

Oral Health Students as Reflective Practitioners: Changing Patterns of Student Clinical Reflections over a Period of 12 Months

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Introduction

The ideal contemporary oral health professional is a reflective and reflexive practitioner. To be reflexive is to evolve one's very being, one's self-awareness and mindfulness through self-examining one's actions within wider social contexts. In contrast, to be reflective is to transform one's ways of being through examining one's experiences and the experiences of others. The ability to reflect deeply and critically is a desirable attribute of the competent health professional.¹⁻⁶ Reflection is one of the highest extended abstract levels of learning and most indicative of deep learning according to the SOLO taxonomy.⁷ Reflection is an important process of "learning to learn," which encompasses learning to interrogate, evaluate and make sense of experiences for learning, identify learning needs, self-direct learning, integrate different aspects of learning, integrate new and existing knowledge and skills and transform through learning.^{2,8-10} Learning to learn has been described as "the greatest challenge facing education in the 21st century," so important that it cannot be left to develop implicitly.⁸ The corollary to this is students must be taught the skills of reflection.^{11,12} Yet critical reflective skills have traditionally been assumed to develop as a by-product of the learning process. This assumption has led to the underdevelopment of critical reflective skills.^{5,13-15}

A lack of taught reflective learning in oral health programs (e.g. dental hygiene programs in the U.S., Australia and New Zealand) and dentistry

programs have been attributed to the assumption that critical reflection is difficult, if not impossible to teach and difficult to implement into traditional content-heavy curricula.^{2,4,13,14,16-21} Moreover, teaching staff themselves may be unfamiliar with reflective learning as a pedagogical approach.^{2,13,17} Students often perceive reflective practices negatively because "they don't know how" and deliberate reflective thinking seems too time consuming

Abstract

Purpose: The purpose of this study was to determine the levels of reflection shown by bachelor of oral health students in relation to their clinical and professional practice.

Methods: Reflective learning was embedded as a topic in the oral health curriculum within the discipline of dental hygiene practice. Reflective journal writing was integrated with clinical practice and linked with assessment requirements. Students' reflective writing was analyzed thematically to elucidate levels of reflection based on Boud's 4 Rs of Reflection (review, react, relate and respond) over a period of 12 months. Differences in the levels of reflection at different time intervals were examined.

Results: Students' ability to critically reflect improved over the period of 12 months. The predominant level of reflection changed from primarily descriptive and superficial at the start of the academic year to primarily critical and relational by the end. As expected, the highest level of critical reflection (respond) occurred infrequently, although it became more frequent as the academic year progressed.

Conclusion: Bachelor of oral health students do reflect critically. Regular reflective writing contributed to the development of critical reflective skills in the context of clinical and professional development.

Keywords: Reflective learning, critical reflection, dental hygiene practice, oral health, clinical experiences, evolving professional

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for very little gain.^{13,17} Discrepancies also exist in the literature in relation to the definitions of reflection and critical reflection, types of reflection, models of reflection, levels of reflection, frames of references and contexts for applications, among others.^{2,22-30} It is not difficult to understand why teaching and learning critical reflection may be challenging.

Not all reflections are created equal. Different types of reflection, different models of reflection and different levels of reflection have been proposed over the years.^{1,2,5,10,22-32} Among these, Boud et al's model of reflection is commonly utilized in professional learning.²³ Boud et al described his model of reflection as the "totality of experiences of learners." Transformation of knowledge, skills and perspectives occur as a result of engaging the learner in affective, cognitive, analytical and transformative processes. In particular, key elements of critical reflection (association, integration, validation and appropriation) are developed.^{23,33} Association refers to relating new knowledge/skills to the pre-existing. Integration refers to the formation of linkages among knowledge/skills. Validation refers to determining the authenticity of the feelings, ideas and perspectives that have resulted. Appropriation refers to internalizing new knowledge, skills, perspectives and ideas. Studies have shown that various reflective frameworks and worksheets based on different models of reflection are helpful to students and reported that structured reflection (via a framework) can assist students with processing thoughts and emotions and structuring and advancing the depth of their reflections.^{2,3,5,13,14,18,22-36}

While reflective practices are utilized in oral health and dentistry, research in this area is limited.^{14,37-40} In the systematic review conducted by Mann et al, of the 600 articles they identified as being related to reflection and reflective practice in medical or health professional education or practice between 1995 and 2005, only 29 papers qualified as being relevant for investigating "the process and outcomes of reflective practice in health professional education and practice."¹⁰ Of these only 4 came from disciplines other than nursing and medicine. Research specifically targeted at investigating the levels of reflection that occur, the students' ability to reflect critically and deeply and the significance of reflective learning for clinical practice and professional development in oral health are yet to emerge.

The purpose of this study was to determine the levels of reflection shown by oral health students in their clinical reflective journals and to deter-

mine whether critical reflection, i.e. "the type of reflection that bring about transformations," contributed to the oral health students' clinical and professional development.^{2,29,41,42}

Methods and Materials

Participants: The educational intervention was embedded into the dental hygiene practice course in the final year of the Bachelor of Oral Health program at the University of Queensland. The program graduates students as oral health therapists and qualifies students to become registrable as both dental therapists and dental hygienists in Australia and New Zealand. Dental hygiene practice constitutes one of the key streams of clinical practice. In contrast, in the U.S., specific dental hygiene programs, studied at a certificate, bachelor or masters level, qualify graduates specifically as dental hygienists. University qualified dental therapists currently do not exist in the U.S., although dental health aid therapists are being utilized in some states, such as Alaska, to provide dental care to the underserved communities.

All bachelor of oral health students in their final year are required to enroll in this compulsory year long course. In total, 17 oral health therapy final year students (all females) participated in the intervention. Written informed consent was obtained from all 17 students. The study was approved by the University of Queensland Medical Research Ethics Committee.

The Intervention: The program did not provide students with knowledge and training in reflective learning and reflective practices. Previously, critical reflection was assumed to occur as students progressed through the program and matured. Most students in the program have not had exposure to reflective skills training or critical reflection. Hence, students were introduced to the concepts of reflective learning and reflective writing at the start of the semester via 2 seminars. In particular, different levels of reflection were discussed, examples of critical reflection versus surface reflection were examined and students were provided with a structured reflective proforma to focus their clinical reflective efforts and to assist with the development of systematic, in-depth reflections. The proforma followed Boud's 4 Rs of Reflection (revisit, react, relate, respond) (Table I).^{23,26,43,44} Students were encouraged to utilize this proforma but not mandated.

Clinical practice constitutes approximately 60% of the final year of the dental hygiene practice course. Students attend 2 dental hygiene practice clinical sessions each week. Each clinical session

Table II: Examples of different levels of student reflections from Semester 1 (Wk10S1) and Semester 2 (Wk8S2, Wk12S2)

Steps/Levels	Examples
REVISIT	<ul style="list-style-type: none"> • (Wk10S1) Today I had a small disaster with the second patient who had a root filled tooth and it fractured at the gingival margin just as I was refining my debridement. • (Wk8S2) I learnt all about removing sutures and periodontal dressings this week. • (Wk12S2) I had one of my favourite patients in for a review today, she is just about to start chemotherapy...
REACT	<ul style="list-style-type: none"> • (Wk10S1) I quietly had a "panic attack" as I waited for the tutor to come. To make matters worse, it was her daughter's wedding that Friday night! ... Thank goodness for supervisors!!! • (Wk8S2) Got the shock of my life when I got to remove sutures for a perio postgrad this afternoon!!! I didn't expect to put this into practice sooo soon. Scary...even now it is scary. • (Wk12S2) I was glad to be able to see her before she started her chemotherapy.
RELATE	<ul style="list-style-type: none"> • (Wk10S1) It was quite a horrible experience especially in explaining what had happened to the patient and realizing that I didn't quite know enough about root canal treated teeth. We eventually decided to refer her to clinic 7b for a consult and temporary treatment. • (Wk12S2) I was very glad that we were given lectures on cancer patients and how this affects their oral health and oral hygiene. This was great as I was able to apply my theory into clinical practice... It was a great opportunity to encourage good OH before undergoing such a horrible experience... that way it's not another thing to have to worry about when the patient already has so much on their mind.
RESPOND	<ul style="list-style-type: none"> • (Wk8S2) I need to learn more about sutures and periodontal dressings i.e. indications, different types etc. I might just have to do that again in the "real patient." • (Wk12S2) My patient's worried about the possibility of mucositis during and after "chemo." I tried to reassure her but realised how hard it could be for her. I want to find out all I can about mucositis especially current treatment so I can offer her better? more realistic? advice next time. I wonder if I'm in a position professionally/legally to help manage her mucositis? I will find out.

lasts 3 hours and involves students providing risk assessment, oral health education, oral hygiene instruction and dental hygiene treatment (quadrant debridement under local anaesthesia, restoration recontouring, etc.) to 3 patients within the School of Dentistry Undergraduate Dental Clinics. In addition, students are rotated throughout the semester into specialty clinics for extraoral radiography and orthodontics as part of course requirement for dental hygiene practice.

On the basis of developing students as reflective practitioners and purposefully optimizing clinical practice, professional development and self-directed learning, students were required to keep a clinical reflective journal noting specific critical incidents that contributed to their clinical learning on a weekly basis. Reflective journaling was selected as the reflective practice of choice as students were able to complete their reflection independently and in their own time. It was intended that privacy and a sense of security would encourage openness. Students were not limited to critical incidents that occurred in dental hygiene practice. Students were provided with guidelines to assist with their reflections, including the definition of a critical incident and recommended length of time to be devoted to

reflection per week. Students were asked to submit a word processed version of their clinical reflective journal and were invited to submit their reflective journal to the course coordinator periodically for feedback. Feedback was provided informally via personal emails to individual students and formally via one-to-one interview appointments.

The reflective journals were submitted at the end of each semester as part of the students' required assessment. The assessment of the reflective journals were based on the rationale that assessed task conveys importance to students. Reflective journals were graded pass or fail. The submission of a journal containing weekly reflections based on critical incidents resulted in a pass grade. A lack of reflective entries or submission of entries that were not based on critical incidents resulted in a fail grade. Written comments, both positive and negative, as well as responses to questions raised by students in their reflection, were provided in each student's reflective journal.

Data analysis: Students' reflective writing were analyzed thematically at different time intervals, with the aid of Leximancer (v2.25), a lexical software.⁴⁵ Leximancer provides "automatic content

and thematic analysis” by objectively analyzing the content of text, beginning with identification of keywords. The list of these keywords can be modified if needed to create a thesaurus-based set of concepts or themes from the textual data, without the need for a prior dictionary. Manual concept seeding may also be performed alongside the automated process. In brief, concepts represent groups of keywords that occur in close proximity that describe an idea. Keywords are weighted according to the frequency of occurrence within each text unit containing the concept compared to the frequency elsewhere. A concept is marked only if the sum of the weights of the keywords found is above a preset threshold. The thesaurus function enables concept editing by merging similar concepts into a single concept, defining context-specific concepts, deleting concepts and/or creating concepts to facilitate different perspectives. Themes represent a summary of concepts determined based on co-occurrence. The frequency of co-occurrence between concepts is determined, and the concepts and themes are then classified and a concept map is generated from an asymmetric concept co-occurrence matrix to aid in analysis and interpretation. Concepts are contextually clustered on the concept map and located in relation to theme circles that cluster related concepts. Concept maps are constructed multiple times to ensure consistent trends and validity. In addition, a thematic summary representing ranked concepts, connectivity and relevance numerically is generated to complement each concept map. The reliability of the coding is based on mathematical algorithms used in the software.⁴⁵

Boud et al’s model of reflection was used as the basis of analysis.^{23,26} This model was chosen because students were provided with a reflective writing guideline based on the Boud et al model.^{23,26,43,44} Students’ reflective writings were processed using Leximancer to produce a list of automatic key concepts and themes. These were reviewed to ensure relevance and edited via manual concept seeding. From these, a thesaurus-based set of concepts and themes were organized. Concepts were categorized using the Leximancer thesaurus function into revisit, react, relate and/or respond. Revisit referred to basic reflection that involved recapturing and recollecting the experience. React referred to reflections that addressed the affective aspects associated with the experience and provided reasons for actions. Relate involved reflections that assessed, related and integrated new and pre-existing perceptions, concepts and understanding. Respond referred to reflections that evaluate and validate the authenticity of the new perspectives, leading to personalization and transformation in

thought, understanding and action. Classification using this reflective model was repeated 3 times to ensure validity and a concept map to be created. A thematic summary report was also produced detailing key concepts and themes, frequency of occurrence, connectivity and relevance. A concept map and its associated thematic summary report was created for each time interval and compared to determine changes in students’ levels of reflection over the 12 month period.

In addition, the levels of reflection were examined as a percentage of total reflections at designated time intervals. The change in reflection level (descriptive versus critical) in Week 1 Semester 1 versus Week 12 Semester 2 was analyzed.

Results

Thematic analysis of students’ reflective journal entries (n=1,000 text units) indicated that students reflected across all 4 levels of reflection. The frequency of the 4 levels of reflections differed from student to student and from semester 1 to semester 2.

Semester 1: When students first began writing reflectively, much of the reflections were basic, i.e. revisited and recollected experiences that were descriptive (61% of total reflection in Week 1 and 68% in Week 5) (Table II). The reflections were mainly about students’ experience in terms of what they did in their clinical sessions: patient management, treatments, clinical examinations and time management.

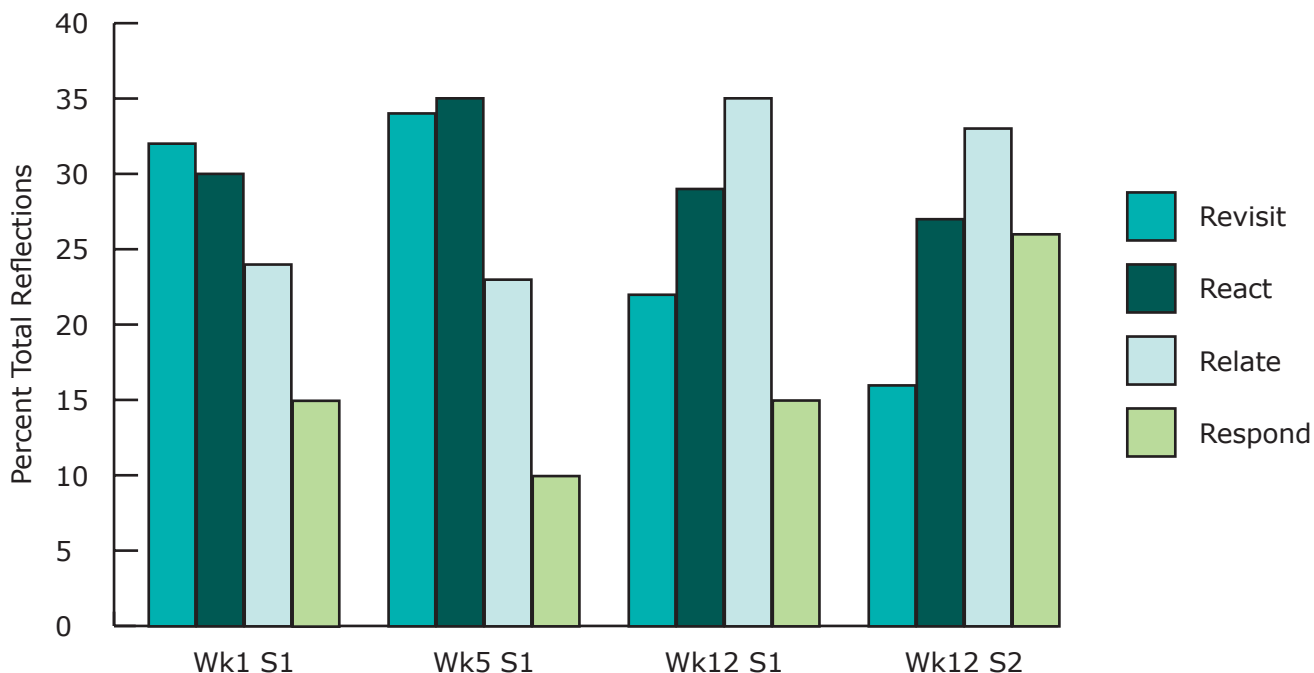
By Week 12 of semester 1, students were reflecting more deeply about their clinical experiences and much of their critical reflections were relational (35% of total reflection in Week 12). Their reflections assessed, related and integrated new perceptions, concepts and understanding to pre-existing perceptions, concepts and understanding to produce new perspectives (Table II). The reflections were populated with greater frequencies of relational concepts such as “thinking” and “finding.” In contrast, the highest level of reflection remained a relatively small component of the students’ reflection throughout semester 1 (15% in Week 1, 10% in Week 5 and 15% in Week 12). The total percentages of reflection that were descriptive (revisit and react) versus critical (relate and respond) were approximately equal at 50% respectively.

Semester 2: By the end of semester 2, students devoted less of their reflections on revisiting and reacting to their experiences (16% and 26%, respectively). By week 12 of semester 2, much of their reflections continued to be relational (32%).

Table I: The 4 R reflective framework based on Boud et al's model of reflection^{23,24,43,44}

Steps/Levels	Action	Guiding Questions
REVISIT	Recall experience To record	<ul style="list-style-type: none"> • What did you do in your clinical session? • Were there any particular event(s) that made an impact on you?
REACT	Affective To feel	<ul style="list-style-type: none"> • How did the session/event(s) make you feel? • As you re-examine the particular event(s), how do you feel now?
RELATE	Cognitive To think To associate To integrate To validate	<ul style="list-style-type: none"> • What event(s) did you learn the most from and why? • What did you learn most about? • How can you relate your experience/event(s) to what you learn in other courses/experiences? • How does the event(s) help you to learn? • How does the event(s) further your understanding e.g. clinical/professional?
RESPOND	Psychomotor To do To appropriate To transform	<ul style="list-style-type: none"> • How will the learning gained from the event(s) help you in your profession? • Can you think of any alternative or new approaches of doing things better? differently? • What do you expect to do better next time? • Any questions? Learning goals? • Did the event(s) change your perspectives? If so what changed and how? • What can you change/how can you improve? • How will you go about making changes/learn?

Figure 1: Differences in Students' Levels of Reflections Over a Period of 12 Months



A significantly greater proportion of their reflections were responsive (26%), i.e. students valued and validated the authenticity of their new perspectives, personalized them, resulted in changes or transformation in thought or understanding and action (Table II, Figure 1). Concepts such as relate, respond and goal appeared more frequently

compared to semester 1. The proportion of critical (relate and respond) reflection (58%) was greater than descriptive (revisit and react) reflection (42%).

Changes in Reflective Levels: Differences in the levels of reflection over the 12 months were

examined as a percentage of total reflections at designated time intervals (Figure 1). Mixed levels of reflection were utilized by students at any one time, often with a dominance of 1 or 2 levels. The rate of progress differed from student to student. The highest level of reflection (respond) was the slowest to improve overall but showed the biggest change in frequency across the semesters, especially in semester 2.

The students' reflection writings in week 1 semester 1 contrasted with those submitted in week 12 semester 2. At week 1 semester 1, 61% of reflection was at the descriptive level. By week 12 semester 2, 58% of total reflection was critical reflection (i.e. relate and response levels). Throughout the 12 month period, the percentage of total reflections that was attributed to the highest level of reflection (respond) remained relatively low (8 to 26%) (Figure 1). Largely, critical reflections performed by students in this study were relational in nature (31 to 58%).

Usefulness of a Reflective Framework: Reflective entries which utilized Boud et al's guided framework were compared to those that did not, in relation to level of reflection. Overall, entries which utilized a framework did not demonstrate higher levels of reflection.

Relevance of Feedback and Guidance: The frequency of feedback and guidance sought by students were also compared, in relation to the frequency of higher levels reflection. In this study, students who sought feedback and guidance frequently submitted their reflective writing voluntarily for feedback during the semesters and also tended to demonstrate higher levels of reflection.

Discussion

Much has been written about reflective learning in the health sciences in general. The focus of this study was on critical clinical reflection in oral health therapy within the discipline of dental hygiene practice. While it is often assumed that oral health and dental students have the ability to reflect, the depth of their reflections and the effectiveness of their reflections are much less researched. The purpose of this paper was to explore the significance of reflective learning in bachelor of oral health students in relation to clinical and professional development. The evidence suggests that oral health therapy students reflect through a range of levels but that critical reflection occurs relatively infrequently, was not automatic, required deliberate effort and had a tendency to develop later, perhaps only after some clinical exposure and when students felt comfortable and confident with the

process of reflecting upon a critical incident. These findings support the idea that reflection is a learned process and that reflective skills do not develop as a natural by-product of time, experience or education.^{2,5,13,19,23,24,26,32,34} These findings also concur that the transformational forms of reflection occur rarely and usually as a part of experiential learning.^{2,4,5,10,13,16,39-41} Given that the ability to critically reflect is desirable, the above findings support the early introduction of clinical practice into the oral health curriculum. As Wetherell et al stated, "What we are endeavouring to do is to create knowledge through the transformation of experience. For the students, their experiences in the clinic are being transformed by the records in their journal."³⁷

The key characteristics of critical reflections are the element of transformation (perspective, contextual and meaning) and the construction of explicit knowledge from what is implicit or intuitive to our actions, leading to improved actions.^{24,29,32,33} Bachelor of oral health students reflected most critically when an experience impacted upon them in some way. Contrarily, students found it difficult to reflect deeply when they perceive their experiences to be routine. This is of significance to oral health educators. In assisting students in their clinical and professional development, the curriculum must not simply implement early clinical exposure but offer clinical learning experiences that are challenging enough to make an impact, so that students see the need to "move from describing an event to reflection on events and analyses of their reactions and actions."³⁴ Repetitive clinical experiences perceived by students as routine tend to retard critical reflection, resulting in practices that are mechanistic and protocol-driven – perspectives remain unchanged and innovations never eventuate.^{2,18,23,29,30,44} On the other hand, experiences that take students out of their comfort zone tend to drive critical reflection as part of the sense making, meaning making, internationalization processes.^{2,18,23,29,30,44,46} Clearly, we as educators must also be mindful that "It is engagement with an event that constitutes a learning experience," and that it is reflection coupled with experience that leads to translation and transformation of learning.⁴⁴ Simply doing a reflective journal because a student is asked to does not constitute engagement, and thus do learning is not expected to occur, even in the midst of the most exhilarating clinical experience.

The rate of improvement and the timing when the proportion of reflection changed from mostly descriptive to critical level differed among the students and could be traced to a particular time interval in this study. This is in contrast to the findings of Landeen et al who pinpointed that the

shift from journaling non-reflectively to journaling reflectively usually required only a few weeks in the presence of faculty feedback and guidance.³⁴ Other studies also articulated the importance of "more guidance, critique, feedback and reinforcement"^{2,5,29,35,46,47} While this study did not examine the impact of feedback on students' progress in critical reflection in detail, students who submitted their journals voluntarily during the semester for feedback tended to demonstrate higher levels of reflection. Feedback was provided to students to encourage sustained efforts, to build trust and to stimulate different perspectives. The availability and method of feedback and guidance should be considered when designing reflective learning into the curriculum. The adoption of "a wide and multidimensional perspective in dealing with issues at hand"³³ and contextual examination of thoughts, feelings and actions^{3,26,44} are enhanced by prompting, feedback and guidance.^{2,5,46,48} In addition, the process of positive feedback and guidance may contribute to a learning environment conducive to the development of critical reflective skills, an environment in which students can expect help rather than criticism and feel safe to disclose their inner thoughts without consequence or prejudice.^{2,5,46,48}

In this study, students' critical reflections consisted primarily of relational reflections. Responsive reflections – the highest level of reflection, remained relatively low. This is to be expected as the kind of reflections that bring about transformation and innovation is difficult to achieve and requires the occurrence of incidents of substantial impact.⁵ Expectations that all undergraduate students will consistently reflect at the highest level of reflection would therefore be unrealistic and impractical. Instead, emphasis should be placed upon developing students as reflective practitioners, who are able to self-evaluate and self-direct their learning post-graduation and thus ascertain professional quality assurance. Moreover, it has been suggested that the lack of reflection may have a negative impact on learning.^{2,41} It is posited that rationalizing explicitly the necessity of developing critical reflective skills to students coupled with educators and curricula that constantly push students to think critically and to engage issues in more critically reflective ways may be one way of optimizing the reflective aspect of learning to learn.^{40,41}

Furthermore, students in this study were introduced to a reflective framework based on Boud et al's model of reflection (Table I).²³ Boud et al's model of reflection was selected because of its simplicity and cumulative style. It was thought that students utilizing the framework for reflection would reflect progressively through the levels to reach the trans-

formational form of critical reflection. However, in this study, reflective writing which utilized Boud et al's framework did not always lead to more critical reflections compared to reflective writing that were not guided by the framework. From this it is evident that a guided framework is one approach of assisting students in developing reflective skills – it is not necessarily going to result in superior quality reflections.

Several limitations were identified. Firstly, the reflective journals were graded, albeit pass or fail. Boud noted the purpose constraints the form of the reflective piece and assessment imposes on the students' freedom to express honestly and completely their thoughts, concerns and uncertainties, and to focus on what they do not know, which drives reflective learning.⁴⁴ Secondly, the number of students in this study was few and therefore limiting the generalizability of the results. Thirdly, it was difficult to determine to what extent the students' improvement in critical reflection was a result of increased clinical experience, provision of feedback and guidance, natural maturation and development through the learning process, as opposed to the direct effect of having practiced critical reflection. Fourthly, this study examined only reflective writing and therefore it was not possible to take into account non-written critical reflection conducted by students. High levels of reflection can take place without students representing these reflections in writing. Hanson et al suggested that reflecting electronically produced more superior reflection than hard copy reflective journaling.⁴⁰ It may be worthwhile in future studies to elucidate whether different media (electronic reflective blogging versus hard copy reflective journaling, group reflective discussion versus independent reflective writing) influences the development of reflective skills and the quality of reflection.

To assist in optimizing the skills of critical reflection and reflective learning in the clinical context amongst oral health students, follow-up studies with greater sample sizes and longitudinal data are being collected to further explore reflective learning in oral health. Further investigation into the outcome measures by which competence in critical reflection is determined and to what extent the roles of learning context, regular feedback and the nature of feedback, as well as consistent practice, play in developing critical reflective skills would also be beneficial. In addition, insights into how practicing oral health therapists, dental hygienists and dental therapists utilize critical reflections in the clinical and professional context would also be of interest.

Conclusion

Oral health students in this study demonstrated that they were able to critically reflect. However, the ability to reflect critically and deeply did not come about instantaneously and therefore should not be assumed to occur as a natural by-product of the professional education process. Critical reflection occurred infrequently among the oral health students, but when it does occur it adds substantially to personal learning and gaining of insights. Reflective skills tended to improve at varying rate and at varying times, suggesting that the development of

critical reflection may be dependent upon exposure to a variety of challenging clinical and professional experiences and the availability of feedback and guidance, rather than simply over time. The results of this study support the continued development of reflective learning in oral health, within both dental hygiene practice and dental therapy practice.

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