

# Students' perceptions of post-exam feedback in oral radiology—A comparative study from two dental hygienist educational settings

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## Abstract

**Introduction:** The aim of this study was to investigate how students perceive the benefit of participating in a teacher-organised session providing feedback on exams, termed post-exam feedback, in two dental hygienist programmes.

**Methods:** The study was based on interviews with 22 participants, including 18 students and 4 faculty teachers. The data were approached on the basis of thematic analysis, allowing us to generate insights on how the participants reflected on their participation in the post-exam feedback sessions and how they perceived this arrangement as learners.

**Results:** The findings from the study suggest that motivated students consider post-exam feedback to be beneficial in clearing up uncertainties and deepening their understanding of issues not fully understood during the exam, as well as supporting their further learning. Less motivated students mainly consider post-exam feedback to be relevant for students who do not pass the exams.

**Conclusions:** Organised in a student-centred way and with attentiveness to student learning preferences, the results suggest that post-exam feedback can be valuable for enhancing assessment and supporting student learning related to exams.

## KEYWORDS

Assessment, oral radiology, post-exam feedback, student learning

## 1 | INTRODUCTION

Assessment as a driver of student learning has been a hot topic in higher and professional education for decades.<sup>1-5</sup> The findings from research on assessment are relevant for all dental education programmes, as they emphasise the integration of multiple knowledge perspectives, including clinical competencies, communication skills, theoretical insights, professional ethics and more.<sup>6-8</sup> However, research on how students experience receiving

feedback about their summative assessment to support continued learning is scarce.<sup>9-12</sup>

In this study, we address the issue of continued learning by examining how students perceive receiving feedback on their exam performances. Here we define feedback as a 'process where the learner makes sense of performance-relevant information to promote their learning'.<sup>13</sup> This signifies a process of obtaining, understanding and using feedback information to improve the quality of learning.<sup>14</sup> This presupposes an active process where the

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learner seeks and investigates information based on the task at hand in relation to their own prior knowledge and learning strategies.<sup>5,15-17</sup> This activeness refers to recent research on feedback and feedback literacy, emphasising empowerment for learners to identify their own shortcomings as a basis for shaping their further learning.<sup>18</sup>

The paper reports on a study providing feedback opportunities for students on their completed final exams, termed post-exam feedback. The study is based on empirical documentation from two different dental hygienist programmes situated in two university settings: one in Sweden and one in Norway. We report our experiences from formally arranged post-exam feedback sessions related to oral radiology exams. The intention of post-exam feedback in these contexts is to provide students with insights into their exam performances and enable them to identify knowledge gaps to guide further learning. We explored this through in-depth analysis of interviews with dental hygienist students attending post-exam feedback sessions in the above-mentioned course contexts with the purpose of improving feedback. We discuss our findings in relation to the benefits of feedback on exams in professional and dental education.<sup>6,7,10,12,19</sup>

According to a survey conducted as part of the current project, about 38% of master's programmes and 39% of bachelor's programmes in dental education in Europe offer some kind of extended feedback on exams to their students.<sup>20</sup> The purposes of these post-exam feedback arrangements appear to be twofold: (1) as a formal requirement to give students access to examination scores and be transparent about the assessment practices; and (2) as a pedagogical measure, where giving feedback on exam results is seen as an opportunity to address misunderstandings and uncertainties to support students' further learning. This latter approach, which is the focus of this study, may include issues relating to integration between theoretical and clinical knowledge and professional work, which is a vital part of professional dental education and training.<sup>21,22</sup> The pedagogical approach to post-exam feedback resonates with the notion of sustainable assessment, which concerns how learners are prepared for future challenges that reach beyond current assessment episodes, transcending course modules and traversing clinical training to prepare for life-long learning.<sup>23</sup> With these perspectives on learning and feedback in mind, our study addressed the following aims:

1. To investigate two different approaches to post-exam sessions implemented in dental hygienist education programmes at different institutions; and
2. To examine how the students perceived these two post-exam feedback approaches with respect to their gains as learners.

Exploring these aims through qualitative analysis is intended to unveil salient properties and underlying dimensions, thereby informing further refinements of post-exam feedback and enabling more accurate evaluations of post-exam feedback as an assessment and feedback practice in the future. In this exploratory study, bachelor's

programme students in oral radiology were chosen to conduct a comparative qualitative study and simultaneously manage the practical implementation of post-exam feedback sessions. Oral radiology was chosen in this study as an example of a complex subject presupposing integration with other dental disciplines, in addition to practical and clinical judgement skills.

## 2 | METHODS

### 2.1 | Context and design

This study reports empirically on two approaches to post-exam feedback in two different dental hygienist programmes at a Swedish (Context 1) and a Norwegian university (Context 2), which are both public universities in Scandinavia. The participants were bachelor's students in dental hygiene and health sciences (also termed oral health science). The two student cohorts attended post-exam feedback sessions after a final summative written exam in oral radiology.

The two universities were chosen due to their similarities regarding both content and assessment methods in their oral radiology courses (Appendix S1 and S2). However, one university (Sweden) had established mandatory post-exam feedback practices for decades, while the other (Norway) had a desire to implement post-exam feedback. This allowed for studying the students' different experiences regarding post-exam feedback.

#### 2.1.1 | Teachers

The post-exam feedback sessions in each context were run by academic teachers with similar and long experience in oral radiology.

#### 2.1.2 | Post-exam feedback session

The post-exam feedback sessions were very similar as context 2 based their session on observations from context 1. In both contexts, the post-exam feedback session included a presentation with an overview of the exam results, whereafter, the educators presented high-quality solutions on each exam task and spent time clarifying parts that had been misunderstood by all or some of the students. Additional information was given on specific topics, explaining and relating the topics further to the clinical situation. At the beginning of the post-exam feedback session, the students were encouraged to raise questions after each presented topic. This was repeated at the end of the session. One difference was that the students in context 1 received their results simultaneously with the feedback session, while in context 2, the feedback was provided 2 months after the students received their exam results. These circumstances may have influenced the student's participation to some extent.

### 2.1.3 | Contents of the exams

As shown in Table 1, the contents of the exams in the two contexts were very similar. A minor difference was that context 2 incorporated a video-case related to clinical behaviour, whereas context 1 did not. Another difference was that in context 2, the exam was conducted as a digital on-site exam, while in context 1, it was an on-site pen-and-paper exam without computer support. The authors do not believe that these differences significantly impact the results of the exams or feedback sessions.

## 2.2 | Programme descriptions

**Context 1:** This dental hygienist programme is based on a two-year syllabus, with an optional third year leading to a bachelor's degree. The oral radiology course starts at the end of the first year with a focus on anatomy, radiation physics/protection, interpretation of intraoral radiographs, pathology and intraoral examination of patients. Students meet patients during this oral radiology course and are assessed on their ability to perform intraoral examinations and how they approach the patients. The final written summative assessment is at the end of the course. Teachers are, in this context, required to offer post-exam feedback 2–3 weeks after the exam, which is arranged in plenary sessions together with reporting the exam results. The students attend these post-exam feedback arrangements on a voluntary basis (see Appendix S1 for more detailed information).

**Context 2:** The dental hygienist programme in context 2 is a three-year bachelor's programme emphasising early clinical exposure, which starts from the first semester and increases progressively across 3 years. The oral radiology subject includes theoretical lectures in radiation physics/protection, seminars with radiographic interpretation of anatomical structures and clinical training in radiographic periapical. The final written summative assessment in oral radiology is conducted in the fourth semester. Post-exam feedback, in this context, was provided for the first time as a mandatory plenary session for the whole student cohort 2 months after the exam, at the beginning of the fifth semester. In this context, post-exam feedback was piloted as a supplement to the regular schedule of the 2019 cohort, several weeks after the students received their exam results (see Appendix S2 for more detailed information).

### 2.3 | Data collection and analysis

The study included four groups of participants for the interviews: the undergraduate students attending the post-exam feedback in contexts 1 and 2 and the faculty staff responsible for the post-exam feedback in both contexts. In addition, the faculty participants in the project observed each other's post-exam feedback sessions to gain detailed insights into the two post-exam feedback arrangements.

The primary data in the study are based on student interviews, while the faculty interviews and field observations serve

TABLE 1 Overview of programmes and data collection of the two studied contexts providing the post-exam feedback arrangement.

Programme/exam	Exam/content	Post-exam feedback arrangement	Post-exam feedback data/cohort
Context 1 2-years programme (4 semesters) with an optional third year for bachelor's degree Exam oral radiology: 2nd semester Exam: analogue Exam results with grades passed or failed	1. Radiation physics/protection 2. Radiographic examination of patients 3. Radiographic interpretation (anatomy/pathology)	Long history of post-exam feedback Feedback session 2 weeks after the exam Feedback given in plenum simultaneously with exam results <b>Voluntary session integrated in the teaching schedule</b> Plenary session with whole student cohort	Interview (students) Cohort 1, $n = 13$ Interview with two local teachers giving the course and post-exam feedback Field observations by external researcher and teachers from context 2
Context 2 3-year programme (6 semesters) Exam oral radiology: 4th semester Exam: digital Exam results with grades A-F	1. Radiation physics/protection 2. Radiographic examination of patients 3. Radiographic interpretation (anatomy/pathology)	Post-exam feedback 1st time (pilot) Postponed feedback-session: Feedback 2 months after receiving exam results <b>Mandatory session integrated in the teaching schedule</b> Plenary session with whole student cohort	Interview (students) Cohort 2, $n = 5$ Interview with two local teachers giving the course and post-exam feedback Field observations by external researcher and teachers from context 1

Note: The bold text signals the difference between the contexts. Context two was voluntary.

as background data. The student interviewees were recruited to voluntarily participate in semi-structured focus group interviews, where the aim was to investigate their experiences of the post-exam feedback sessions in the respective dental hygienist programmes.

The project was approved by the National Social Science Data Service, requiring all participants to be notified of the purpose of the data collection and their right to withdraw from the study without further explanation at any time from data collection to final publication. This also required written informed consent from all participants prior to the data collection. The student interviews were conducted in Spring 2019 in context 1 and Autumn 2019 in context 2. Four focus group interviews were conducted with a total of 22 participants, including faculty staff ( $n=4$ ), students from context 1 ( $n=13$ ) and students from context 2 ( $n=5$ ), amounting to a total of 11 hours of audio recordings. One of the authors is an external educational researcher who observed both post-exam feedback sessions and led the interviews. This researcher had no affiliation to the observed educational programmes and is therefore not a stakeholder concerning the outcome of the feedback arrangement. The interviews were based on a semi-structured interview guide that offered a certain predefined focus and simultaneously allowed the participants to freely discuss raised issues.<sup>24,25</sup> The data transcribed from the audio-recorded interviews were anonymised and subjected to thematic analysis to identify patterns in participant experiences and perceptions. Pseudonyms are used for participants in the presented extracts to ensure their anonymity.

The thematic analysis involved a complete read-through and logging of the contents of the interviews, with an initial writing of short extracts that provided an overview of the interviews. This was followed by an in-depth analysis examining themes and patterns emerging from the focus groups regarding the participants' experiences of the post-exam feedback sessions.<sup>26,27</sup> This in-depth analysis included going through all the material several times, focusing on how the participants perceived receiving feedback on their exam performances.

### 3 | RESULTS

Based on our thematic analysis of the interview data, we identified two main themes: *pragmatic/instrumental* and *understanding/competence development* orientations. Each overarching theme was divided

in the analysis into separate categories and sub-categories displaying different notions of how the participants orient themselves as learners and how they prepare for and consider the purpose of exams. These thematic patterns and sub-categories are summarised in Table 2.

The overarching thematic patterns presented in Table 2 are largely consistent across the two empirical contexts of the study. Below, we display in detail how these patterns emerged in our data, first from context 1 and then from context 2.

#### 3.1 | Context 1: Established post-exam feedback practice

Starting with the identification of the two main themes in our material, a discussion between the participants at the beginning of the interview of focus group 1 illustrates an early distinction between *pragmatic/instrumental* and *understanding/competence*:

Excerpt 1.

**Interviewer:** How many usually attend these [post-exam feedback] sessions?

**Aron:** On average, about 20 students, while the rest do not. [I] think we are about 34 in class. These numbers are quite stable, I think [several others nodded in agreement].

**Interviewer:** Who usually appears?

**Marie:** I usually do not ... before now.

**Aron:** I attend every time.

**Tana:** I do too. I appreciate it. It is important to me [several others approve].

**Aron:** I think it is a good opportunity to repeat things.

As seen in excerpt 1, the participants distinguish who attends the post-exam feedback, displaying a divide in both the student population and the focus group. Further analysis of our data confirmed this divide, suggesting an overarching pattern of pragmatic versus understanding-oriented perspectives on learning.

##### 3.1.1 | Pragmatic/instrumental orientation

Students stating a pragmatic/instrumental orientation described their involvement in post-exam feedback as something they usually did not participate in. Several overlapping utterances by

TABLE 2 Diagrammatic representation of the thematic analysis of interview-data with focus on the participants perception of post-exam feedback.

Themes	Pragmatic/instrumental		Understanding/competence development	
Categories	Interpret assessment requirements, pass exams, simplify learning		Learn beyond assessment requirements, develop deeper understanding	
Sub-categories	Post-exam feedback redundant	Exceptions (feedback, failed exams)	Post-exam feedback advantage	Improvements

participants accentuating this position illustrate what this orientation represents:

**Shara:** Personally, I usually never attend these plenary sessions. I think it just ... I do not learn anything. I just start checking my own results [...]. So, if I make it on the exam, even if it is just one point from failing, I have still passed.

**Theo:** For me, it's like I do not see the point. It might be okay to see what I did wrong, but as long as the exam is accepted, nothing of what's said [in the post-exam feedback session] really sticks in my head.

**Marie:** As I see it, when I have passed an exam, I just do not see the point with being here. I've passed, so I do not need it. I can understand those who have failed, to see what they should have answered, but otherwise ...

The students reported, on the one hand, that they do not learn from feedback on exam results. They also underlined that passing the exam makes feedback on their performance pointless. Looking more closely at the above utterances, however, reveals a more nuanced position, as post-exam feedback is considered useful in certain situations. This concerns students having failed their exams and needing to improve their results for a re-examination. This latter position indicates that even though post-exam feedback is not prioritised, it is still considered an opportunity to improve exam results in more competitive situations:

**Theo:** At our programme [...] you either pass or fail [...]. I would understand it [the point of post-exam feedback], if there was a grading system [of the exam results] that compares students' performance, and these comparisons count somehow, such as in Law [...]. Then I would attend every session. But it does not count, so I do not see the point.

Again, we see a position where feedback on exam results is relevant for improving scores. What is similarly striking with this *pragmatic/instrumental* position is that the participants emphasise formal approval while focusing little on understanding the content being assessed. The summative assessment process is thereby reduced to pass or fail as a characteristic marker of the *pragmatic/instrumental* position. Following the data in further detail, we also see how these participants' utterances resonate on learning the subject of radiology:

**Marie:** Your whole professional life, you'll have to view images like these. So the issue is just this: either you get it right, or you get it wrong [...].

**Theo:** The way, I think, to learn about a discipline is simply that you read about it, eventually you memorise it, and then you know how to answer. With images [in radiology], it's also about being able to recognise features or spot them.

**Shara:** The reason why I usually do not attend these sessions is mainly based on how I approach my learning prior to the exam [...]. I mainly go through previous PowerPoints and exams, and

by doing this I get a basis for anticipating what [questions] they are going to ask [...]. So, even if I just pass, I feel that this is sufficient.

The utterances above consider knowledge as *right or wrong*, while learning is associated with *memorisation*. In Figure 1, these dispositions are categorised as a tendency to *simplify learning*. These notions of knowledge and learning are nuanced in the sense that they connect to professional practice, but this contextualisation is mainly related to knowledge as the recognition and identification of similarities. While the participants with this instrumental view may have other opinions about learning and knowledge, their association with assessment is clearly articulated as *simplified*, corresponding with what in the literature is considered a surface-oriented approach to learning and a limited focus on gaining deeper understanding.<sup>2,3</sup>

### 3.2 | Understanding/competence orientation

Students stating an *understanding/competence* orientation described their post-exam feedback involvement as an opportunity to learn and, therefore, more important:

**Aron:** I can see Marie's point, but I feel that, even though I passed the exam, I want to know what I've missed and what I've done wrong in order to learn. I always come to the rounds because I want to learn. Because I take it as a learning opportunity to know ...

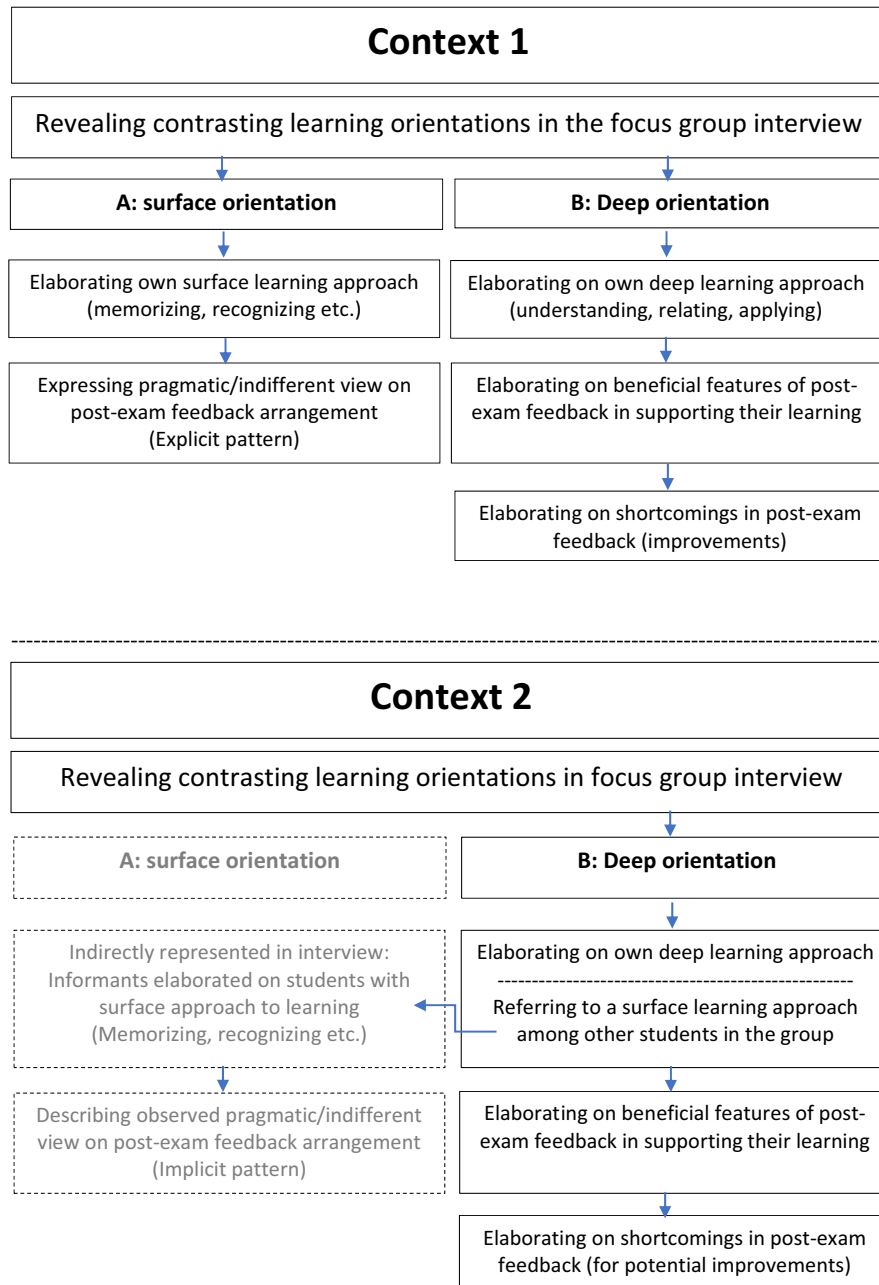
**Biljana:** I think it's great to have these briefings because you do not really know how you did on the exam even though you pass. However, even if I do not get the answers to everything in these [post-exam feedback] sessions, you still get some answers to many things actually.

**Hassan:** I know I'm not picking up everything [from the briefings], but for me, the most important thing in attending this is that I want to learn.

As we see above, Aron contests previous statements in the group that post-exam feedback is pointless. This statement is representative of opinions considering feedback as an opportunity to learn. These participants also underline that passing the exam is subordinate, since attending the sessions concerns their understanding of the subject, thereby representing an *understanding/competence development* orientation. Looking more closely into these segments of our data, the following utterances provide us with finer-grained explanations:

**Tana:** Well, I attend these post-exam sessions because I wish to learn. I see it as an opportunity to see what I did right and not and to get correct answers [...], or else I get insecure.

**Mona:** For me, the point of this feedback session is more that, even if I've passed, that I still can learn more. It is an opportunity to



**FIGURE 1** Overview of student orientations revealed in the interviews from the two contexts included in the study. The figure shows that the participants in context 1 represented both surface and deep learning orientation. The surface learners express a pragmatic/indifferent view on feedback while the deep learners are very favourable. In context 2 the participants exclusively expressed deep learning orientations and favourable opinions, but the participants also referred to surface learning orientation as common among students in their community, with a corresponding pragmatic/indifferent stance to feedback after exams. This suggests that the two contexts presumably have similar characteristics concerning learning orientations and opinions about post exam feedback.

learn not just about the discipline but also about myself [...] and how I learn.

**Hassan:** I think there are different opinions about this, because I think what I consider as important is how I see myself in the profession [...] how I perform and understand these things in practice. That's the most important thing for me and why I always attend.

The nuances that emerge stretch from clarifying misunderstandings to more complex propositions, such as gaining deeper knowledge, preparing for professional life and improving as learners. A common denominator of these positions is that post-exam feedback is considered important and productive. The extent of how productive the participants view the feedback varies from cursory considerations, such as repetition and checking answers, to more sophisticated

concerns, such as professional relevance and learning strategies. The latter we categorised as *learning beyond assessment requirements*, with an emphasis on deep learning and understanding.

An additional denominator within the cluster of *understanding/competence development* lies in the potential improvements in post-exam feedback. In contrast to perspectives surfacing in the pragmatic/instrumental assertions, almost all the participants within the understanding/competence segment addressed improvement issues:

**Hassan:** I'd like to do this more often [...], but there are too many people here who want to get answers to their questions, and I feel like, well, I just take a step back...

**Tana:** Many times, I really want to ask questions, but I just do not dare to ... I guess it depends a bit on who you are.

**Mark:** But even if you do ask questions, I'm sure we could have learned more because I think they are going through the exams too fast [...] and then you sit there...

Above, we see how students address limitations on how the post-exam feedback is organised. On the one hand, this concerns the opportunity to discuss and ask clarifying questions, which they find limited. On the other hand, it concerns anxiety about exposure in plenary sessions and the fear of asking 'simplistic' questions. The students delved further into these shortcomings but also addressed possible *improvements*:

**Aron:** I think the teachers in general are going through the exam too quickly [...], and thereby I think we miss the opportunity to contemplate complex, confusing or complicated issues that we probably should ponder more about. It's just too fast.

**Mark:** There are many of us who would prefer to receive the exam results before the feedback, at least the results, so that we maybe could prepare more for the sessions.

**Tana:** To be able to prepare for a few days, we would be more focused during the feedback session. Then we could prepare questions, and we would have a better overview and avoid the pressure of receiving the results simultaneously.

The students emphasised three aspects of *improvement*: first, feedback is too hasty and additional time is necessary to go more deeply into issues where students are uncertain. Second, they expressed the need for more time in preparing for the post-exam feedback sessions to be able to follow the teacher's feedback and avoid falling behind, which they experience as stressful. Finally, the participants prefer more opportunities for discussion, suggesting increased student involvement.

Our findings thereby imply that *understanding/competence development* orientations consider exams as learning situations, where the post-exam feedback arrangement is considered an arena for further learning. While these participants may also have other opinions about learning that did not surface in our data, we see clear similarities to what is referred to in the literature as deep approaches to learning.<sup>2,3,28</sup>

### 3.3 | Context 2: Newly implemented post-exam feedback arrangements

Keeping in mind the organisational differences between contexts 1 and 2 (the former with post-exam feedback as an established practice and the latter implementing post-exam feedback for the first time), an important difference was that in this second context, none of the participants represented a *pragmatic/instrumental* orientation. However, our analysis uncovered a clear reference to this disposition:

Excerpt 2.

**Carrie:** I've talked to most students, and I know for sure that there are those that did not want to attend [the post-exam feedback session].

**Fatima:** Why not?

**Carrie:** No, they just said 'I am finished with the exam and therefore I don't see the point'.

**Fatima:** Well, that's a bit strange, because I think it's so important [...].

**Carrie:** Yes, and those were in my opinion those who needed it most. They just do not want to. I guess it is ...

**Fatima:** Now, that's a bit ironic, is it not?

**Carrie:** Yes, it is.

As we see from excerpt 2, the distinction of students that consider post-exam feedback *redundant* is identified almost identically to context 1. This indicates that the *pragmatic/instrumental* orientation appears to be a cross-contextual feature. The suggestion from Carrie that these 'negative' students would benefit most from post-exam feedback can, on the other hand, not be verified. However, the excerpt still signals the presence of a pragmatic/instrumental tendency in the population. This tendency is also further supported in the following excerpt:

Excerpt 3.

**Keith:** I would absolutely recommend establishing this feedback on exams on a permanent basis.

**Rose:** Even if there are some who do not want to attend?

**Keith:** Yes, for the sake of learning, because I think that those who do not want to are those who would ...

**Rose:** So you think it should be mandatory [...].

**Keith:** Yes, because it is so useful. You cannot just put it [the exam] behind you; you need to take it with you further. If not, how are you going to be competent and skilful? If I just would put things behind me, how should I develop my competence then? [...].

**Rose:** But people do it [put it behind them] anyway.

**Keith:** Well, I think that this feedback arrangement can work against that or some of it at least.

Here, the participants also point to students in the population who consider post-exam feedback irrelevant, confirming the presence of the *pragmatic/instrumental* orientation in the second population, and what the current participants consider problematic with this position. Having identified these corresponding positions in both contexts, we continue presenting the theme of *understanding/competence* in relation to post-exam feedback in the second context.

#### 3.3.1 | Understanding/competence

While the data from context 1 reveal divided views on post-exam feedback, the participants in the second context were more uniform in support of the arrangement. This predominant *understanding/competence* orientation (see Figure 1) is illustrated in the following statements:

**Ellen:** I think it [post-exam feedback] was really nice, and it contributed to making the exam more into a learning process, rather

than just checking if we know what we are supposed to know. In this way, I think the whole exam became more useful ...

**Carrie:** It was a good try-out, and for me it contributed to clearing up things I was uncertain of and even making me aware of things that I had not even thought of. So I think it really made me feel more self-confident.

**Keith:** I am often uncertain after an exam, as some questions always surprise me [...], and I do not always remember what I answered. In this sense, it [post-exam feedback] was an opportunity to look into things [from the exam] that I may have missed or could have understood better.

The participants consider the activity not only as an opportunity to learn, clear up uncertainties and address misunderstandings but also to discover new insight. The students therefore consider post-exam feedback as both repetition and confirmation as well as a way to elaborate and consolidate disciplinary knowledge. The participants thereby associate post-exam feedback with what we previously labelled *learning beyond assessment requirements* (Figure 1) in our data:

**Fatima:** If we get things wrong or have misunderstood, I think it's really important with further explanations. Especially if you do not know if you were wrong. Then you may hold on to misunderstandings and do it wrong in the clinic and in practice [...] this can have serious consequences. That's why I think this is so important.

**Rose:** I also think it's important per se to learn from the exams [...] or to have an opportunity to learn from our mistakes. Because if you just pass or fail, what do you really know?

**Carrie:** In a practical subject like this, you cannot just look things up in a book after an exam. You actually need an arena where you can look into it with the teachers [...] to reflect.

**Keith:** It's also about learning to understand what the exam is about [...] and how it [the exam] relates to how you learn in the clinic later on. You learn about yourself, and here I think the session is really helpful to have a chance to understand this [relation] better.

The post-exam feedback arrangement is here considered an opportunity to reflect on ethical issues in the crossing of boundaries between teaching, exams and clinical practice. Seeing themselves in these learning transitions sustains the notion of *learning beyond assessment requirements*, where feedback on exams provides opportunities to consolidate knowledge and possibly a catalyst for lifelong learning.<sup>23</sup>

The participants in context 2 were pleased with post-exam feedback as a novel measure: as one of the participants said, *We are very pleased [...] this is more than we ever have been offered before*. However, the students also pointed out opportunities for extended involvement. Another interesting difference that emerged between contexts 1 and 2 concerns the timing and organising of the feedback sessions:

- In context 1, feedback was presented together with announcing exam results. The session was organised with teachers presenting

examples of correct answers and with opportunities to discuss and ask questions based on previous course content.

- In context 2, feedback was arranged 2 months after the exam, and giving students 24 hours to go through their examinations. The session was organised with teachers presenting examples of correct answers and with opportunities to discuss and ask questions, based on previous course content.

Revisiting the findings from context 1, the participants underlined some limited possibility of student involvement due to limitation in time.

In the second context, the students were less critical of this issue but pointed to quite similar possibilities of improvement:

**Carrie:** They asked us to write down questions [anonymously] related to the exam, but when they went through the exam, this was very difficult to do while you are listening. I think that this should be more prepared in advance.

**Fatima:** I felt I was not sufficiently prepared for what this feedback really was about. So I think the whole thing should have been explained more to us.

**Ellen:** I feel I needed even more time to go through the exams before the session [...] it takes time to refresh the memory [...], and I think we could have discussed more ...

Although the participants were satisfied with the arrangements, they still point to improvements, such as more active involvement and more time to prepare for the feedback. Since there was a longer time lag between the exam and the post-exam feedback compared to context 1, the students seemed to need more time to refresh their memory. The data also indicate that the participants in context 2 did not fully understand the purpose of the arrangement, since it was new. Revisiting the sub-category of *improvements* (Figure 1), our analysis therefore advocates more extensive student involvement, both prior to and during feedback sessions.

Summarising the findings from context 2, we largely confirm the pattern from context 1, where the students were divided in their views on post-exam feedback. The participants with pragmatic and instrumental attitudes to assessment and learning are less interested, while those with orientations towards deep understanding and developing as learners are supportive. The supportive participants, regardless of context, also suggested feedback to be more student-centred. Finally, and interestingly, the findings from both settings are surprisingly similar, even though the second context was less critical of the arrangement.

## 4 | DISCUSSION

The qualitative study in this paper aimed to investigate post-exam feedback arrangements implemented in two different dental education contexts and to examine how the students perceived and engaged with this measure as learners. The findings from this study



provide multifaceted views among the involved students but simultaneously reveal a two-sided attitude vested in both contexts considered in the study. One side has a pragmatic/instrumental attitude that is associated with a surface learning approach. The other side has an understanding/competence development attitude that relates to a more in-depth approach to learning. These different traits appear to consider post-exam feedback and its impact and relevance in contrasting ways (see Figure 1).

As displayed in Figure 1, the benefits of post-exam feedback were in both contexts identified by the participants who showed interest in understanding their discipline more deeply, while the participants with pragmatic and instrumental notions of knowledge and learning showed little interest in this measure. These findings are also consistent with previous research on student learning, where surface-oriented students often adopt less intricate strategies, such as memorising and recognition, while deep-oriented students also employ more sophisticated strategies such as connecting across contexts, encouraging reflection and critical thinking.<sup>2,3,28</sup>

As assessment is crucial in driving student learning, a key recommendation is to align assessment practices with teaching and student learning in meaningful and appropriate ways.<sup>29,30</sup> Yet, this basic goal is challenged by the fact that students often apply surface approaches to learning and in dealing with exams and assessment results. A notable issue in this relation lies in the fact that students, even if they are equipped with sufficient strategies to pass exams, may develop strategies that lack the robustness to handle future complexities and intricate contextual interconnections which characterise professional development and practice.<sup>21,31</sup>

For this reason, our investigation into post-exam feedback becomes particularly relevant. While post-exam feedback may be designed to clarify uncertainties, our aim, as mentioned earlier, is to provide extended learning opportunities for students, especially to their forthcoming clinical placements and professional learning. One prospect, therefore, is to engage students in post-exam feedback not only to question their knowledge base but also to critically scrutinise their learning strategies. Given the divided findings from our study, this prompts the need for further explorations in post-exam feedback to enhance the relevance and accuracy of this measure across a broader spectrum of student motivation and learning proficiencies. This in order to achieve the ultimate goals of assisting as many students as possible in navigating across educational course elements and transitioning into professional practice.<sup>32-34</sup>

To succeed with this type of post-exam feedback experimentation, we consider it prudent to develop the arrangement towards more active student engagement, aiming to involve a diverse range of students. This is mainly an issue of pedagogical design and planning. Drawing from previous research, this suggests creating a pedagogical framework where students make use of and act upon learning activities that trigger their engagement with knowledge elaboration and questioning. Furthermore, such arrangements are more likely to enable progress to more advanced levels of learning.<sup>35</sup>

There is substantial evidence suggesting that purposeful feedback significantly contributes to student learning.<sup>15,36,37</sup> A comprehensive

understanding of feedback entails providing students with relevant information about their current performance which in turn helps to improve learning.<sup>16,p6</sup> The main purpose of feedback is therefore to reduce discrepancies between students' current and desired understanding. This presupposes that the feedback does not simply point out shortcomings in students' performances but also prompt students' self-monitoring and self-regulation to adjust their future learning actions.<sup>38</sup> To achieve these outcomes, it is recommended to focus on developing teacher and student feedback competencies and carefully consider integrating feedback opportunities systematically into the curriculum and course design.<sup>16,39</sup>

To this end, we see the potential of developing post-exam feedback pedagogically as a component of the student's learning ecology.<sup>10</sup> In similar settings, this has proven valuable for students in clarifying and comprehending the reasoning behind examinations, while also fostering reflective learning.<sup>12,19,40</sup> This perspective also brings us back to the concept of 'sustainable assessment', where post-exam feedback offers students the opportunity for continuous learning by connecting their examination performances across course modules and clinical training.

Drawing on feedback literacy research, several interesting pointers for future developments in post-exam feedback emerge. First, future designs and experiments would benefit from a more explicit emphasis on how to accommodate student feedback literacy when designing post-exam feedback as a learning environment. Here, student feedback literacy refers to making sense of information and using this information to enhance further learning and work.<sup>39</sup> This involves attentiveness towards how students appreciate the value of feedback, how they make judgements, and how they can expand their understanding in increasingly sophisticated ways. It also involves understanding how to respond to feedback, such as in future elements of the educational programme, the clinic, or professional practice. Incorporating these fundamental feedback elements into the design of post-exam feedback simultaneously highlights an additional weakness in the contexts of the current study, which is a clear concept of teacher feedback literacy. Teacher feedback literacy mainly involves how to design and handle assessment and feedback environments that enable students to learn and develop their own feedback literacy capabilities.<sup>39,41</sup> In this respect, we recognise that post-exam feedback largely needs to develop teacher feedback literacy to realise students' capacities to benefit from this arrangement. This depends, in large part, on how the teachers who create these environments can facilitate this output.<sup>15,39,42</sup> Lastly, we consider it important to involve students more actively, both during sessions and in designing post-exam feedback, to succeed in further enhancing this measure as an extension of the learning environment.

## 5 | CONCLUSIONS

This paper has explored the practice of post-exam feedback in two dental hygienist education contexts at a Swedish university and a

Norwegian university. The results from the study suggest that students with deep approaches to learning are more inclined to appreciate learning-oriented feedback on exams than students with pragmatic and surface-oriented approaches to learning. The study results also suggest that more attention should be given to the further development and documentation of post-exam feedback in dental education settings, emphasising student learning. Given the empirical and contextual limitations of the current study, we also recommend future studies to trace student benefits across modules, programmes and cross-institutional studies, including Master's programmes, to verify the potential learning gains and limitations of post-exam feedback. We also consider it vital for further experiments and documentation that initiatives at the course, module and programme levels are clearly defined with respect to learning purposes and disciplinary requirements and that pedagogical organisations hold multidimensional views of students as learners. The results from the study may, in this respect, contribute to further developments of feedback practices at dental education institutions and raise what we consider to be a needed awareness of the potential of feedback on summative assessment to enhance the quality of teaching and students' learning.

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#### CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest influencing on the design, execution, or presentation of the scholarly work.

#### DATA AVAILABILITY STATEMENT

The present research received approval from the Norwegian Social Science Data Service (Project No. 105597) and adhered to local institutional ethical requirements for research. Data from this study are not publicly available due to privacy or ethical restrictions. Any questions regarding the data that support the findings of the study should be directed to the corresponding author.

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### SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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