and 4 preferred not to say. The average age was 26.95 years ($SD = 6.2$). The highest level of education previously achieved was 29% High School, 1% vocational training, 57% Bachelor, 17% Master, and 4.1% Doctorate. 35.8% of participants were enrolled in 2nd year, 59% in 3rd year, 20.7% in 4th year and 13% in 5th year 7.3%.

**Exemplars used.**

To confirm students used exemplars, the questionnaire asked how often they access to different sources of exemplars (Table 4), type (Table 5) and discipline they find exemplars more useful (Table 6).

**Psychometric Analysis**

Exploratory Factor Analysis (EFA) using the principal axis factoring method of extraction resulted in a single factor that explained over 62% of the variance with an alpha of .88. The final questionnaire retained six questions (Q) representing the themes Perceived value (Q2, Q6), Explicit support (Q12, Q9) and Quality (Q8, Q1) (Table 6). The EFA resulted in the elimination of all questions on theme Engagement. The final 6 items were further investigated and there was a significant difference between male and female responses for item 8 and 1 only (Table 8).

**Opened ended question thematic analysis.**

The theme most frequently mentioned was that visualising helps students to understand procedures. Figure 1.

*It helps me visualise what is going on (female, 2nd year) when I see new techniques or watch someone do a filling in a certain way, or drill in a certain way I can copy it (female, 3rd year). Watching youtube videos the night before a big clinic session to help visualize what you need to do and mentally prepare (Male, 4th year).*

Students reported that exemplars help to understand the “what”, “how” and to some extent “why” of a procedure enabling them to use

*time and efforts more efficiently instead of going blind* (Undisclosed gender, 2nd year).

Exemplars are guides, not only showing step by step procedures such as
how materials are manipulated (Female, 4th year) and how to hold an instrument (Male, 4rd year), but also

they show little things that you may never have thought of (Male, 2nd year).

Not surprisingly, videos were the exemplars students reported to be the most useful (94.3%). The second theme was that exemplars help to know what is expected from the dental procedure and what quality is required. This appears to be particularly helpful when students are confronted with inconsistent instructors’ opinions about quality and diverse instructors’ teaching ability:

It's difficult when dentistry is subjective and tutors have different opinions about what is ideal. An exemplar standardizes what is expected (Female, 3de year).

Finally, knowing what to expect gives students certainty and confidence:

An exemplar of poor, good, and excellent quality of work allows me to evaluate my own work independently and gives me more confidence (Female, 4th year).

particularly when trying for the first time.

Good example of crown preps are always useful when first starting out as before simlab I had never seen a crown prep before (Female, 5th year).

Because exemplars enable students to

think ahead on how to achieve it (Male, 3rd year) as they visualise the process in their mind before attempting the procedure.

Summarising, students find exemplars visually guide them to understand procedures and the quality of their outcomes. These prompts students to think and mentally prepare before performing. Consequently, students feel more certain and confident to achieve the procedure intended outcomes.

**Discussion**

Content validity of the questionnaire was supported by deriving items from a review of the literature, interviewing members of the target population to ensure the questionnaire language matched their expressions, pilot testing and expert review. The questionnaire items were further validated with EFA, which extracted a single 6-item factor. No more underlying factors were found suggesting that the initial defined themes contribute to exemplars to be regarded as beneficial for learning. A qualitative analysis of students responses to open ended questions further validated the selected items.
The final questionnaire comprises three themes. 1) Value: Exemplars promotes understanding of procedures students are learning. 2) Explicit support: Self explanatory examples help students focus on what is important. 3) Quality: Exemplars of excellent work enable students to compare their current work’s quality. Only one initially identified theme, students engagement with teachers and peers, was not represented after the exploratory factor analysis.

Only two of the 6 selected questions showed a significance difference between male and female participants. This difference needs further investigation. The answers to the open-ended questions are consistent with the literature on exemplars. Students report exemplars help them to visualise what is required and, consequently, to work more efficiently. This concurs with the theory that decreasing the extraneous cognitive load enables more working memory resources to be used in activities that facilitate learning. Therefore, exemplars are particularly useful for novice learners who lack of complete schemas necessary to integrate new information. At the same time, students comments resonates with the literature on judging exemplars’ quality and the role of exemplars on assisting students to grasp tacit concepts, self-monitoring and understanding what to achieve.

Students preferred exemplars of performance, videos and tutors’ demonstrations and they reported videos to be as useful as tutors’ live demonstrations (Table 5). This is important to consider when tutors’ live demonstrations are not possible and standardisation of procedures is necessary because of variation on tutors’ opinions on what is considered ideal. Furthermore, videos have the advantage to be easily accessible and allow students to work independently.

This study found students seek examples outside of their courses’ resources (Table 4) accessing exemplars in social media almost as often as to those provided by their courses. This is congruent with Gao et al (2015) findings of medical, dental and nurse undergraduate students accessing visual internet resources to supplement their learning enhancing their clinical confidence and self perceived competency.

Exemplars are reported to promote self regulation. It can be argued, however, that to some extent students are already self regulating by searching for exemplars and learning resources beyond of what their courses provide. Surprisingly, library books and journals were reported by students to be the least used source of exemplars. This begs the question: How do students know they can trust the source of the exemplar? It appears teachers not only need to create resources beneficial for students’ learning, but to develop strategies to help learners discriminate reputable sources from the vast world web of information.
In addition, it still remains to be seen if what students perceive as beneficial in exemplars has an impact on their performance. While learners report exemplars help them to visualise, focus and understand, there is no evidence of whether student perception of exemplars affects their performance. The six validated questions in this study were developed to investigate if a particular exemplar is perceived as beneficial by students. To use the instrument, the word ‘exemplar’ in each question could be replaced by the exemplar being investigated. For instance, exemplars in the form of a video or series of videos could read as: How beneficial are the videos of two surfaces composite restorations in helping you perform the procedure?. Survey using Google™ or Microsoft™ Forms could simplify the process of collecting data. In order to ensure that an exemplar provides learning support it is proposed this novel scale is used to assess the students perception of newly developed or previously developed exemplars. As the scale allows to assess an exemplars benefits, this could be used in other areas of medicine and allied health care where exemplars are used to support leaning.

This study had a sufficiently large sample size. However, the participants were all drawn from one institution and hence further studies with other participating universities would be essential to confirm the outcome of this study.

**Conclusion**

This study developed a new instrument to measure students’ perceived benefit of exemplars, verifying its reliability and validity. Students report exemplars visually guide them to understand procedures and the quality of their outcomes prompting them to think and mentally prepare before performing. Consequently, students feel more certain and confident to achieve the desired procedure outcomes.
References


<table>
<thead>
<tr>
<th></th>
<th>Question</th>
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<tbody>
<tr>
<td>1</td>
<td>How helpful are exemplars of dental procedures with explanations to improve your performance?</td>
</tr>
<tr>
<td>2</td>
<td>How helpful are exemplars of dental procedures with explanations to improve your performance?</td>
</tr>
<tr>
<td>3</td>
<td>How beneficial are exemplars in understanding the requirements to perform dental procedures (e.g., skills, materials, methods)?</td>
</tr>
<tr>
<td>4</td>
<td>How useful are exemplars with explanations to help you focus on what is important in a dental procedure?</td>
</tr>
<tr>
<td>5</td>
<td>How beneficial are exemplars in helping you to perform dental procedures?</td>
</tr>
<tr>
<td>6</td>
<td>How useful are exemplars without explanations to help you focus on important aspects of dental procedures?</td>
</tr>
<tr>
<td>7</td>
<td>How confident do you feel about performing a dental procedure when you see an exemplar of it?</td>
</tr>
<tr>
<td>8</td>
<td>How beneficial is discussing exemplars of dental procedures in informal online sites (e.g., Facebook)?</td>
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<td>9</td>
<td>How certain are you about the quality of a dental procedure in an exemplar when you see it?</td>
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<tr>
<td>10</td>
<td>How beneficial is discussing exemplars of dental procedures in university online sites (e.g., Blackboard)?</td>
</tr>
<tr>
<td>11</td>
<td>How beneficial is discussing exemplars of dental procedures face to face?</td>
</tr>
<tr>
<td>12</td>
<td>How useful is seeing an exemplar of excellent work quality for improving your performance?</td>
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<tr>
<td>13</td>
<td>How important are exemplars to facilitate discussions with others about dental procedures?</td>
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<td>14</td>
<td>How important are discussions with my classmates to understand exemplars?</td>
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<tr>
<td>15</td>
<td>How helpful is seeing exemplars of different work quality (Excellent, good, acceptable, border line, unacceptable) for improving your performance?</td>
</tr>
<tr>
<td>16</td>
<td>How helpful is seeing an exemplar of excellent work quality to understand the requirements for a dental procedure?</td>
</tr>
<tr>
<td>17</td>
<td>How important are discussions with tutors to understand exemplars?</td>
</tr>
<tr>
<td>18</td>
<td>How helpful is seeing exemplars of different work quality (Excellent, good, acceptable, border line, unacceptable) to understand the requirements of a dental procedure?</td>
</tr>
<tr>
<td>19</td>
<td>How anxious do you feel about performing a dental procedure when you see an exemplar of it?</td>
</tr>
</tbody>
</table>
Table 2: Example of expert questionnaire for question 1.

1. How beneficial are examples to **understand** the requirements to perform dental procedures? (e.g. skills, materials, methods)

<table>
<thead>
<tr>
<th>Not representative</th>
<th>Major revisions</th>
<th>Minor revisions</th>
<th>Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not clear</td>
<td>Major revisions</td>
<td>Minor revisions</td>
<td>It is clear</td>
</tr>
<tr>
<td>Expert</td>
<td>Value</td>
<td>Explicit support</td>
<td>Quality</td>
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<tr>
<td>6</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>CVI %</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>a</td>
<td>a</td>
<td>a</td>
<td>a</td>
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</tbody>
</table>

IRA: a: 13/17 = 0.76

a: 100% agreement n: less than 100% agreement

1: no representative, 2: major revisions, 3: minor revisions and 4: representative
Table 4: How often* do you use exemplars of dental procedures from the following sources?

<table>
<thead>
<tr>
<th>Sources</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course content</td>
<td>4.19</td>
<td>0.9</td>
</tr>
<tr>
<td>Social media</td>
<td>3.81</td>
<td>1.0</td>
</tr>
<tr>
<td>Websites other than school e.g., Australian Dental</td>
<td>2.85</td>
<td>1.2</td>
</tr>
<tr>
<td>Association</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visiting dental practice</td>
<td>2.41</td>
<td>1.2</td>
</tr>
<tr>
<td>Library e.g., books and journals</td>
<td>2.30</td>
<td>1.1</td>
</tr>
</tbody>
</table>

5 points Likert scale 1=Almost never to 5 = Almost always. *Indicates through the time students have been enrolled in the program.
Table 5: Usefulness of each type of exemplar.

<table>
<thead>
<tr>
<th>Type of exemplar</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tutor demonstrations</td>
<td>4.6</td>
<td>0.76</td>
</tr>
<tr>
<td>Videos</td>
<td>4.6</td>
<td>0.65</td>
</tr>
<tr>
<td>Models of dental work (prepared and restored plastic teeth)</td>
<td>4.3</td>
<td>0.8</td>
</tr>
<tr>
<td>Three dimensional images (3D objects on screen)</td>
<td>4.1</td>
<td>0.82</td>
</tr>
<tr>
<td>Two dimensional images (photos drawings)</td>
<td>3.43</td>
<td>0.99</td>
</tr>
</tbody>
</table>

*5 points Likert scale 1 = Not at all useful to 5 = Extremely useful.*
Figure 6: Usefulness of exemplars by discipline

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative</td>
<td>4.7</td>
<td>0.6</td>
</tr>
<tr>
<td>Anatomy</td>
<td>4.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Radiology</td>
<td>4.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Prosthodontics</td>
<td>4.1</td>
<td>1.6</td>
</tr>
<tr>
<td>Oral Pathology</td>
<td>4.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Paediatrics</td>
<td>3.8</td>
<td>1.7</td>
</tr>
<tr>
<td>Endodontics</td>
<td>3.9</td>
<td>1.6</td>
</tr>
<tr>
<td>Oral surgery</td>
<td>3.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Orthodontics</td>
<td>3.9</td>
<td>1.5</td>
</tr>
<tr>
<td>Periodontics</td>
<td>3.5</td>
<td>1.8</td>
</tr>
</tbody>
</table>

*5 points Likert scale 1 = Not at all useful to 5 = Extremely useful.*
<table>
<thead>
<tr>
<th></th>
<th>Items</th>
<th>Loading</th>
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<tbody>
<tr>
<td>2</td>
<td>How beneficial are exemplars in helping you to perform dental procedures?</td>
<td>.76</td>
</tr>
<tr>
<td>6</td>
<td>How useful are exemplars with explanations to help you focus on what is important in a dental procedure?</td>
<td>.76</td>
</tr>
<tr>
<td>12</td>
<td>How helpful is seeing an exemplar of excellent work quality to understand the requirements for a dental procedure?</td>
<td>.75</td>
</tr>
<tr>
<td>9</td>
<td>How useful is seeing an exemplar of excellent work quality for improving your performance?</td>
<td>.73</td>
</tr>
<tr>
<td>8</td>
<td>How helpful are exemplars of dental procedures with explanations to improve your performance?</td>
<td>.72</td>
</tr>
<tr>
<td>1</td>
<td>How beneficial are exemplars in understanding the requirements to perform dental procedures (e.g. skills, materials, methods)?</td>
<td>.72</td>
</tr>
</tbody>
</table>
### Table 8: Descriptive Statistics of Final Six Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Overall Mean (SD)</th>
<th>Female Mean (SD)</th>
<th>Male Mean (SD)</th>
<th>Gender Difference (Female-Male)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How beneficial are exemplars in helping you to perform dental procedures?</td>
<td>4.52 (0.73)</td>
<td>4.38 (0.81)</td>
<td>4.30 (0.89)</td>
<td>0.08</td>
</tr>
<tr>
<td>How useful are exemplars with explanations to help you focus on what is important in a dental procedure?</td>
<td>4.48 (0.75)</td>
<td>4.55 (0.59)</td>
<td>4.31 (0.78)</td>
<td>0.25*</td>
</tr>
<tr>
<td>How helpful is seeing an exemplar of excellent work quality to understand the requirements for a dental procedure?</td>
<td>4.44 (0.70)</td>
<td>4.47 (0.74)</td>
<td>4.33 (0.91)</td>
<td>0.14</td>
</tr>
<tr>
<td>How useful is seeing an exemplar of excellent work quality for improving your performance?</td>
<td>4.35 (0.84)</td>
<td>4.45 (0.76)</td>
<td>4.45 (0.86)</td>
<td>-0.01</td>
</tr>
<tr>
<td>How helpful are exemplars of dental procedures with explanations to improve your performance?</td>
<td>4.46 (0.80)</td>
<td>4.71 (0.55)</td>
<td>4.30 (0.83)</td>
<td>0.42***</td>
</tr>
<tr>
<td>How beneficial are exemplars in understanding the requirements to perform dental procedures (e.g. skills, materials, methods)?</td>
<td>4.41 (0.82)</td>
<td>4.64 (0.61)</td>
<td>4.28 (0.84)</td>
<td>0.36**</td>
</tr>
</tbody>
</table>

Note. 4 participants did not disclose gender

* $p < .05$; ** $p < .01$; *** $p < .001$
Figure 1: Frequency of words mentioned by students

- Visualise
- What to do
- What to expect
- Understand
- How to do
- Learn
- Guide
- Aim
- Why
- Explained
- Discuss
Exploring the utilisation of dental procedures exemplars by dental students

An EXEMPLAR is something (a photo, video, live demonstration, etc) that SHOWS you what is IMPORTANT in a dental procedure.

Thank you for taking part in this survey. Your thoughts and opinions about exemplars will help us to create better learning resources for you and future students. This survey should take about 10 minutes to complete.

After submitting the survey, check your email box, we send you a toquen for a coffee vaucher on "G", (the coffee shop downstairs).

There are 32 questions in this survey

Demographics

[] How old are you? *

Only numbers may be entered in this field.

Please write your answer here:

[] What is your gender?

Please choose only one of the following:

- Female
- Male

[] In what year are you enrolled? *

Choose one of the following answers

Please choose only one of the following:

- First year
- Second year
- Third year
- Fourth year
- Fifth year

[] In what program are you enrolled? *

Choose one of the following answers

Please choose only one of the following:

- Bachelor of Dental Health Science
- Bachelor of Dental Prosthetics
- Bachelor of Dental Technology
- Doctor of Clinical Dentistry
- Graduate Diploma of Dentistry
What is your higher degree or level of school you have completed? *

Choose one of the following answers:

Please choose only one of the following:

- Master of Clinical Dentistry
- Master of Dentistry
- High school degree or equivalent
- Vocational training
- Bachelor's degree
- Master's degree
- Doctorate
Sources of exemplars

[ ] How often do you use exemplars of dental procedures from the following sources? *

Please choose the appropriate response for each item:

<table>
<thead>
<tr>
<th>Course resources. E.g. Lectures, blackboard</th>
<th>Almost never</th>
<th>Once in a while</th>
<th>Sometimes</th>
<th>Often</th>
<th>Almost always</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library. E.g. Books and journals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social media. E.g. Instagram, YouTube</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Websites other than the school's E.g. ADA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visiting a Dental Practice</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[ ] If you use other source of exemplars, please specify

Please write your answer here:

[ ] How useful are the following type of exemplars? *

Please choose the appropriate response for each item:

<table>
<thead>
<tr>
<th>Two dimensional images (photos, drawings)</th>
<th>Not at all useful</th>
<th>Slightly useful</th>
<th>Moderately useful</th>
<th>Quite useful</th>
<th>Extremely useful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three dimensional images (3D objects on screen)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Videos</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tutors demonstrations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Models (e.g. plastic teeth with preparations and restorations)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[ ] If you use other type of exemplar please specify.

Please write your answer here:

[ ] How useful are exemplars in the following disciplines? *

Please choose the appropriate response for each item:

<table>
<thead>
<tr>
<th>Operative</th>
<th>Not useful at all</th>
<th>Slightly useful</th>
<th>Moderately useful</th>
<th>Quite useful</th>
<th>Extremely useful</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not useful at all</td>
<td>Slightly useful</td>
<td>Moderately useful</td>
<td>Quite useful</td>
<td>Extremely useful</td>
<td>Not applicable</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------</td>
<td>-----------------</td>
<td>-------------------</td>
<td>--------------</td>
<td>------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Orthodontics</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Radiology</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Prosthodontics</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Paediatric Dentistry</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Oral Pathology</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Endodontics</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Oral surgery</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Periodontics</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Other</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

[]If you use exemplars in another discipline, please specify

Please write your answer here:
Explanations

Explanations in an exemplar may be: Voice over, subtitles and annotations

[ ] How helpful are exemplars of dental procedures with explanations to improve your performance? *

Choose one of the following answers

Please choose only one of the following:

- Not at all helpful
- Slightly helpful
- Moderately helpful
- Quite helpful
- Extremely helpful

[ ] How beneficial are exemplars in understanding the requirements to perform dental procedures (e.g. skills, materials, methods)? *

Choose one of the following answers

Please choose only one of the following:

- Not at all beneficial
- Slightly beneficial
- Moderately beneficial
- Quite beneficial
- Extremely beneficial

[ ] How helpful are exemplars of dental procedures without explanations to improve your performance? *

Choose one of the following answers

Please choose only one of the following:

- Not at all helpful
- Slightly helpful
- Moderately helpful
- Quite helpful
- Extremely helpful

[ ] How useful are exemplars with explanations to help you focus on what is important in a dental procedure? *

Choose one of the following answers

Please choose only one of the following:

- Not at all useful
Slightly useful
Moderately useful
Quite useful
Extremely useful

How beneficial are exemplars in helping you to perform dental procedures? *
Please choose only one of the following:

Not at all beneficial
Slightly beneficial
Moderately beneficial
Quite beneficial
Extremely beneficial

How useful are exemplars without explanations to help you focus on important aspects of dental procedures? *
Please choose only one of the following:

Not at all useful
Slightly useful
Moderately useful
Quite useful
Extremely useful
Exemplars and learning

[ ] How confident do you feel about performing a dental procedure when you see an exemplar of it? *

Choose one of the following answers

Please choose only one of the following:

- Not at all confident
- Slightly confident
- Moderately confident
- Quite confident
- Extremely confident

[ ] How beneficial is discussing exemplars of dental procedures in informal online sites (e.g. Facebook)? *

Choose one of the following answers

Please choose only one of the following:

- Not at all beneficial
- Slightly beneficial
- Moderately beneficial
- Quite beneficial
- Extremely beneficial

[ ] How certain are you about the quality of a dental procedure in an exemplar when you see it? *

Choose one of the following answers

Please choose only one of the following:

- Not at all certain
- Slightly certain
- Moderately certain
- Quite certain
- Extremely certain

[ ] How beneficial is discussing exemplars of dental procedures in university online sites (e.g. Blackboard)? *

Choose one of the following answers

Please choose only one of the following:

- Not at all beneficial
- Slightly beneficial
1/20/2021 Online Research Survey Tool - Exploring the utilisation of dental procedures exemplars by dental students

- Moderately beneficial
- Quite beneficial
- Extremely beneficial

[ ] How beneficial is discussing exemplars of dental procedures face to face? *
Choose one of the following answers:

- Not at all beneficial
- Slightly beneficial
- Moderately beneficial
- Quite beneficial
- Extremely beneficial

[ ] How useful is seeing an exemplar of excellent work quality for improving your performance? *
Choose one of the following answers:

- Not at all useful
- Slightly useful
- Moderately useful
- Quite useful
- Extremely useful

[ ] How important are exemplars to facilitate discussions with others about dental procedures? *
Choose one of the following answers:

- Not at all important
- Slightly important
- Moderately important
- Quite important
- Extremely important

[ ] How important are discussions with my classmates to understand exemplars? *
Choose one of the following answers:

- Not at all important
- Slightly important
Moderately important
Quite important
Extremely important

[] How helpful is seeing exemplars of **different work quality** (Excellent, good, acceptable, border line, unacceptable) for improving your performance? *

Choose one of the following answers

Please choose **only one** of the following:

- Not at all helpful
- Slightly helpful
- Moderately helpful
- Quite helpful
- Extremely helpful

[] How helpful is seeing an exemplar of **excellent work quality** to understand the requirements for a dental procedure? *

Choose one of the following answers

Please choose **only one** of the following:

- Not at all helpful
- Slightly helpful
- Moderately helpful
- Quite helpful
- Extremely helpful

[] How important are discussions with **tutors** to understand exemplars? *

Choose one of the following answers

Please choose **only one** of the following:

- Not at all important
- Slightly important
- Moderately important
- Quite important
- Extremely important

[] How helpful is seeing exemplars of **different work quality** (Excellent, good, acceptable, border line, unacceptable) to understand the requirements of a dental procedure? *

Choose one of the following answers

Please choose **only one** of the following:
Not at all helpful
Slightly helpful
Moderately helpful
Quite helpful
Extremely helpful

How anxious do you feel about performing a dental procedure when you see an exemplar of it? *

Choose one of the following answers:

Not at all anxious
Slightly anxious
Moderately anxious
Quite anxious
Extremely anxious
Open question

Your particular experiences with exemplars.

[] What is specifically beneficial about having exemplars of dental procedures?

Please write your answer here:

[] Please tell us an occasion when using an exemplar helped your learning? Why exactly?

Please write your answer here:
Thank you for helping us to create new and better learning resources!
16/10/2020 – 07:08

Submit your survey.
Thank you for completing this survey.