UNIVERSITY OF LEEDS

Evaluation of Providing Dental Trainees with Personalised Feedback on their Decision Making After Initial Dental Consultations with Children

Salman Nakhi

Submitted in accordance with the requirements for the degree of
Professional Doctorate in Paediatric Dentistry

February 2021

The University of Leeds

Leeds Dental Institute

The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others.

ACKNOWLEDGEMENTS

This thesis would not be possible without the direct support, both on a professional and emotional level, of several individuals. I would like to express my gratitude to my supervisors Dr Richard Balmer, Dr Jinous Tahmassebi and Dr Heather Leggett. I would like to thank my main supervisor Dr Richard Balmer in particular, for his calmness and encouragement since day one. I would also like to thank my second supervisor, Dr Jinous Tahmassebi who provided the best advice for ground breaking decisions and valuable appraisal of the thesis. Last but not least, I am very grateful to my third supervisor, Dr Heather Leggett who offered endless support and assistance to my ideas and questions whilst I was designing, conducting and writing-up the thesis. I consider myself lucky to have had the support of three amazing supervisors.

I would also like to take the opportunity to thank all my friends, colleagues and mentors at Leeds Dental Institute for their support and guidance, notably the consultants and the post-graduate students who participated in this study. I am also grateful to my friend Jannat for her helpful contributions.

I hope to give back to the community some of what I have been granted, since the opportunity I was provided with was priceless. A big thanks to the Kuwait Institute for Medical Specialisation (KIMS) for believing in me and allowing me to take on this journey.

Finally, I wish to acknowledge my deepest gratitude to my wife Sumayah, who was always my source of unparalleled strength and love, as well as my children Eissa, Layal and twins Mohammad and Ali who were my source of joy during the difficult times. I dedicate this to my family, the apple of my eyes.

ABSTRACT

Introduction: Feedback is one of the most powerful influences on education, where it is claimed that feedback improves students' performance in general. It can be defined as information provided by an agent (e.g., teacher, peer, book, parent, self, experience) regarding aspects of one's performance or understanding.

Objective: To investigate the effects of the personalised feedback provided by trainers to their trainees with regards to trainees' clinical decision making to reach an appropriate treatment plan for new patients treated in consultation clinics at Leeds Dental Institute.

Study Design: This study is a descriptive, qualitative, prospective longitudinal study. It is a single centre study in which trainers and trainees attending the consultation clinics at Leeds Dental Institute were approached to participate as part of their clinical rotation. By the 1st week of the rotation (Phase 1: September, 2018), both trainers and trainees answered first cycle questionnaires which were modified from the validated questionnaires used by Dr Leggett in 2016 (Leggett et al, 2016). Trainers and trainees were asked about the frequency of providing/ receiving the traditional routine feedback, the effectiveness of this feedback and the perception of the influence of the dental environment, patient characteristics and trainee factors on trainees' clinical decision making. In October 2018 (Phase 2), trainers attended a training session which was delivered by an experienced trainer on how to provide the personalised feedback to their trainees. After this session, trainers were asked to use the personalised feedback model with their trainees at the consultation clinics. By December 2018 (Phase 3), trainers were invited to answer second cycle questionnaires while trainees were invited to participate in audio-recorded, structured interviews. Trainers and trainees were asked about any noticed change in the way of providing/ receiving the personalised feedback and the strengths and the weaknesses of this type of feedback. Summative content analysis was used to analyse the qualitative data while SPSS Statistics software was used to analyse the quantitative data.

Results: Three trainers and seven trainees participated in this study. In phase 1, the traditional routine feedback was somewhat effective in improving trainees' clinical decision making. Trainees believed that they needed to receive the feedback more often; however, trainers believed that they provided the feedback as required. Time constraint and understanding the feedback were the major reasons for that difference. In phase 2, trainers were trained by an experienced trainer to provide a more structured feedback through the personalised feedback

model. This model concentrated on four components, which were: the trainee's level of confidence in their ability to perform the task, their set goals and plans for the task, their ability to pay attention throughout the consultation and the awareness of any contextual factors that may affect the clinical decision making. In phase 3, the personalised feedback was more effective in improving trainees' clinical decision making in general as compared to the traditional routine feedback. Trainers and trainees appreciated the impact of the personalised feedback model. Lack of time in these busy consultation clinics was one of the biggest limitations to this model.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

Diagnostic Decision Making – DDM

Dental Research Ethics Committee – DREC

Feedback about the processing of the task – FP

Feedback about self-regulation – FR

Feedback about the self as a person – FS

Feedback about the task – FT

Heather Leggett (Dr) – co-supervisor – HL

Jinous Tahmassebi (Dr) – co-supervisor – JT

Kuwait Institute for Medical Specialisation – KIMS

Leeds Dental Institute – LDI

National Health Service – NHS

Personalised Feedback Model – PFM

Participants Identification Codes – PICs

Richard Balmer (Dr) – main supervisor – RB

Salman Nakhi – researcher – SN

Self-Regulated Learning – SRL

United Kingdom – UK

Workplace Based Assessments - WBAs

1.0 REVIEW OF THE LITERATURE

1.1 The Cycle of Education

The process of education can be viewed as a cycle, whether it is in a classroom or a clinic. It starts with setting educational goals and objectives with the students, and progresses to a period of instruction in studies or practices to reach said objectives. This is followed by the assessment of their success in reaching the objectives. The assessment is divided into formative and summative assessments. Formative assessment uses feedback to help the students improve their performance, while summative assessment is used at the end of the educational cycle to make the final decision about the students' success in reaching the objectives (Schartel et al, 2012).

Feedback is a crucial component of the educational process. It helps the students improve their knowledge and skills by providing a comparison of their performance to the educational goals (Schartel et al, 2012). The clinical educators commonly think that they provide feedback to trainees; however, trainees rarely report that they receive any feedback (Sender-Liberman et al, 2005; McIlwrick et al, 2006). Unfortunately, many clinical educators do not know what the feedback actually means, and/or do not have the practical skills for delivering a powerful feedback (Schartel et al, 2012).

The concept of feedback has a long history - as a component of the clinical teaching, feedback is discussed in the writings of Hippocrates and other prominent ancient Greek physicians (Puschmann et al, 1966). This concept is now used in many science fields, such as social science, logic, engineering, biology, mathematics and econometrics (Richardson et al, 1991).

1.2 Feedback Definition

The Oxford English Dictionary defines feedback as information about the result of a process or an experiment (Oxford English Dictionary). Moreover, feedback is defined as "information provided by an agent (e.g., teacher, peer, book, parent, self, experience) regarding aspects of one's performance or understanding." (Hattie et al, 2007). Feedback, thus, is a consequence of the task's performance.

Van De Ridder and his colleagues conducted an extensive search in literature in 2008 in order to define feedback in a way to be used in clinical education. They proposed the operational

definition of feedback, which is “specific information about the comparison between a trainee’s observed performance and a standard, given with the intent to improve the trainee’s performance.” (Van De Ridder et al, 2008).

1.3 Types of Feedback

1.3.1 Hattie and Timperley Classification

Feedback according to Hattie and Timperley can be divided into four major types: feedback about the task (FT), about the processing of the task (FP), about self-regulation (FR) and about the self as a person (FS) (Hattie et al, 2007). Each level has its own impact on learning and performance.

1.3.1.1 Feedback about the Task (FT)

As the name suggests, it is a feedback about how well a task is being accomplished or performed (Balzer et al, 1989). The benefits of FT depend heavily on the learner being attentive and sufficiently strategic in character to generate effective internal feedback (Winne et al, 1994).

1.3.1.2 Feedback about the Processing of the Task (FP)

This type of feedback is more specific to the process underlying tasks, such as the environment and the student’s perceptions (Balzer et al, 1989). It has its greatest effect when a student expects a response to be correct and it turns out to be wrong. Feedback at the process level is more effective than at the task level for enhancing deeper learning (Balzer et al, 1989).

1.3.1.3 Feedback about Self-Regulation (FR)

This involves interplay between commitment, control and confidence (Hattie et al, 2007). Seeking help is a student’s proficiency and many types of help-seeking behaviour can be considered aspects of self-regulation. But many students do not seek help because of perceived threats to self-esteem or social embarrassment (Karabenick et al, 1991; Newman et al, 1993).

1.3.1.4 Feedback about the Self as a Person (FS)

It can be a personal form of feedback in the sense that it is directed to the “self”, which is too often unrelated to performance on the task (Hattie et al, 2007). Personal feedback (FS), such as “Good boy” or “Great effort” typically expresses positive (and sometimes negative) evaluations

about the student (Brophy et al, 1981). It contains little task-related information, and is rarely converted into more engagement or commitment to learning goals, enhancing self-efficacy, or understanding the task.

The Department of Education and Communities of the State of New South Wales in Australia in 2015 described different types of feedback as such:

1.3.2 Oral and Written Feedback

Oral feedback is usually given during the conduction of the task, and it sometimes is underestimated because it is counted as less formal; however, it can be a powerful tool in improving performance as it can be given in a timely way and in an educational moment. On the other hand, written feedback is usually provided after the task is completed. The added benefit to that is that the students can keep a record of this effective written feedback and go back to it later to improve their performance.

1.3.3 Feedback During and After Learning

Feedback during learning helps the students to reflect immediately and try to administer the improvements during the learning process. On the other hand, with feedback after the learning process has ended, the students would need to remember it for future similar tasks. Feedback provided during the task is often more effective and productive than when offered at the end of the task (Earl et al, 2003).

1.3.4 Evaluative Feedback and Descriptive Feedback

Evaluative feedback appears in the form of grades or short general comments, and leaves the student with little information about the learning process. The student might not find it useful to improve their performance following evaluative feedback. Many teachers increase the level of praise in an attempt to create a more positive climate for learning; however, the impact of the feedback on learning is low when it is focused on praise, rewards and punishment (Hattie et al, 2007). The other type of feedback, which is the descriptive feedback, provides the students with detailed and specific information about the task in order to improve their performance.

1.3.5 Informal and Formal Feedback

Informal feedback is achieved when the teacher checks on the student in the middle of the task to quickly and effectively guide the student to the right track, in order to enhance the learning. On the other hand, formal feedback is usually carried out at the meeting between the teacher and the student. The teacher uses these meetings in a structured way with the focus of the objectives to improve the student's learning and performance. The students can improve their learning and performance when the teachers use the formal meetings and feedback alongside the informal feedback (Earl et al, 2003).

1.3.6 Peer Feedback and Self-Feedback

Peer feedback is one provided by people of similar levels or competencies regarding one's task and performance. Meanwhile, self-feedback is defined as providing feedback regarding your own performance.

Some teachers can use a structured peer meeting with their students to give them the chance to provide and receive feedback about the ongoing work amongst each other. The students will be able to see the work of other students, helping them understand the topic from other perspectives and acquiring the skill of delivering productive feedback.

Self-feedback is the ultimate aim of evaluation for learning as it allows the students to become more independent. To achieve that, the teachers need to clarify the learning goals, provide opportunities for self-feedback and teach the students how to use it to determine the next steps and set future goals.

1.3.7 The Feedback Sandwich

This technique is commonly used for delivering negative and corrective feedback in a few sentences (Dohrenwend et al, 2002). The teacher starts the feedback with pointing out a positive aspect of the student's performance, then delivers the negative observation and ends the feedback with additional positive information. The purpose of this technique is to make it easier for both the teacher and the student to provide and receive the information, respectively. It is really crucial not to leave the student with a false positive impression, which may occur especially in a busy clinic where the teacher only concentrates on the positives and grants less time to discuss the negatives and how to rectify it for the following tasks.

1.3.8 The Pendleton Model

Pendleton in 2003 described a structured approach for developing a conversation between the teacher and the student about the performance. It is a modification of the feedback sandwich in which the teacher's comments are provided after the student's observations. The session starts with the student mentioning what was good about his performance. Then, the teacher comments on the areas of the good performance. After that, the student points out areas for improvement, followed by the teacher's evaluation of those ideas on areas of improvement. Compared with feedback sandwich, this technique creates a more interactive environment between the student and the teacher and incorporates the self-assessment by the students (Pendleton et al, 2003).

1.3.9 The Reflective Feedback Conversation

This technique is similar to Pendleton's teacher-student conversation; however, it concentrates on the student's ability to identify performance deficits and shows how the student plans to improve them through the discussion with their teacher (Sargeant et al, 2007). With practice, this technique can be carried out routinely in a relatively short time to improve the clinical learning process (Cantillon et al, 2008). Table 1 describes this model, which was proposed by Sargeant in 2007.

Reflective feedback conversation (adapted from Sargeant et al, 2007)		
1.	Teacher	Asks the student to identify areas of concern that need improvement
2.	Student	Describes areas of performance that need improvement
3.	Teacher	Provides feedback about performance and offers support
4.	Teacher	Asks the student to reflect on how performance can be improved
5.	Student	Offers improvement ideas
6.	Teacher	Elaborates on the improvement ideas, modifies or adds to them Assesses the student's understanding of the areas of concern and the improvement plan

Table 1. Describing the reflective feedback conversation model.

1.4 Providing Effective Feedback

For feedback to be effective it needs to be clear, coherent, compatible and in correspondence with the students' prior knowledge. The feedback should provide a logical and comprehensible connection. Moreover, it needs to prompt active information processing on the learners' part by compromising of low task complexity, relating to specific and clear goals and providing little threat to the learner on a personal level (Hattie et al, 2007).

It is acknowledged that feedback about a task can be overlooked by the students if it is poorly presented. Howie in 2000 found that it was the poor presentation (or lack of information value in the feedback), rather than the students' faulty knowledge, that more often explained the low power of some feedback information (Howie et al, 2000).

Three key factors were identified by Sadler in 1989 for an effective feedback. These factors include the concept of the education goal, the comparison of the performance with this goal and the action taken to reduce the gap between the performance and the goal. Sadler believes that the learning system will develop an artificial limitation to the students' improvement if it fails to help the students in developing the skills of setting goals, comparing the performance with the set goals and working on reducing the gap between them (Sadler et al, 1989).

Additionally, Lynne Coia fabricated a booklet regarding providing quality feedback based on her observations to the feedback being delivered from experienced trainers to vocational dental practitioners in Glasgow. Top 10+1 tips were suggested for quality feedback through NHS Education for Scotland in 2012 (Coia et al, 2012). These tips are listed in Table 2.

	Top 10+1 tips for quality feedback (adapted from Coia et al, 2012)
1	Trainers should give feedback as close to the event as possible when details of the task are still fresh in trainees' minds.
2	Trainers should let trainees describe the process initially and encourage self-assessment.
3	Trainers should avoid "sugar coating" the feedback so that trainees move on with their progress with a true picture of their performance.
4	Trainers should work in building trust with trainees as it is crucial in receiving the feedback.
5	Trainers must point out the consequences of not taking the feedback seriously.
6	Trainers are the role model in the eyes of their trainees; therefore, trainers should practise what they teach so trainees can take their feedback seriously.
7	The feedback should focus on the trainee's behaviour, not personality.
8	The feedback should be focused on specific tasks, not the general performance.
9	The feedback should be limited to a few important areas as to not overload the trainee.
10	If trainers are going to use subjective data, they need to label it as "I think", "I feel" etc.
10+1	Trainers should check that trainees understood the feedback by supervising them later on and making sure that trainees' behaviours have been modified.

Table 2. Showing the top 10+1 tips for quality feedback.

1.5 Students' and Teachers' Thoughts about Feedback

From students' point of view, feedback means gaining information about how and what they understand and misunderstand, finding directions and strategies that they must take to improve and seeking help to understand the goals of learning. On the other hand, feedback from the teachers' point of view means devising activities and questions that provide feedback to them about the effectiveness of their teaching. It is very common that the teachers limit the students' opportunities to receive information about their performance by assuming that it is the responsibility of the students to search for this information, and not considering the learning possibilities acquired as a result of feedback (Hattie et al, 2007).

1.6 Assessments Instead of Feedback

Assessment can be considered as activities that provide the teachers and/or the students with feedback about the task (FT), processing the task (FP) or self-regulation (FR). Too often, the feedback's power of the assessment is aimed either to drive the students towards unspecified goals or to do better. Such feedback rarely enhances the process (FP) and meta-cognitive attributes (FR) of the task (Hattie et al, 2007).

Ende in 1983 mentioned that feedback should be based on direct observation of the performance in order to be adequate. The major goal for a trainee in education is to be clinically competent. Meaningful feedback is crucial for establishing competence. Ende stated that "without feedback, mistakes go uncorrected, good performance is not reinforced, and clinical competence is achieved empirically or not at all" (Ende et al, 1983). Ende's guidelines for providing feedback are listed in Table 3.

Ende's guidelines for giving feedback (Ende et al, 1983)	
Feedback should:	Be undertaken with the teacher and the trainee working as allies, with common goals
	Be well-timed and expected
	Be based on first-hand data
	Be regular in quantity and limited to behaviours that are remediable
	Be phrased in descriptive non-evaluative language
	Deal with specific performances, not generalisations
	Offer subjective data, and labelled as such
	Deal with decisions and actions, rather than assumed intentions or interpretations

Table 3. Showing Ende's guidelines for giving feedback.

1.7 Evidence of Feedback Effects

Kluger and DeNisi conducted a meta-analysis of feedback intervention studies in 1996. They concluded that on average feedback improved performance. However, they mentioned that more than 33% of feedback interventions led to a deterioration in performance. They suggested that the reason for such less successful feedback results was that the feedback moved away from the task and closer to the self. They addressed the effects of various types of feedback and concluded that the most impact achieved was when the goals were specific and challenging, while the task complexity was low. When the goals had an appropriate challenge, and the teachers and the students were committed to these goals, a clearer understanding of the criteria for success was likely to be shared (Kluger et al, 1996). Feedback is effective when it consists of information about progress or how to proceed (Hattie et al, 2007).

Feedback plays a crucial role in the student learning process. It aids in enhancing their understanding of the subject, motivation, interest and self-awareness which may encourage

their improvement (Fugill et al, 2005). However, students often claim that the feedback they received from their supervisors is sparse and non-useful (Anderson et al, 2011).

1.8 Feedback and Self-Regulated Learning (SRL)

Self-regulation is a style of engaging with tasks in which the students gain powerful skills like setting goals, deliberating about strategies and monitoring the accumulating effects of their engagement. Monitoring is very crucial in SRL, as it is the cognitive process that assesses the progress relative to goals and generates internal feedback that can guide further action (Butler et al, 1995).

Students' academic outcomes at medical school are influenced by their attitudes, behaviours and their approach to the learning. Feedback, in general, is either self-generated or provided from external sources, such as comments from observers about the performance; it provides the students with important information on how to carry out the task efficiently.

Unfortunately, struggling students who don't perform well present a particular challenge during remediation since they often have difficulties with generating their own internal feedback and ignore external feedback about their performance (Kruger et al, 1999). Analysing the cognitive processes involved in self-regulated learning is the ideal goal behind providing the feedback (Butler et al, 1995). Feedback will provide the students with information that empowers them to strengthen aspects that are in need of improvements (Boud et al, 2013).

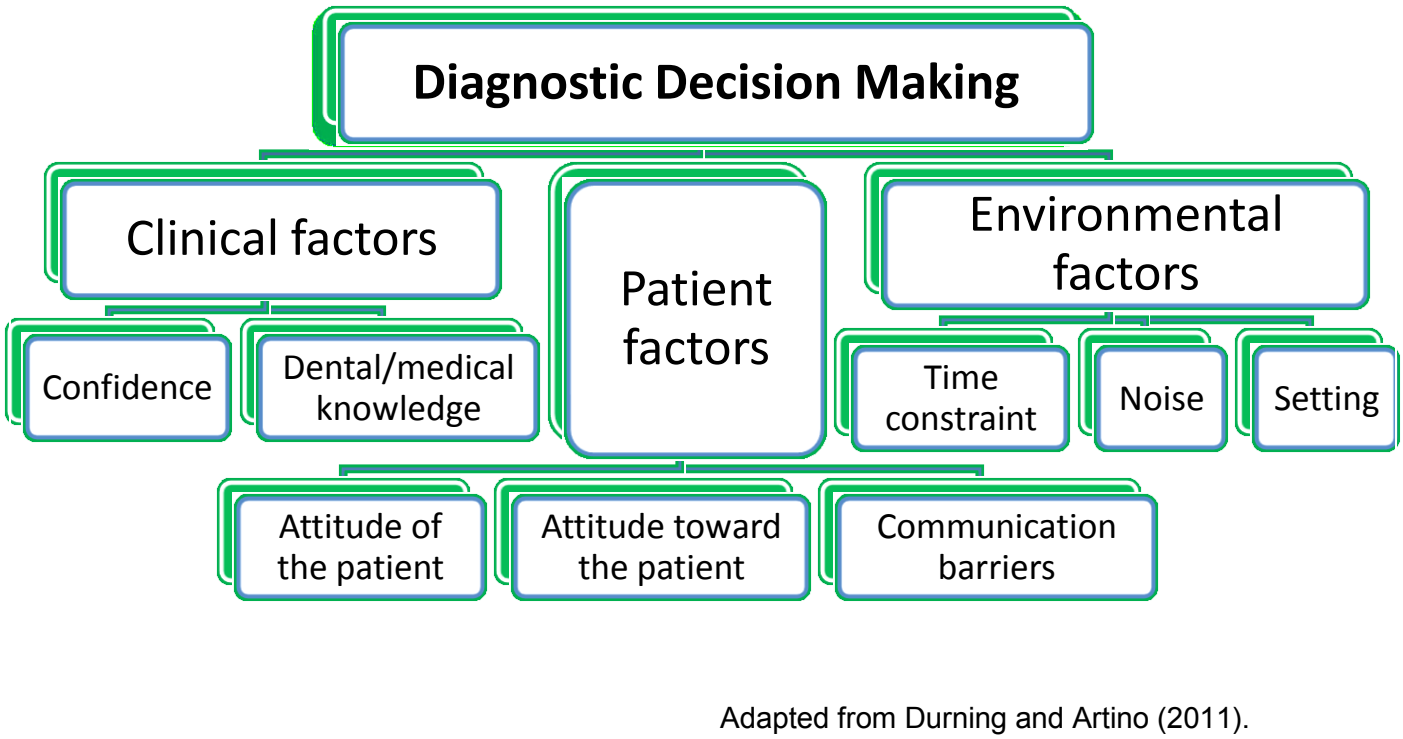
It was found that students who have deficits in Self-Regulated Learning (SRL) tend to struggle with their academic performance, whereas students who engage in SRL are more likely to succeed (Patel et al, 2015). Fifty five students who had failed the final re-sit assessment at two medical schools in the UK underwent semi-structured interviews to explore their use of SRL. The struggling students had inflated beliefs and expectations about their performance as well as inappropriate learning strategies. The struggling students had problems with SRL due to limited attempts to access formal and informal support. Poor SRL prevented the students from overcoming failure appropriately and it effectively confined them to a cycle of repeated failure (Patel et al, 2015).

On the other hand, external feedback provides information about students' domain understandings, enlightening them about the types of the monitoring that can generate internal

feedback in the form of the functional validity information, e.g., the relationship between the student's estimate of achievement and actual performance (Balzer et al, 1989).

In general, students' knowledge, beliefs and thinking collaboratively mediate the effects of externally provided feedback (Butler et al, 1995). Feedback is information in which a student can confirm, add to, overwrite, tune or restructure information in memory, whether that information is domain knowledge, meta-cognitive knowledge, beliefs about self and tasks or cognitive tactics and strategies (Alexander et al, 1991).

1.9 Contextual Factors Affecting Diagnostic Decision Making (DDM)



Adapted from Durning and Artino (2011).

Figure 1. Illustrating the influence of contextual factors on DDM

Figure 1 illustrates how the clinician, patient and environmental factors interact together in order to reach diagnostic decision making. In other words, these factors will affect the clinician's pathway to reach the diagnostic decision for that particular patient at the consultation visit (Leggett et al, 2016).

1.9.1 Clinician Factors

Dentists in general do not practice alike. Different general dental practitioners differ in the way they take technical and patient factors into consideration when discussing variable treatment options in restorative dentistry. Dentists have been shown to consider technical factors, such as caries rate, extent of tooth damage and periodontal status to be more important than patient factors, such as patient's preference or procedure's cost (Grembowski et al, 1988).

Self-confidence has a great influence on clinical decision making. It helps clinicians to solve problems and think critically to decide how best to act (Fry et al, 2014).

1.9.2 Patient Factors

Several patient factors can affect direct restorative decision making, which include caries experience, tooth size, socio-economic status, behaviour, aesthetics and patient characteristics, such as gender, ethnicity and age (Correa et al, 2012). The most important patient factor in the clinical decision making to provide treatment was motivation, followed by patient-clinician relationship and disease perception (Bos-Touwen et al, 2017). Grembowski in 1988 studied the factors influencing dental decision making and found that 35% of dentists considered the cost of treatment as the most important patient factor when choosing between crown versus composite restoration and between fixed bridge and a removable partial denture. They also found that 34% of dentists indicated that the patient's preference was an important factor in choosing between root canal treatment and extraction (Grembowski et al, 1988).

1.9.3 Environmental Factors

Environmental factors include practice characteristics, such as number of working hours per week, number of clinics, average patient waiting time and appointment delay (Grembowski et al, 1988). This is really critical when the dentist wants to replace an amalgam restoration; the dentist needs to keep in mind any potential phase-out of amalgam on environmental grounds and the shift toward minimisation of mercury exposure to the environment including the use of amalgam in dentistry (Alexander et al, 2014).

Distractions, such as interruption or noise within the clinical environment, can affect complex decision making (Speier et al, 1999). Moreover, time constraint for each consultation in the case of busy clinics will negatively affect the clinician decision making because of the pressure and the need to reach the decision faster so that the clinician can see the following patients (Smith et al, 2008).

1.10 Feedback in the Field of Medicine

Medical schools can benefit from feedback in enhancing their students' learning. Liza Edmonds evaluated the paediatric outpatient teaching clinics which were conducted in the paediatric outpatient service of the Southern District Health Board on a weekly basis during the University of Otago academic year in New Zealand in 2016. A total of 74 undergraduate fifth year medical students participated in this evaluation with three tutors. Direct feedback and case discussion with the students were carried out before and after the clinics. The feedbacks were overwhelmingly positive and supported the use of such clinics to provide the medical students with consistent high quality learning experiences. It was claimed that feedback was highlighted as an important feature of high quality learning experiences in spite of the barriers, such as busy clinics, variable attendance, variety of cases and service provision (Edmonds et al, 2016).

In 1995, Isaacson and his colleagues conducted a survey about the feedback delivered to residents at a large academic medical centre in Cleveland, Ohio. It was noted that around 22% of residents never received any verbal feedback and 80% never received any negative feedback (Isaacson et al, 1995).

Another study conducted by Boehler and his colleagues assessed the impact of feedback to the medical students on learning how to tie surgical knots. They noticed that the students, who received specific feedback, improved their skills in surgical knots. On the other hand, the students who received only praise did not improve but these students were more satisfied compared to the students who received feedback. The authors concluded that satisfaction is not a good marker for effective feedback. Praise was associated with satisfaction and feedback was associated with learning (Boehler et al, 2006).

1.11 Feedback in the Field of Dentistry

Dental students reported that most of their learning takes place in the clinical setting (Victoroff et al, 2005). In addition, the dental students are required to perform the difficult and irreversible tasks while still relatively inexperienced (Fugill et al, 2005). The dental environment was therefore a place for both professional health care and learning at the same time. A high level of supervision and the supervisor-student interaction is needed to maintain a safe clinic and effective environment for both the students and the supervisors (Anderson et al, 2011).

It was not a surprise that dental students reported that the poor feedback limited their learning and that is why they preferred a more specific feedback in order to enhance their confidence and learning (Anderson et al, 2011). In 2016, Lee Adam evaluated this issue by conducting semi-structured interviews with 12 teaching staff members at University of Otago and six focus groups discussions with a total of 19 undergraduate students at the School of Dentistry at the University of Otago. The staff and the students had similar views regarding feedback. The supervisors viewed their role as challenging, guiding and motivating the students to reflect on their practice. Similarly, the students showed the desire to be challenged, guided and motivated to reflect on their learning and the gaps in their knowledge rather than to be told what to do. The results of this study showed that feedback needs to be immediate, tailored to each student, realistic and respectful. In addition to that, feedback should aim to refine and enhance self-reflection, problem solving, the student's confidence and learning experiences (Adam et al, 2016).

1.12 Feedback and Workplace Based Assessments (WBAs)

Workplace Based Assessments (WBAs) represent formative assessments for learning in a way that trainers observe trainees and give them feedback in order to improve their future performance. Medical and dental schools worldwide are using WBAs in addition to other tools, such as written and practical exams, to grade their students. These schools are using WBAs to evaluate both the under-graduate students and the post-graduate students as part of the requirements to pass the programme and earn the certificate.

It is the responsibility of the medical/dental school to make sure that their graduates have the skills and knowledge to face the real world and to treat patients without a trainer. Workplace Based Assessments give the students who reach a certain level of confidence that chance by letting them treat patients with a silent observer who is the supervisor of that clinical session. Workplace Based assessments can be used to assess different clinical skills, such as taking appropriate medical/dental history, injecting local anaesthetic, performing a specific examination and applying a composite restoration. During the study years, students would experience similar tasks that they needed to perform under the supervision of a trainer. Once a student has reached a certain level of confidence, they could ask their trainer in advance to do a WBA on that specific task. The student can then perform the task with the trainer being a silent observer. The silent observer can only intervene if they noticed that the student is not at the right track and there is a danger of harming the patient. By completing the task, the trainer would provide

verbal and written feedback to the student who should utilise it to improve and keep a record of the WBAs.

The Academy of Medical Royal Colleges in 2017 provided a practical guide for trainees and trainers regarding improving feedback and reflecting to improve learning. This guide focused on practical information for trainees and trainers on trainees' self-reflection, feedback from the trainer and the trainer's self-reflection. This practical guide could improve the performance and value the formative Workplace Based Assessments.

Trainees consider feedback as one of the most important components of a WBA. Providing feedback, however, should not be restricted to WBAs. It is crucial for trainers to feel that trainees appreciate the feedback that is provided as part of a framework for learning and that their views are valid, trusted and sought after by trainees. The trainee needs to take the feedback seriously and to think how the future practice could be improved (Grffiths et al, 2017).

Quality feedback aiming at improving performance can only achieve its goal if trainees are willing to modify their behaviour. Each feedback episode should include an agreed plan between the trainer and the trainee that is targeted at areas in need of improvement. This should be as specific as possible and should include parameters for defining success (Grffiths et al, 2017).

Trainees could make incremental progress throughout the training year if they planned to spread performing the WBAs throughout the year, and not only carrying out these assessments in a short period of time toward the end of the training year (Grffiths et al, 2017).

It is clear that trainees will need feedback on knowledge development and skills improvement. On the other hand, trainers will need to acquire the skills to provide effective feedback which helps trainees to understand and explore their professional beliefs, values and behaviours (General Medical Council, 2013).

Despite the potential offered by WBAs, feedback provided in WBAs is often limited, ineffective, excessively positive, and it commonly avoids a negative aspect. This is why WBA documentation alone is insufficient in promoting effective feedback. Trainees and trainers may be unaware of the benefits of feedback. Trainees may be apprehensive in seeking feedback and often avoid it, whereas trainers often fail to encourage trainees to seek feedback. This can be as a result of a busy clinic and the need to finish on time, leading to less or no time at all for

feedback to be provided. It should be also noted that face to face training is needed for giving and receiving feedback (Grffiths et al, 2017).

1.13 A Gap in the Literature

Studies of feedback in educational settings focused on information given to the students by their teacher after completing the task or test. The aim of such feedback is to emphasise or alter the student's knowledge. In general, feedback is one of the most powerful influences on education even though it is under-researched, and is in need of further qualitative and quantitative research to fully understand its effects in a classroom or clinical setting (Leggett et al, 2016).

Research into effective clinical teaching practices in the dental setting highlights the trainer feedback as a crucial factor in the trainer-trainee interactions (Fugill et al, 2005). However, studies show that trainees report receiving no or little feedback that is often not useful (Anderson et al, 2011). Most of the studies have evaluated feedback effects at a high school level or an undergraduate clinic level, which emphasize the importance of feedback at these levels. However, there is a lack of literature about the effects of feedback at the trainee level (postgraduate dental student or speciality registrar) who are dentists working as part of a speciality training programme.

From the researcher (SN) of the current study's perspective, as a trainee in paediatric dentistry at Leeds Dental Institute, trainees experience busy consultation clinics on a weekly basis. Almost all the clinical decision making is made at these busy clinics with new patients. So it is really crucial that trainees receive personalised feedback from the consultant in order to improve their clinical decision making and performance.

As there is a gap in the literature at the trainee level and in the effect of the personalised feedback on improving trainee performance, the researcher (SN) is aiming to further investigate the effectiveness of personalised feedback from the consultant to the trainee in the clinical setting in dentistry. The personalised feedback model to be used had been previously validated and used for medical students (Leggett et al, 2016); however, minor adjustments were made to this model to relate it more to paediatric dentistry (Appendix 1).

1.14 The Personalised Feedback Model (Appendix 1)

Heather Leggett in 2016 did a systematic literature review regarding feedback on clinical decision making and medical education. It was found that feedback on clinical decision making is under-researched. A survey was completed by 312 medical under-graduate students at University of Leeds and 62 educators to investigate feedback on clinical decision making. Then, the personalised feedback model was fabricated and examined by six general practitioners (trainers) and five medical under-graduate students through semi-structured interviews (Leggett et al, 2016).

The model does not promote a specific way of teaching diagnostic decision making but it is used alongside the usual feedback provision. In other words, the model can guide the trainer to focus on specific areas and provide the personalised feedback based on the trainee's answers.

This model concentrates on four components, which are: the trainee's level of confidence in their ability to perform the task, their set goals and plans for the task, their ability to pay attention throughout the consultation and the awareness of any contextual factors that may affect the clinical decision making. Therefore, the personalised feedback is defined in this study as feedback being provided by trainers to their trainees based on trainees' answers to the four questions related to these four components.

1.14.1 Confidence Level on Successfully Diagnosing/Planning the Treatment

The trainer would ask the trainee about their confidence levels on successfully diagnosing/ planning the treatment for each patient at the end of the session. Figure 2 illustrates the personalised feedback approach that trainers need to follow based on the trainee's confidence and performance. The trainer would ask the trainee about their confidence in order to provide appropriate personalised feedback. If the trainee expressed high confidence level and the trainer observed a good performance from the trainee, then the trainer would approve that. However, when the trainer observed poor performance from that particular confident trainee, the trainer would provide support. The support could be in the form of searching for the reasons that made the trainee so confident despite the poor performance so that the trainer could give them a personalised feedback. On the other hand, if the trainee expressed low confidence level and the trainer observed a poor performance; the trainer would support them in a different way. This support could be in the form of exploring the reasons for the trainee's poor performance with the low confidence level in order to provide a personalised feedback that would help in improving

the trainee's diagnostic decision making. However, when the trainer observed good performance despite the low confidence level of the trainee, the trainer would encourage their trainee and highlight the strengths of the trainee's diagnostic decision making skills to be more confident with future interactions. All these scenarios are summarised in figure 2.

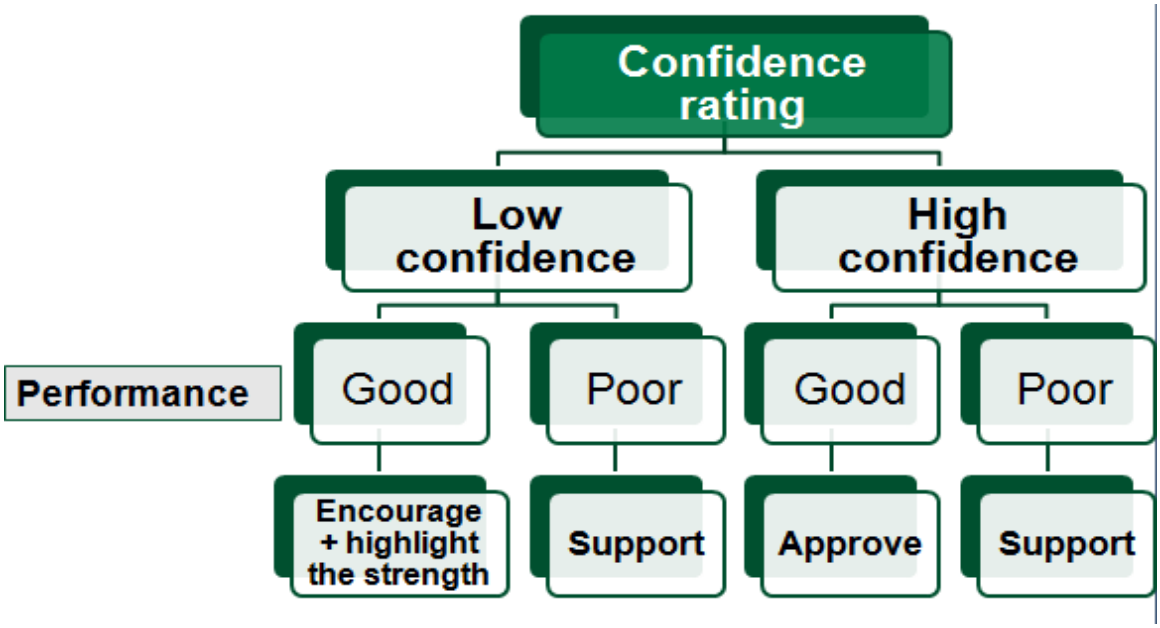


Figure 2. Illustrating the trainer's personalised feedback approach based on the trainee's confidence level and performance at consultation clinic.

Anderson in 2011 found that it was not a surprise that the dental students preferred a more specific feedback that could enhance their confidence and learning (Anderson et al, 2011). It is clear that self-confidence helped the clinicians to perform better (Fry et al, 2014), therefore feedback should aim at cultivating the student's confidence and learning experiences (Adam et al, 2016).

1.14.2 Goals and plans from the consultation visit

The trainee should know the goal of the consultation visit and plan to achieve that goal. The goal should be a specific rather than a vague goal. For example consider a child presenting in pain from the upper right quadrant of the mouth. The goal for this consultation visit for this child would be to identify the cause and plan appropriate treatment. The trainee should think about the plans to achieve that goal. This could be achieved by detailed pain history taking, extra and intra oral examination and radiographic examination in order to reach a diagnosis and treatment plan for that child. The trainer could approve the goal and plans when they were accurate and

specific. However, when trainees' goals and plans were vague, the trainer should support the trainee and provide them with a personalised feedback about how to set a goal and plan for that particular child. This would allow the trainee to focus and be confident with similar cases in the future.

To be effective, feedback needs to be related to specific goals (Hattie et al, 2007). Furthermore, Sadler believed that student improvement would be affected if the learning system failed to help the students to develop the skills of setting educational goals and performing as close as possible to these goals (Sadler et al, 1989).

1.14.3 Keeping Track (Paying Attention) of the Diagnostic Decision Making During the Interaction

The consultation session includes several steps which trainees should perform in order to reach the accurate diagnosis and the treatment plan. It starts even before bringing the patient in when the trainee reads the referral letter and tries to understand the reason for the child's dental appointment.

In an ideal dental environment, the trainee would bring the child and their parent to the clinic in order to ask them about the child's medical and dental history in addition to the chief complaint. The trainee would then perform the extra and intra oral examination in order to decide with their trainer on the type of radiographs needed. The trainee should be able to reach an appropriate diagnosis if they followed these steps. Once an accurate diagnosis is reached, discussion with the parent about the treatment options and the risks and the benefits of each option should be carried out in order to reach the final treatment plan for the child. The trainee should pay attention throughout these steps in order to determine if there were any adjustments required depending on the case and the trainer's comments. If the trainee failed to pay attention throughout these steps or failed to follow the trainer's comments, then a personalised feedback would be provided specifically on how to pay attention throughout these steps and to be ready for any adjustments depending on the case and the trainer's comments.

1.14.4 Awareness of Any Contextual Factors

Contextual factors could affect the clinical decision making at the consultation visit. Figure 3 illustrates the types of contextual factors. These factors can be divided into environmental factors (time constraint, noise and location), patient factors (stereotype of patient/ parent and

communication barriers), trainee factors (confidence and perceived lack of dental knowledge) and other factors if present and not listed above (Figure 3). The trainee should be aware of these factors and the trainer should provide a personalised feedback on how to recognise these factors in order not to affect the clinical decision making.

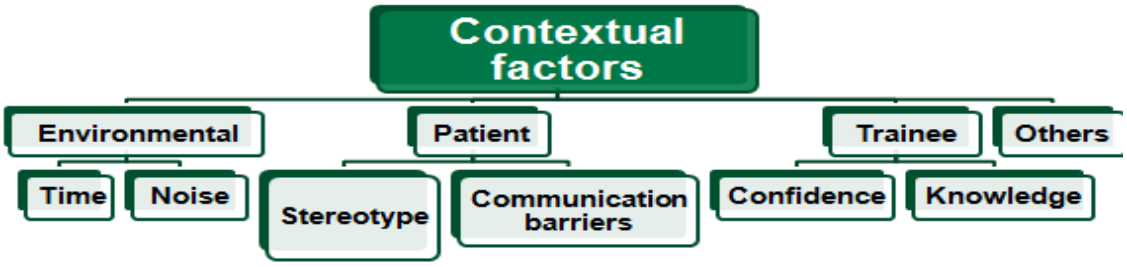


Figure 3. Illustrating the different types of contextual factors.

1.15 Research Question

This study is anticipated to answer the following questions:

- How does personalised feedback affect trainees' clinical decisions on treatment planning for paediatric patients in consultant clinics?

- Is providing the feedback using the personalised feedback model more effective than the traditional routine feedback being regularly provided at consultation clinics?

1.15.1 Aim of the Study

To investigate the effects of personalised feedback provided by trainers to their trainees with regards to trainees' clinical decision making.

1.15.2 The Null Hypothesis for the Study

There is no difference in the effects of the personalised feedback provided by trainers on trainees' clinical decision making through the personalised feedback model compared to the traditional routine feedback being regularly provided at consultation clinics.

2.0 MATERIALS AND METHODS

2.1 Introduction

To access dental treatment in consultation clinics at Leeds dental institute, patients require a referral letter from general dental practitioners or specialists. Referred patients are usually examined by around four post-graduate dental students and two registrars under the supervision of one consultant (trainer). Consultation clinics are considered busy clinics due to the large number of patients being seen each session.

This study considered the effect of personalised feedback on trainees' clinical decision making in the consultation clinics at the Leeds Dental Institute (LDI) and compared this to the traditional routine feedback that the same trainees receive from their trainers whilst in the clinic.

Trainers supervising these clinics participated in this study alongside their trainees. Trainees who were invited to participate in this study were post-graduate students enrolled in the paediatric dentistry specialist programme. Trainers attended a training course about the personalised feedback model that was delivered by one of the supervisors of this thesis (HL) who is an experienced trainer. This training course was crucial in exploring the effects of the personalised feedback from the trainer's or the trainee's point of view since data was collected from the same groups of trainers/trainees before and after the training course. Data collected before the training course represented information about the traditional routine feedback while data collected after the training course represented the personalised feedback that had been delivered. This study was carried out from September-December 2018 at Leeds Dental Institute (LDI).

2.1.1 Study Design

This study was a descriptive, qualitative, prospective longitudinal study. It was a single centre study that was carried out at Leeds Dental Institute. Trainers and Trainees attending consultation clinics, as part of their clinical rotation, during the period of this study were invited to participate.

2.1.2 Ethical Approval

The study was reviewed by the University of Leeds Dental Research Ethics Committee (DREC). A research protocol in addition to consent forms and participation sheets for both trainers and

trainees (Appendix 4, 5 and 6) were provided to DREC who reviewed them and approved the research (Appendix 2 and 3). (DREC ref: 220518/SN/255)

2.1.3 Sample Size

No sample size calculation was required as it was a descriptive qualitative study.

2.1.4 Selection of Participants

This was a qualitative study that included trainers and trainees attending consultation clinics at LDI. The participants were recruited in this study using opportunity sampling. We were aiming to include as many trainers with their trainees attending the consultation clinics during their clinical rotations as possible.

The planned study rotation was during the autumn term timetable, from September 2018 until December 2018. This autumn term timetable contained four and a half sessions of consultation clinics per week that were supervised by three trainers. We aimed to include all trainers supervising these sessions and as many trainees as possible.

Identified participants were invited to participate via an e-mail along with the consent form (Appendix 4) and the participant information sheet (Appendix 5 and 6). A minimum of one week was given to the potential participants to decide whether or not they would like to be involved in the study. The research investigator (SN) was available to answer any questions and queries regarding the study. Once trainers and trainees had had the opportunity to read the participant information sheet and the consent form and ask any questions, they were asked to sign the consent form. Participants were given a copy of the signed consent form.

2.1.5 Inclusion/Exclusion Criteria

To meet the inclusion criteria, a participant must have been a post-graduate student (trainee) enrolled in the paediatric dentistry programme or an experienced supervisor (trainer) who has supervised and taught trainees regularly at consultation clinics for over ten years.

There were no exclusion criteria as all trainers and trainees engaged with the consultation clinics in the paediatric dentistry department at LDI during the 2018 autumn term were invited to participate in this study. However, registrars were not able to participate in this study as they were attending a study course. This study was carried out in three phases.

2.2 Study Phases

Pilot study:

- A pilot study was carried out on 1st cycle questionnaires in September 2018.

Phase 1:
- Trainers and trainees answered 1st cycle questionnaires at the end of a routine consultation clinic in the first week of the rotation.

Phase 2:
- Trainers attended a training session on how to give personalised feedback.

Phase 3: (last week of the rotation)
- Trainers answered 2nd cycle questionnaires, while trainees had audio-recorded interviews.

Trainers' and trainees' opinions were explored regarding the personalised feedback model and to explore if there were any effects of this personalised feedback on trainees' clinical decision making in general by comparing data from phase 1 and phase 3. The flow chart of the study phases is shown in figure 4.

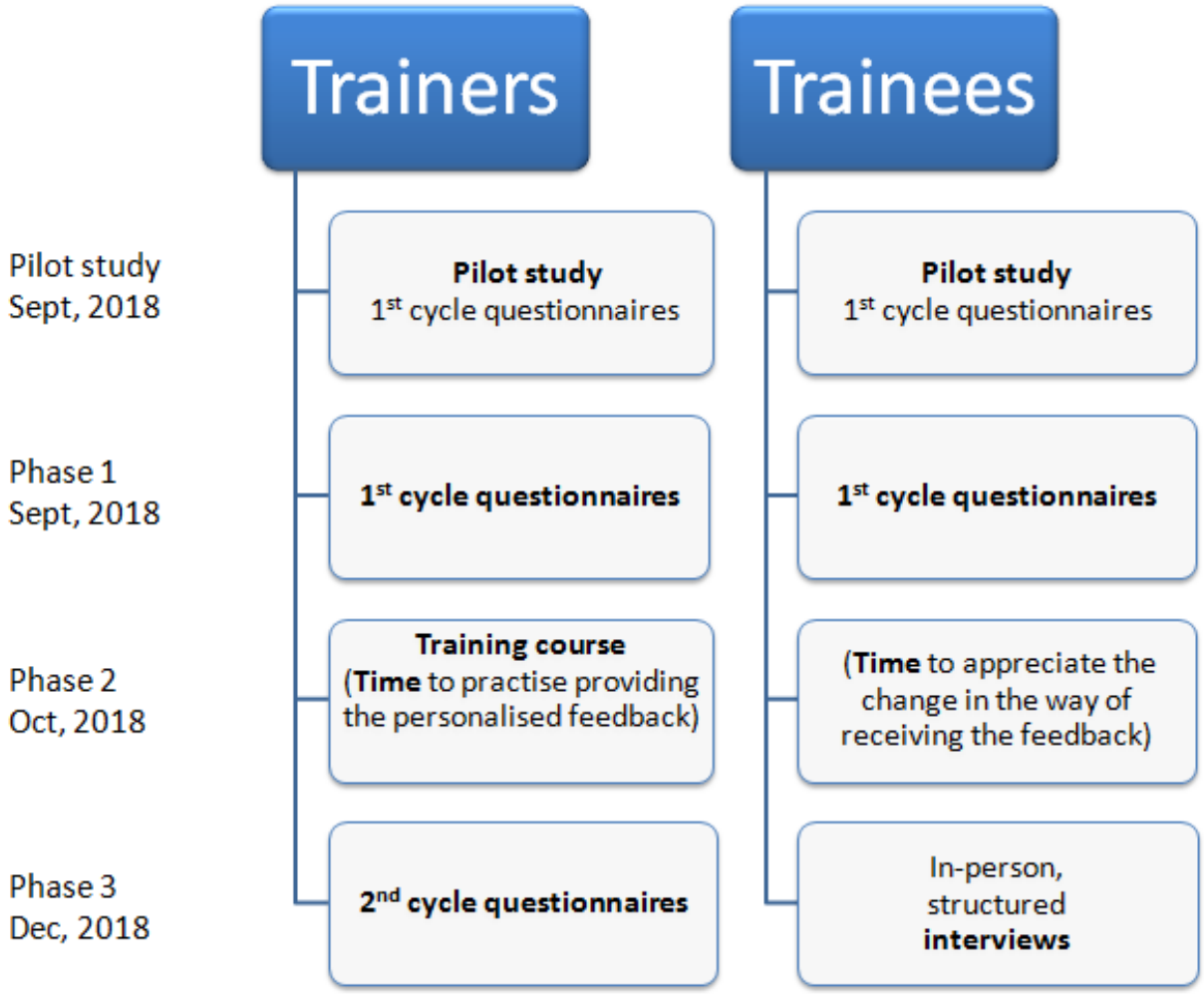


Figure 4. Showing the flow and timeline of the phases of the present study with regards to trainers and trainees.

2.2.1 Trainers' Pathway

A summary of trainers' pathway is shown in figure 4. Trainers were asked to complete two questionnaires (Appendix 8 and 9); each questionnaire took about 15 minutes to complete. After completing the first questionnaire (Trainer phase 1), a convenient time and location was arranged for the training session which was estimated to take 30 minutes (Trainer phase 2). At the training session, an explanation on how to provide personalised feedback was delivered to trainers. After the session, trainers were asked to use the personalised feedback model with their trainees in the consultation clinics at the paediatric dentistry department at LDI. Finally, trainers were asked to complete the second questionnaire five to six weeks after the training session (Trainer phase 3).

2.2.2 Trainees' Pathway

A summary of trainees' pathway is shown in figure 4. Trainees were asked to complete a questionnaire in the consultation clinic that was divided into three sections; before seeing the patient, after seeing the patient and after the trainer's feedback (Appendix 7) (Trainee phase 1). The questionnaire was estimated to take ten minutes in total. Following this, in another consultation clinic (approximately five to six weeks later) once the trainee had received feedback from the trainer, the research investigator (SN) carried out an in-person (one-to-one) interview with the trainee (Trainee phase 3). The structured interview, which was guided by a questionnaire, took around ten minutes. All conversations in the interview were audio-taped and transcribed at a later stage and remained confidential. If during the interview the trainee felt uneasy in any way or worried, they could refuse to answer the questions and could leave at any time without giving an explanation.

2.3 Pilot Study

Questionnaires (Appendix 7, 8, 9 and 10) used in this study had previously been validated for use with medical students (Leggett et al, 2016); however, minor adjustments were made to these questionnaires to ensure they were specific to the dental setting.

These questionnaires were piloted with three trainees and one trainer. Changes and adjustments on these questionnaires were made according to the feedback received.

Several questions had a scale rating from one to ten while others had a scale rating from one to five. A decision was made to change all the scale rating questions to a scale rating from one to five in order to aid participant completion and facilitate data analysis. Lines were added after open-ended questions to make it clear that a more detailed answer was required. A number of questions were divided into (a) and (b) to break up the questions and to aid the flow of the questionnaire.

Two questions were added to trainees' questionnaires; one on the frequency of receiving feedback and one on whether they appreciate receiving such feedback or not. In addition, three questions were added to trainers' questionnaires about the frequency of providing feedback, the duration of the feedback to each trainee and whether they appreciate providing such feedback or not. The two questions regarding the frequency and enjoyment had a scale rating from one to

five, while the third question about the duration of feedback to each trainee was an open-ended question.

The supervisors of this study (RB, JT and HL) suggested the addition of these questions at the research meeting that followed the pilot study that was carried out by the research investigator (SN). They believed that it would be valuable to explore these areas further.

2.4 Phase 1: Trainees' and Trainers' Perceptions of the Traditional Routine Feedback

All trainers and trainees that attended the consultation clinics in September 2018 were approached to participate in the study. After following the recruitment and consenting procedures outlined above, participants were asked to complete first cycle questionnaires.

First cycle questionnaires for trainees were divided into three parts. The first part was completed before the clinical interaction. This meant that the trainee would start to complete the questionnaire after reading the referral letter for that specific patient before bringing the patient into the clinic. The second part was completed after the clinical interaction; the trainee completed this part after taking a detailed medical and dental history from the patient/parent and consideration was given on the need of specific radiographs. The third part was completed once the trainee had received the traditional routine feedback from their trainer.

Trainers were asked to complete their questionnaires after providing the traditional routine feedback to their trainees.

2.5 Phase 2: Delivering the Training Course

Trainers attended a training session regarding how to give a personalised feedback after phase 1. The training session was delivered by an experienced trainer, Dr Heather Leggett (HL), who validated the personalised feedback model in 2016 (Leggett et al, 2016). The training session consisted of an introduction to the personalised feedback model and guidance on how to use the model to provide feedback, a workbook and the trainer's sheet (Appendix 11 and 12).

The personalised feedback model had been previously validated for use with medical students (Leggett et al, 2016); however, minor adjustments were made to this model to relate it more to paediatric dentistry (Appendix 1). These modifications included the rewording of the model by changing the medical terms to dental terms, adding examples that could happen in the dental clinic and finally designing the trainer's sheet that would facilitate the delivery of the personalised feedback to trainees in phase 3.

A workbook with different scenarios to be used at the consultation clinic was fabricated (Appendix 11). This workbook was designed in order to help in delivering the training session to trainers. In addition, a structured feedback sheet was designed for trainers. The purpose of the trainer's sheet (Appendix 12) was to help trainers provide the personalised feedback by focusing on four major areas which were the trainee's level of confidence in their ability to perform the task, their set goals and plans for the task, their ability to pay attention throughout the consultation and the awareness of any contextual factors that may affect the clinical decision making.

The researcher (SN) met with trainees separately and showed them the trainer's sheet with an explanation of each question. Trainees had the chance to ask questions regarding the trainer's sheet. The reason for the meeting was to familiarise trainees with the trainer's sheet in order to answer the questions when asked by their trainers at the end of the consultation session.

2.6 Phase 3: Trainers' and Trainees' Perceptions of the Personalised Feedback

Trainers answered second cycle questionnaires, while trainees had audio-recorded, in-person, structured interviews. The topic guide for these interviews was developed after minor modifications to trainees' second cycle questionnaires that was used by (HL) in 2016 (Leggett et al, 2016). Trainers' and trainees' opinions regarding the personalised feedback model were explored to determine if there were any effects of this personalised feedback on trainees' clinical decision making in general by comparing data from phase 1 and phase 3.

2.7 Data Confidentiality and Anonymity

Confidentiality and anonymity of all participants were protected. The researcher (SN) gave the participants individual participants identification codes (PICs) so as not to reveal the participants' identities or names in reports, publications or conference presentations. Anonymous quotes from participants' interviews were used in writing up the study report. Extracted data using the data collection sheet was kept away from unauthorised access in a locked file cabinet.

The researcher (SN) interviewed trainees while recording the interviews on an encrypted digital recorder. Later, all these recordings were transferred to a secure server on the University of Leeds computers and deleted immediately from the digital device. The digital audio recordings of interviews were pseudonymised, incorporated PICs to substitute participants' names and

were stored on a server at the University of Leeds that only the researcher (SN) and the main supervisor (RB) had access to and will be kept for several years. The Typing Works Company (which has a confidentiality agreement with University of Leeds as shown in their website www.thetypingworks.com) transcribed the audio data, and the transcripts were sent to the researcher (SN) using a University approved, encrypted data transfer service. Both the PICs and transcripts were stored on a server at the University of Leeds that only the researcher (SN) and the main supervisor (RB) could access.

No information provided by trainees during the interviews was shared with their paediatric dental consultants (trainers). However, there were certain instances, which could limit this confidentiality, such as if an evidence of unsafe practice was discovered in the audio recordings. There was no such evidence in the present study, so no data was disclosed.

2.8 Data Analysis

The data were entered into an electronic database and analysed using SPSS Statistics software (version 26) for quantitative data extracted from first cycle questionnaires of trainers and trainees, second cycle questionnaires of trainers and the transcripts of trainees' interviews.

Summative content analysis was used to analyse the qualitative data extracted from participant's answers to open-ended questions in both cycles of the questionnaire and the transcripts of trainees' interviews. Content analysis was applied as a systematic categorizing and coding approach for analysing the content of the data. It is used to determine the trends and patterns of the words, their frequency and their relationships (Grbich et al, 2013). A summative content analysis involves identifying and counting keywords in the text with the purpose of understanding the contextual use of these keywords (Hsieh et al, 2005). The elements identified in this summative content analysis were the codes and categories running through trainers' and trainees' responses.

The overall change in scale measures of graphs with regards to the effectiveness of the personalised feedback after the training course at the end of the rotation was calculated. Data explicated by all participants was assembled, categorised and classified to reveal factors involved in illustrating the effects of this personalised feedback on trainees' clinical decision making at consultation clinics. Data was collected twice at the beginning of the rotation and at the end after the training course to trainers.

3.0 RESULTS

Data taken from first and second cycle questionnaires in addition to trainees' interviews are shown in this section. Trainees' and trainers' perceptions of different aspects of the traditional routine feedback were explored in phase 1. Moreover, their awareness of different influences on the clinical decision making was illustrated. Phase 2 focused mainly on delivering the training course on how to use the personalised feedback model by an experienced trainer (HL) to trainers. Finally, trainers' and trainees' views on improving feedback were sought in phase 3. Moreover, their perceptions of strengths and weaknesses of the personalised feedback model were explored.

Quantitative data extracted from first cycle questionnaires of trainers and trainees, second cycle questionnaires of trainers and the transcripts of trainees' interviews were analysed using SPSS Statistics software (version 26) to perform the descriptive statistics. On the other hand, qualitative data extracted from answers to open-ended questions in both cycles of the questionnaire and the transcripts of trainees' interviews were analysed using summative content analysis through the codes and categories that were identified in trainers' and trainees' responses.

3.1 Coding Process of Summative Content Analysis

The elements identified in this summative content analysis were the codes and categories running through trainers and trainees responses. A summary of the codes and categories that was used for the summative content analysis is shown in tables 4, 5 and 6. These codes were developed based on trainers' and trainees' responses to the open-ended questions at both cycles of the questionnaire and the transcripts of trainees' interviews.

Coding process of trainees' first cycle questionnaires	
Categories	**Codes**
Factors related to the dental environment, patients or trainees that may influence trainees' decision making	• Time constraint • Noise in the setting • Confidence • Perceived lack of knowledge • Keeping track with recent waiting list of any treatment option • Communication barriers
Goals at consultation session	• Chief complaint • Diagnosis • Treatment plan
Plans for the consultation session	• Treatment plan • Cased-based-Discussion with consultant • Radiographs
Feedback routinely focused on	• Treatment plan • Diagnosis • Medical/Dental history • Type of radiographs required • Case presentation • Positive feedback

Table 4. Illustrating the coding process of trainees' first cycle questionnaires used for the summative content analysis.

Coding process of trainers' second cycle questionnaires	
Categories	**Codes**
Strengths of the personalised feedback model	• Well structured • Engagement of the trainer and the trainee • Encourage the trainee's reflection • Focus on the clinical outcome
Weaknesses of the personalised feedback model	• Time-consuming • Questions may need development

Table 5. Illustrating the coding process of trainers' second cycle questionnaires used for the summative content analysis.

Coding process of trainees' interviews	
Categories	**Codes**
Strengths of the personalised feedback model	• Well structured • Clear questions
Weaknesses of the personalised feedback model	• No obvious weaknesses • Questions need to be simpler • Unclear third question • Query about applicability in busy clinic • Time-consuming in already busy clinic

Table 6. Illustrating the coding process of trainees' interviews used for the summative content analysis.

There was no coding process for trainers' first cycle questionnaires as their responses to the questions in first cycle questionnaires were limited. Trainers provided short answers and since they were only three trainers, a decision was made to summarise their responses and describe the findings.

3.2 Phase 1: Trainees' Perceptions of the Traditional Routine Feedback (Trainees' First Cycle Questionnaires)

Phase 1 took place in September 2018. Every trainer or trainee who attended the consultation clinic in the first two weeks of the autumn term of 2018 was reached. Four trainees could not be reached because either they were not available at a consultation clinic due to sick leave or attending a study course. Therefore, three trainers and eight trainees agreed to participate and answer first cycle questionnaires. However, the data available for analysis were from the three trainers and only seven trainees as one trainee was excluded from the study due to their unavailability for phase 3 of the study.

3.2.1 Before the Clinical Interaction

This part explored trainee's confidence levels and their awareness of any contextual factors during the clinical interaction.

The average confidence levels for the ability to make a successful diagnostic decision was (3.7) out of (5.0). All trainees were aware of some factors related to the clinical environment, patients or themselves that may influence their decision making. The most important factor that was selected by five trainees out of seven was time constraint followed by noise in the setting which was selected by three trainees. Other important factors identified included: confidence, lack of dental knowledge, communication barriers and keeping track with recent waiting list time of any treatment option that may be discussed with the patient/parent. These factors were analysed using summative content analysis and summarised in table 7.

Factors related to the dental environment, patients or trainees that may influence trainees' decision making	Number of trainees who selected that factor
Time constraint	5
Noise in the setting	3
Confidence	1
Perceived lack of knowledge	1
Keeping track with recent waiting list of any treatment option	1
Communication barriers	1

Table 7. Showing the different factors that may influence trainees' clinical decision making.

3.2.2 After the Clinical Interaction

This part explored whether there were any changes to a trainee's initial confidence levels, if the trainee had specific goals and a plan to achieve these goals and their ability to keep track of the diagnostic decision making.

All trainees had specific goals and plans at the consultation session. However, the goals and plans varied among trainees. The most common goal that was mentioned by three trainees was figuring out the chief complaint that brought the patient to the consultation clinic. Other goals included reaching an appropriate diagnosis and treatment plan. On the other hand, the most common plan that was mentioned by four trainees was reaching an appropriate treatment plan. Other plans included case-based-discussion with the consultant and taking radiographs. These goals and plans were analysed using summative content analysis and summarised in table 8.

Goals at consultation session	**Number of trainees who mentioned that goal**	**Plans for the consultation session**	**Number of trainees who mentioned that plan**
Chief complaint	3	Treatment plan	4
Diagnosis	2	Cased-based-Discussion with consultant	2
Treatment plan	2	Radiographs	1

Table 8. Showing trainees' goals and plans at the consultation session.

Most trainees (six trainees out of seven) were able to self-observe or keep track of their diagnostic decision during the interaction. Two of these trainees mentioned that the discussion with their trainer made the diagnosis clear and made them confident to go ahead with the treatment options. Other trainees mentioned that consideration of the waiting time of each treatment option, not being influenced by information in the referral letter, the need for a preventive visit before treatment visits and the approval from their trainer were crucial factors in gauging whether they were on the right track or not. Only one trainee was not able to keep track of their diagnostic decision as they mentioned that they did not receive specific feedback.

Figure 5 illustrates the change in trainees' average confidence levels before and after the clinical interactions. The average confidence levels for the ability to make successful diagnostic decision in similar cases in the future increased from (3.7) to (4.4) out of (5.0) (Figure 5). No trainee reported a decrease in their confidence levels as it either stayed the same or increased. This increase in the average confidence levels is related to the traditional routine feedback received from their trainers.

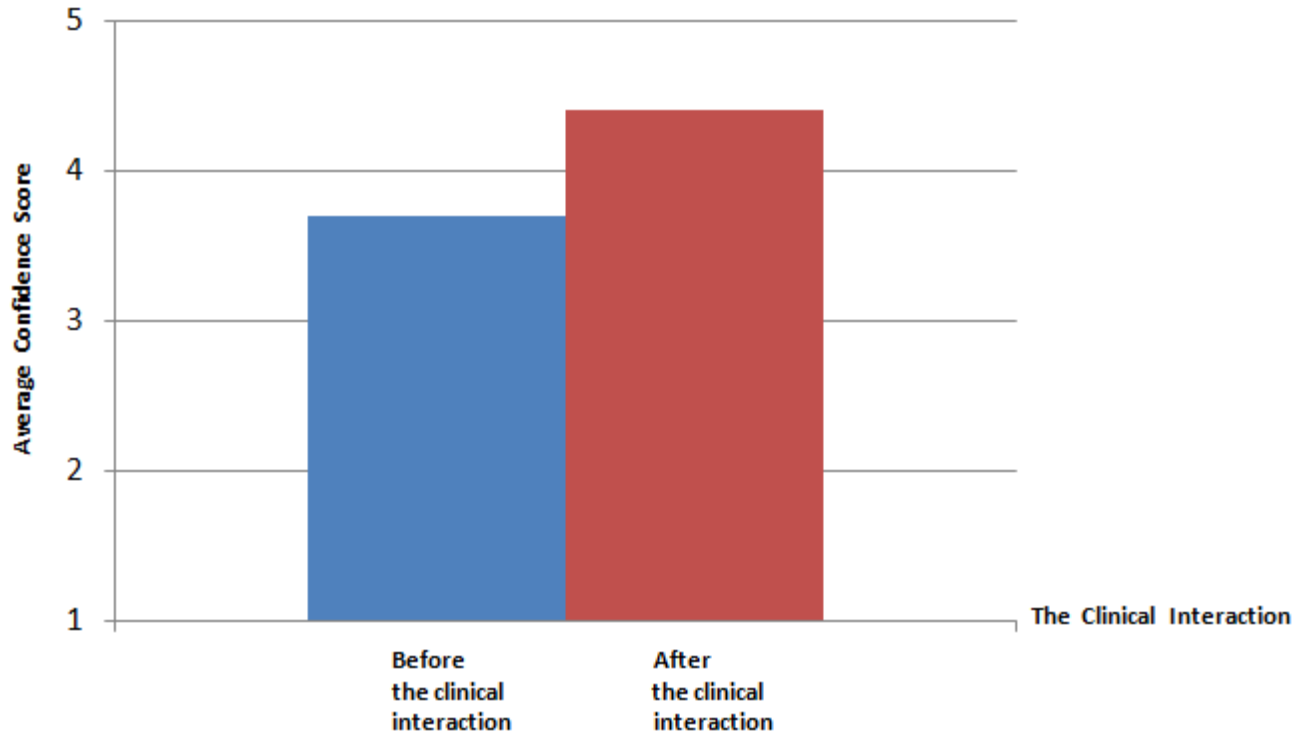


Figure 5. Illustrating the change in trainees' average confidence levels before and after the clinical interaction.

Trainees related the increase of their confidence levels to the discussion with the trainer and the feedback they received. Moreover, the increase in trainees' knowledge either by seeing similar cases in the past or by studying helped in increasing the confidence levels. One trainee related their confidence gain to the cooperation of their patient. However, one trainee mentioned that it was highly influenced by the trainer and the difficulty of the case. Despite the fact that their confidence levels did not change, this trainee clearly perceived that sometimes their confidence increased or decreased depending on the supervising trainer.

3.2.3 The Traditional Routine Feedback

This part explored the traditional routine feedback that trainees received during the consultation clinics.

Four trainees received the traditional routine feedback occasionally while three trainees received it very frequently. Three trainees appreciated receiving the traditional routine feedback

occasionally, while one trainee appreciated it very frequently and three trainees always appreciated receiving such feedback.

The majority of trainees (six trainees out of seven) noted that they received feedback about the treatment plan. Some trainees received feedback on taking the medical history and reaching an appropriate dental diagnosis. Two trainees received feedback on the type of radiographs needed and the reason for these radiographs. One trainee mentioned that they sometimes received feedback on the way they presented the case to the trainer while another trainee mentioned that they received positive feedback many times. So, the feedback that trainees received routinely focused on many aspects which were analysed using summative content analysis and summarised in table 9.

Feedback routinely focused on:	**Number of trainees who reported receiving feedback on each aspect**
Treatment plan	6
Diagnosis	2
Medical/Dental history	2
Type of radiographs required	2
Case presentation	1
Positive feedback	1

Table 9. Showing the different aspects that feedback routinely focused on.

Five trainees found the traditional routine feedback given on their treatment plan useful while only two trainees found it very useful. The same five trainees, who found this feedback useful, found it effective in improving their clinical decision making in the future. Similarly the two trainees, who found this feedback very useful, found it very effective in improving their clinical decision making.

Four trainees always used the traditional routine feedback they received to improve their clinical decision making in the future. One trainee used it very frequently while two trainees used this traditional routine feedback occasionally.

3.2.4 Trainees' Perceptions of Different Aspects of the Traditional Routine Feedback

A summary of trainees' perceptions of different aspects of the traditional routine feedback is shown in figure 6. It showed that the most common focus of the traditional routine feedback was the process trainees followed in the interaction to aid their clinical decision making with a score of (3.3) out of (5.0). On the other hand, the area with the least focus was the ability to self-observe the progress or performance through the interaction with a score of (2.9) out of (5.0).

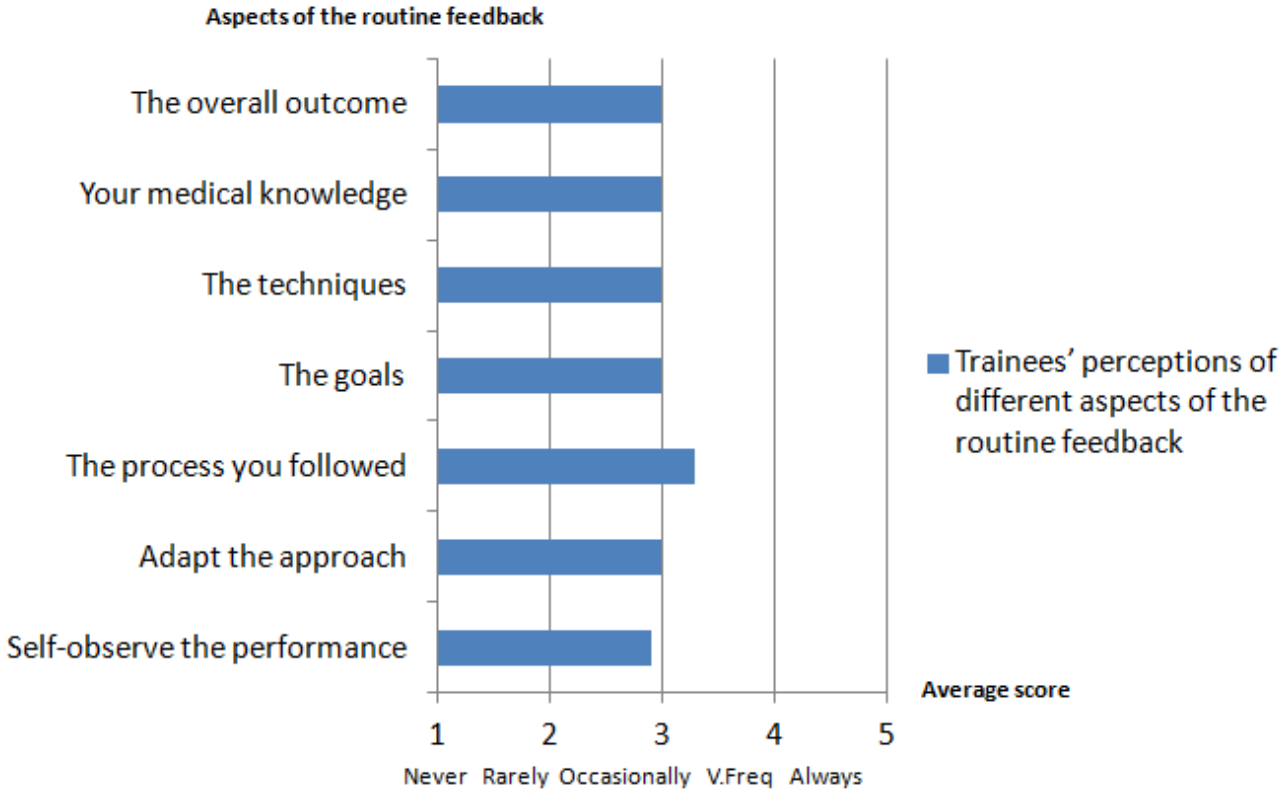


Figure 6. Showing trainees average scores ranging from 1: never to 5: always, on the aspects of the traditional routine feedback they received.

3.2.5 Perception versus Reported Scores with Regards to Trainees' Awareness of Different Influences on their Clinical Decision Making

3.2.5.1 The Dental Environment

A summary of the influence of the dental environment on trainees' clinical decision making is shown in figure 7. It illustrated that trainees thought that feedback on time constraint and noise occasionally influenced their clinical decision making. Moreover, they thought that feedback on the setting of the clinic influenced their clinical decision making very frequently. On the other hand, they rarely received any feedback from their trainers regarding the influence of these dental environment factors. From trainees' point of view, the traditional routine feedback needed to focus more on time constraint, noise and the setting of the clinic so that it could positively influence their clinical decision making when treating similar cases in the future.

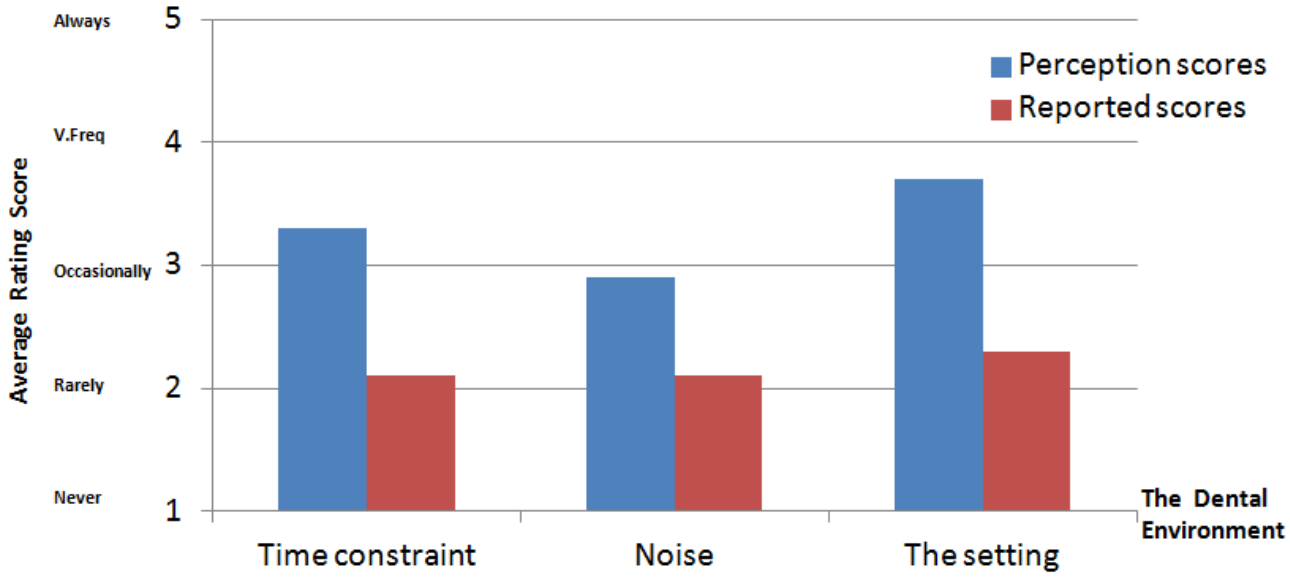


Figure 7. Illustrating trainees scores on the influence of the dental environment on trainees' clinical decision making.

3.2.5.2 Characteristics of Patients

A summary of the influence of patient characteristics on trainees clinical decision making is shown in figure 8. It revealed that trainees thought that feedback on the attitude toward the patient, the attitude of the patient and communication barriers occasionally influenced their clinical decision making. On the other hand, they rarely received any feedback from their trainers regarding the influence of these characteristics during the traditional routine feedback. From trainees' point of view, the traditional routine feedback needed to focus more on the attitude toward the patient, the attitude of the patient and communication barriers so that it could positively influence their clinical decision making when treating similar cases in the future.

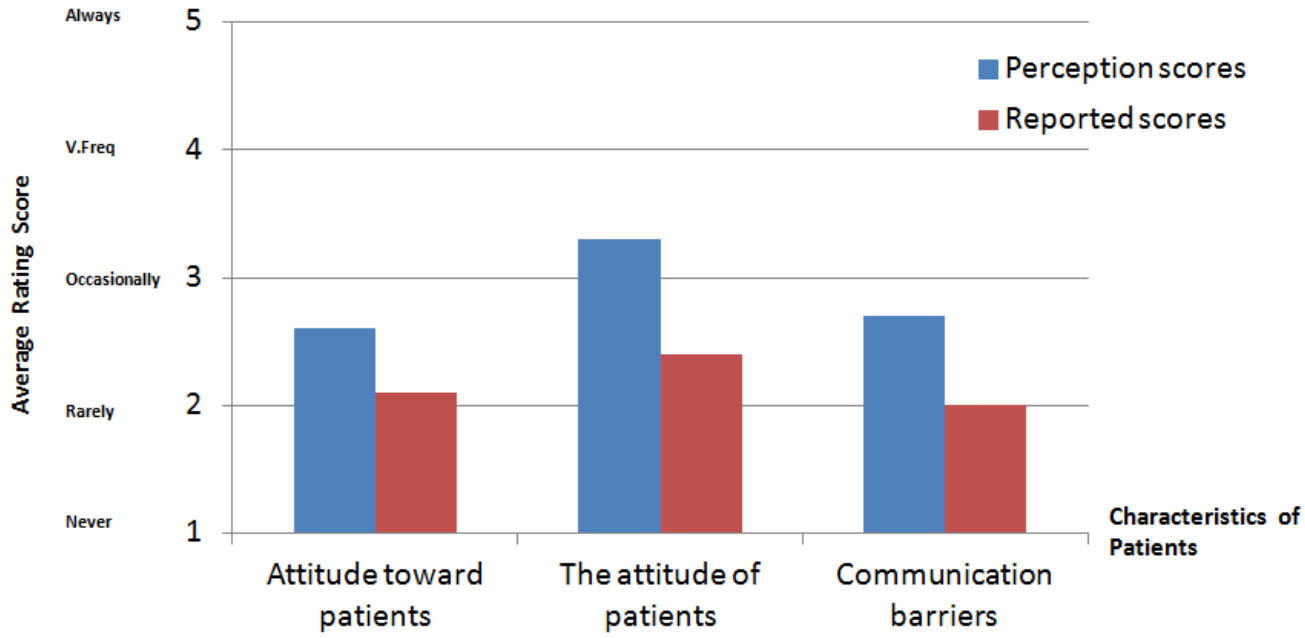


Figure 8. Illustrating trainees scores on the influence of the characteristics of the patient on trainees' clinical decision making.

3.2.5.3 Trainee Factors

A summary of the influence of the trainee factors on their clinical decision making is shown in figure 9. It illustrated that trainees thought that feedback on their confidence and medical/dental knowledge and experience influenced their clinical decision making very frequently. On the other hand, they occasionally received feedback regarding their confidence to make an accurate treatment plan.

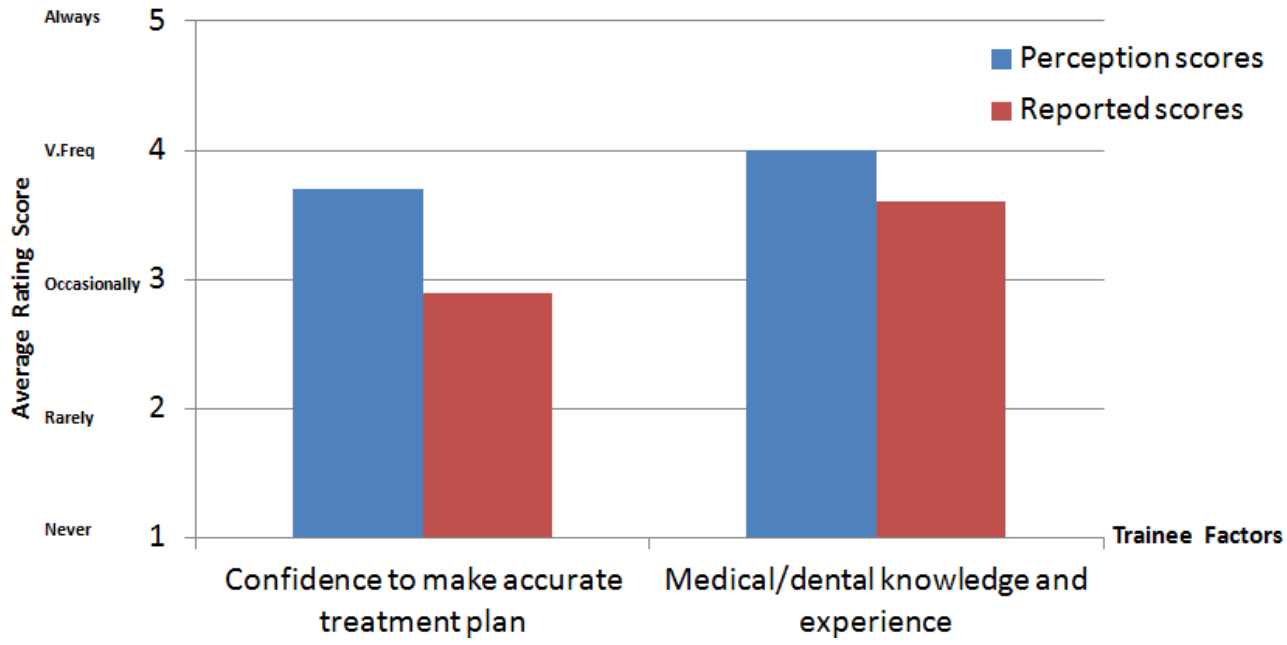


Figure 9. Illustrating trainees scores on the influence of the trainee factors on their clinical decision making.

From trainees' point of view, the only factor that was found to have similar perception and reported scores was trainees' medical/dental knowledge and experience. However, the value of the reported average score (3.6) was lower than the value of the perception score (4.0) of that particular factor (Figure 9).

The perception score is the perceived effects of a particular factor on trainees' clinical decision making and how often the trainer needs to emphasise the influence of this factor on trainees' clinical decision making. On the other hand, the reported score is the actual effects of a particular factor on trainees' clinical decision making and how often the trainer actually emphasised the influence of this factor on trainees' clinical decision making.

3.3 Phase 1: Trainers' Perceptions of the Traditional Routine Feedback

3.3.1 Trainers' First Cycle Questionnaires

Routinely, trainers provide most of the traditional routine feedback to their trainees at the end of the consultation clinics. Three trainers agreed to participate in this study. These three trainers were the only trainers available in consultation clinics in September 2018 so the response rate for trainers was 100%.

Two trainers reported routinely providing feedback to trainees very frequently while one trainer reported always delivering the traditional routine feedback to trainees. Two trainers stated that they appreciate providing the traditional routine feedback very frequently while one trainer occasionally appreciates delivering the traditional routine feedback.

The estimated period that was given by trainers for how long it took them to provide feedback routinely varied. One trainer said it could last approximately five minutes while another trainer said it could last as long as ten minutes. The third trainer mentioned that it ranged from one minutes to fifteen minutes depending on the trainee and the case complexity.

The feedback that trainers provide routinely to their trainees after observing them engaged in making the treatment plan at the consultation clinic focused on all areas of this procedure starting from reading the referral letter until reaching an appropriate treatment plan as mentioned by one trainer. Another trainer focused on the communication with parents and the child in addition to the treatment decisions. The third trainer mentioned that they would give more feedback if the trainee used a workplace based assessment sheet; however, this trainer routinely gave a lot of directive feedback to trainees regarding clinical decision making.

One trainer believed that trainees found the feedback on clinical decision making at consultation clinics was somewhat useful while the other two trainers hoped that their trainees found the traditional routine feedback useful to them. One trainer stated that they would like to spend more time giving feedback to trainees but the fact that trainees were not finished with writing the dental notes up until ninety minutes after the session would impede the delivery of the traditional routine feedback in a timely manner straight away after the consultation clinic.

Two trainers thought that their traditional routine feedback was somewhat effective at aiding their trainees in improving with regards to clinical decision making for future clinical interactions. One of these two trainers was actually disappointed that the consultation clinics had overrun

recently and they had been unable to manage the traditional routine feedback as they would like. One trainer thought that their traditional routine feedback was effective in improving their trainees' clinical decision making despite the fact that some of their trainees were continually making the same mistakes.

One trainer thought that their trainees used the traditional routine feedback provided by them very frequently to improve their clinical decision making for future clinical interactions. However, the other two trainers believed that their trainees occasionally used the traditional routine feedback to improve their clinical decision making for future clinical interactions.

3.3.2 Trainers' Perceptions of Different Aspects of the Traditional Routine Feedback

The focus of aspects of the feedback routinely provided by trainers is summarised in figure 10. The most common focus of the traditional routine feedback provided by trainers to their trainees in order to aid their tratment planning was trainees' medical/dental knowledge with a score of (4.0) out of (5.0) as trainers focused on this aspect very frequently. On the other hand, the aspect with the least focus was trainees' ability to self-observe the progress or performance through the interaction with a score of (3.0) out of (5.0) indicating that trainers occasionally provided feedback on this aspect.

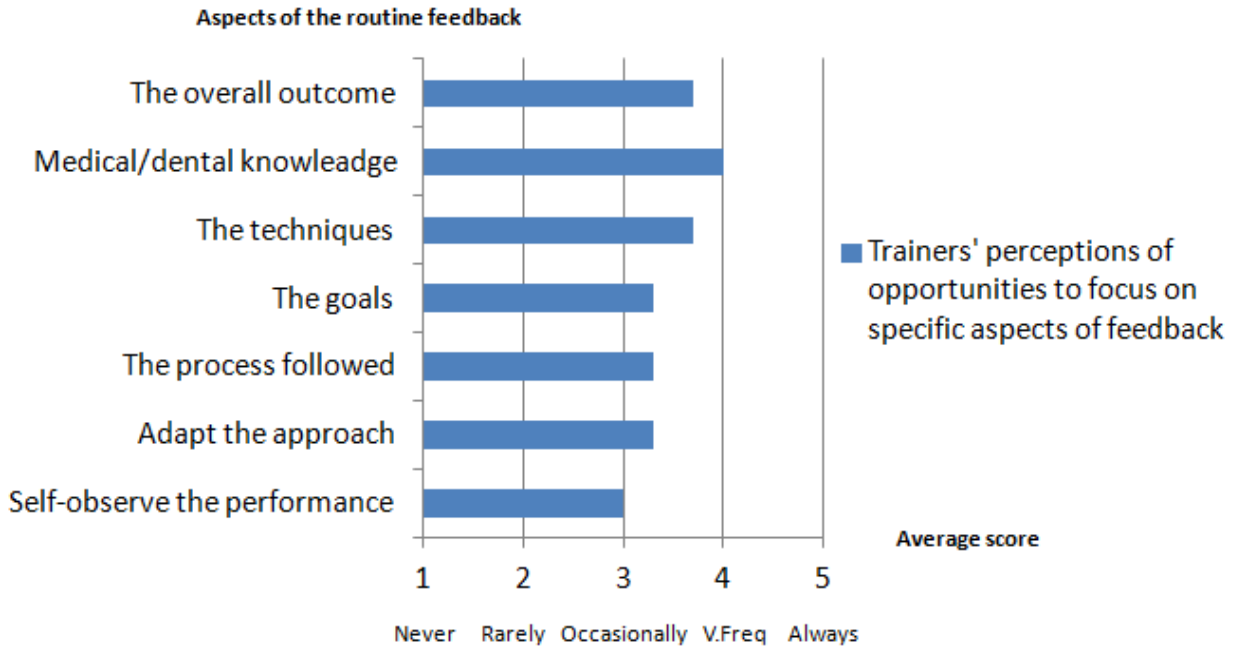


Figure 10. Showing trainers average scores ranging from 1: never to 5: always, on their perceptions of opportunities to focus on specific aspects of the feedback they routinely provided.

3.3.3 Perception versus Reported Scores with Regards to Trainer Awareness of Different Influences on the Clinical Decision Making

3.3.3.1 The Dental Environment

Figure 11 summarises trainers' perceptions regarding the influence of the dental environment on clinical decision making. Trainers thought that time constraint, noise and the setting of the clinic occasionally influenced their trainees' clinical decision making. On the other hand, they rarely gave any feedback regarding the influence of these dental environment factors with the traditional routine feedback except feedback about the time constraint that was given occasionally (figure 11).

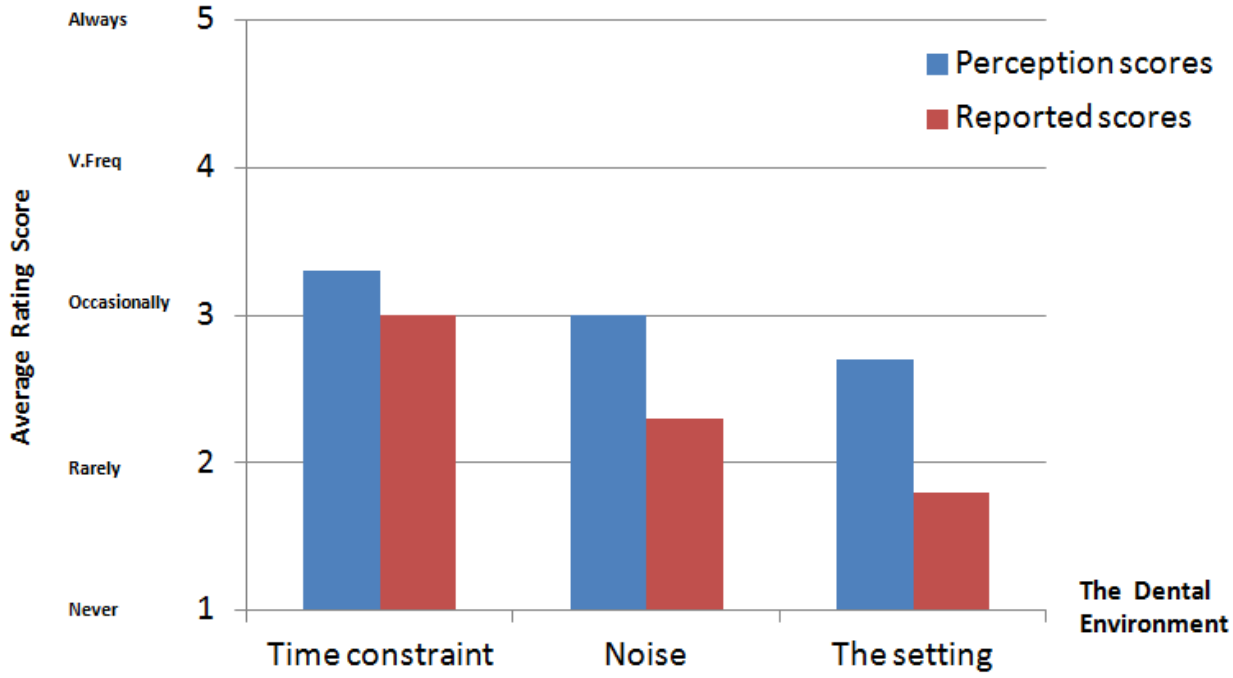


Figure 11. Illustrating trainers scores on the influence of the dental environment on trainees' clinical decision making.

3.3.3.2 Characteristics of Patients

Figure 12 summarises trainers' perceptions regarding the influence of patient characteristics on clinical decision making. Trainers thought that feedback on attitude towards the patient rarely influenced trainees' treatment planing. They also thought that feedback on attitude of the patient occasionally affected trainees' clinical decision making. Moreover, trainers thought that feedback on communication barriers would influence trainees' treatment planing very frequently. Trainers actually gave feedback to their trainees regarding patient characteristics in the same manner as they perceived the effects of trainees' clinical decision making (figure 12). In other words, trainers rarely commented on attitude towards the patient when providing the traditional routine feedback because they believed that this factor rarely influences trainees' clinical decision making in future interactions. Same principle was applied with trainers when commenting on communication barriers very frequently and occasionally on attitude of the patient.

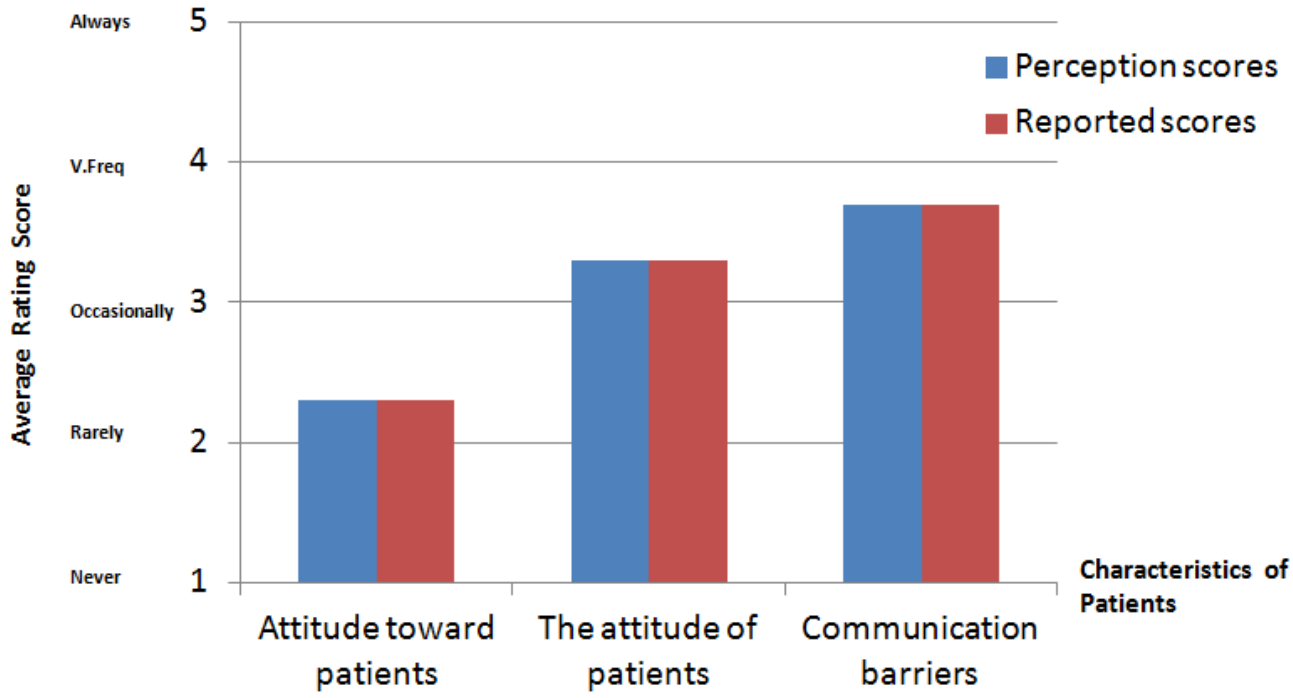


Figure 12. Illustrating trainers scores on the influence of patient characteristics on trainees' clinical decision making.

3.3.3.3 Trainee Factors

Figure 13 summarises trainers' perceptions regarding the influence of the trainee factors on clinical decision making. Trainers thought that the trainee confidence and medical/dental knowledge would very frequently influence trainees' treatment planing. Trainers actually gave feedback to their trainees regarding the trainee characteristics in the same manner as they perceived the effects of trainees' clinical decision making (figure 13). In other words, trainers commented on the trainee confidence and medical/dental knowledge very frequently when providing the traditional routine feedback because they believed that these factors influence trainees' clinical decision making more often in future interactions.

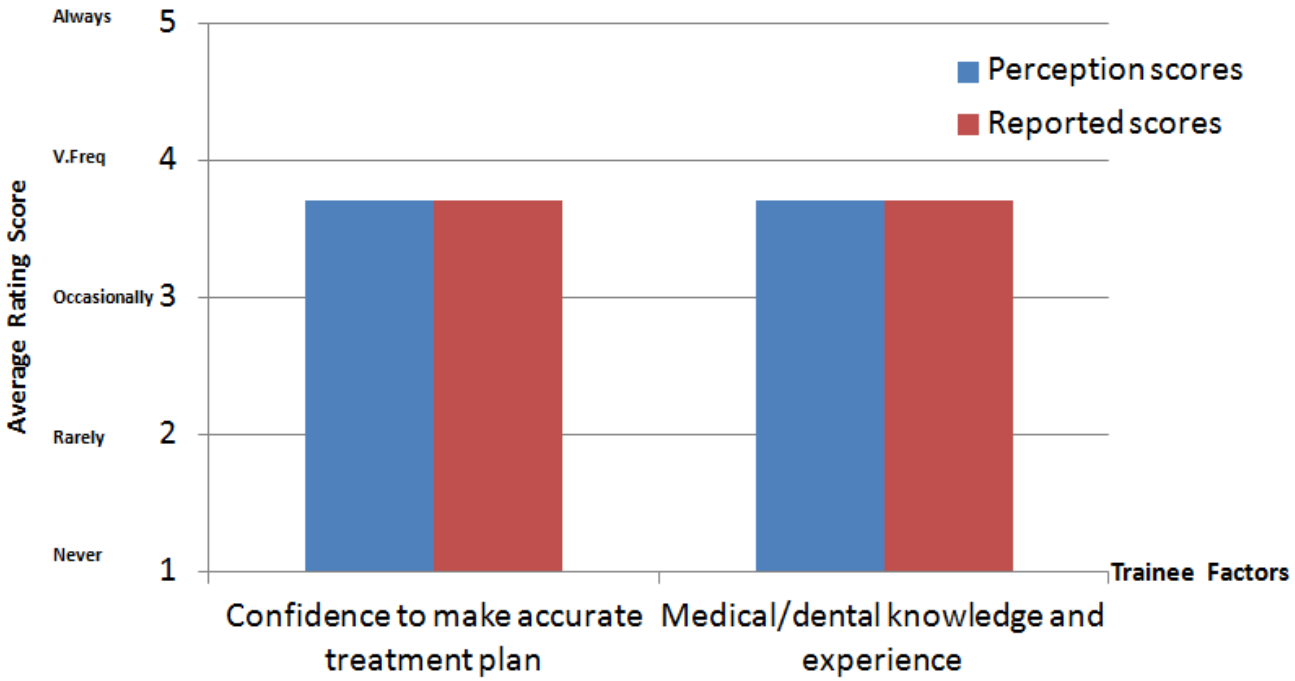


Figure 13. Illustrating trainers scores on the influence of the trainee factors on their clinical decision making.

3.4 Phase 2: Delivering the Training Course

Trainers attended a training course regarding the personalised feedback model in October 2018. The experienced trainer (HL) and the researcher (SN) met each trainer separately. This one-to-one meeting was beneficial since it allowed us to offer a more direct one-to-one training.

The experienced trainer (HL) along with the three trainers and the researcher (SN) agreed on the best way of using the trainer's sheet in order that it would facilitate the personalised feedback delivery to trainees at the end of the consultation clinics. Four questions were used by trainers to find out about the trainee's approach for each patient who they treated at one of the consultation clinics. The four questions were focused on the trainee's confidence level to make an accurate treatment plan, the trainee's goals and plans for the consultation, their ability to pay attention throughout the consultation and their awareness of any contextual factors that would have influenced their decision making. The trainer would then provide a personalised feedback based on the trainee's answers to these four questions.

Trainers had the chance to ask questions regarding this model. They totally understood the concept and were excited to practise it with trainees until December 2018 (phase 3).

3.5 Phase 3: Trainers' Perceptions of Personalised Feedback

3.5.1 Trainers' Second Cycle Questionnaires

Three trainers completed the study and answered second cycle questionnaires. Their thoughts were explored in these questionnaires.

Two trainers felt that there was an obvious change in the way they provided feedback to their trainees in consultation clinics at LDI. One trainer emphasised the importance of getting a glance at the referral letter in clinical decision making. Another trainer started to ask trainees about their feelings and contextual factors routinely rather than asking these questions only for formal workplace based assessment. On the other hand, one trainer felt there had been no change in the way they delivered feedback to their trainees.

Two trainers felt that providing feedback in this way was useful in helping trainees improve their clinical decision making, while one trainer found it somewhat effective in improving the clinical decision making because they had a problem with one of the questions in the trainer's sheet.

All three trainers agreed that this method was useful and helped them to provide effective feedback. They liked how structured the method was in a way that the trainee's thoughts were explored and followed from the referral letter until the treatment plan. One trainer felt that trainees were expecting more detailed feedback as they were also part of this study. Another trainer liked how this model encouraged trainees to reflect on their performance and interaction with patients. On the other hand, this trainer mentioned that this method could be considered as an extra time-consuming part of the teaching and training process, and it would be difficult to ask trainees such open-ended questions considering a busy clinical environment:

> *"In principle, it is very helpful as it encourages trainees to reflect on their performance and interaction with the patient. In reality, it is an extra part of the teaching and training process that takes more time as it is difficult to ask such `open-ended` questions in a busy clinical environment".* (Trainer 3)

One trainer found it easy to deliver feedback in line with the personalised feedback model. On the other hand, two trainers found it not particularly easy nor difficult. The model was seen as more time consuming and some questions were difficult to interpret by trainees. However, trainers appreciated how structured the feedback could be after using the personalised feedback model.

3.5.2 Trainers' Perceptions of Strengths and Weaknesses of the Personalised Feedback Model

Trainers were asked about the strengths and weaknesses of providing feedback in this way. The strengths of this method according to trainers were the structured model, the engagement of both the trainer and the trainee, the trainee's reflection and the focus on the clinical outcome. On the contrary, the weaknesses of this method were questions may need development and the model was more time consuming as they were waiting to find out what the trainee thought they did well or could develop. These strengths and weaknesses of the personalised feedback model were analysed using summative content analysis and summarised in table 10.

Strengths of the model	**Number of trainers who mentioned it**	**Weaknesses of the model**	**Number of trainers who mentioned it**
Well structured	2	Time-consuming	3
Engagement of the trainer and the trainee	1	Questions may need development	1
Encourage the trainee's reflection	1		
Focus on the clinical outcome	1		

Table 10. Showing trainers' perceptions of strengths and weaknesses of the personalised feedback model.

3.5.3 Trainers' views on improving the feedback

Trainers' opinions regarding improving this method of providing the personalised feedback were sought. One trainer mentioned that more time per interaction would be ideal to enable the full value of such open-ended questions as time is a constant pressure:

> *"Time is a constant pressure. To enable the full value of such open-ended questions plus reflective thinking to be realistic, more time per interaction would be ideal".* (Trainer 3)

Another trainer suggested to improve the wording of one open-ended question as it was difficult to interpret by their trainees:

> *"Question number three: wording could be improved. Perhaps ask the trainee what did they think they did well – anything they can develop".* (Trainer 2)

On the other hand, one trainer had nothing to add to improve this model.

3.6 Phase 3: Trainees' Perceptions of the Personalised Feedback

3.6.1 Trainees' Interviews

Seven trainees attended the one-to-one structured interviews which explored their opinions regarding the personalised feedback model.

All trainees felt that there was an obvious change in the way they received the feedback after making a treatment plan at the consultation clinics. Three trainees found this change useful in their clinical decision making for future cases, while four trainees found it very useful. Most trainees were happy because trainers took their time in providing a more detailed and focused feedback. In addition to that, trainers pointed out the missing information or steps that trainees need to be aware of. Moreover, trainees were engaged more in discussion with their trainers regarding the cases they saw at these consultation clinics. Two trainees liked that the feedback they received included information about their confidence and other factors that could influence the clinical decision making.

Four trainees felt that receiving such feedback was effective in helping them improve their clinical decision making process, while three trainees felt that it was very effective in that manner. One trainee mentioned that their trainer was asking them more questions to drive them to reach an accurate diagnosis and discussed with them the different treatment options in order to finally choose the appropriate treatment plan that suited that specific patient.

Three trainees found this method useful in improving their clinical decision making when compared with the previous way of the traditional routine feedback, while another three trainees found it very useful. Three trainees liked the fact that they had more time with their trainer to receive the personalised feedback in such a structured and organised way that can guide them to appropriate treatment planning. One trainee mentioned that because they encountered somehow similar cases at consultation clinics, they could see their progress from the personalised feedback.

Only one trainee mentioned that this method was not very effective or ineffective. This trainee illustrated their answer by mentioning that they could not compare between the two methods:

> *"I think when I received the personalised feedback that the supervisor (trainer) had the time to sit with me and provide the feedback. So, I am not sure previously as it was*

carried out while the clinic was very crowded and I did not receive enough feedback". (Trainee 1)

Figure 14 summarises trainees' average agreement scores with the statements regarding the personalised feedback model. All trainees on average agreed or strongly agreed with all the statements about the personalised feedback model. The most agreed upon statement with a score of (4.7) out of (5.0) was that receiving feedback through the personalised feedback model helped trainees in self-observing and modifying their performance at consultation clinics. On the other hand, the least agreed upon statement with a score of (4.1) out of (5.0) was that the way that trainees reached an appropriate plan had been changed by receiving feedback by this model. Even though it was the least agreed upon statement, the average score was (4.1) which indicated average agreement with this statement. Other statements covered areas, such as how effective the model was in improving the clinical decision making, the structured feedback, confidence factor consideration, influence of other contextual factors, consideration of goals and plans, encouragement of self-observe own performance and improvement in self-confidence.

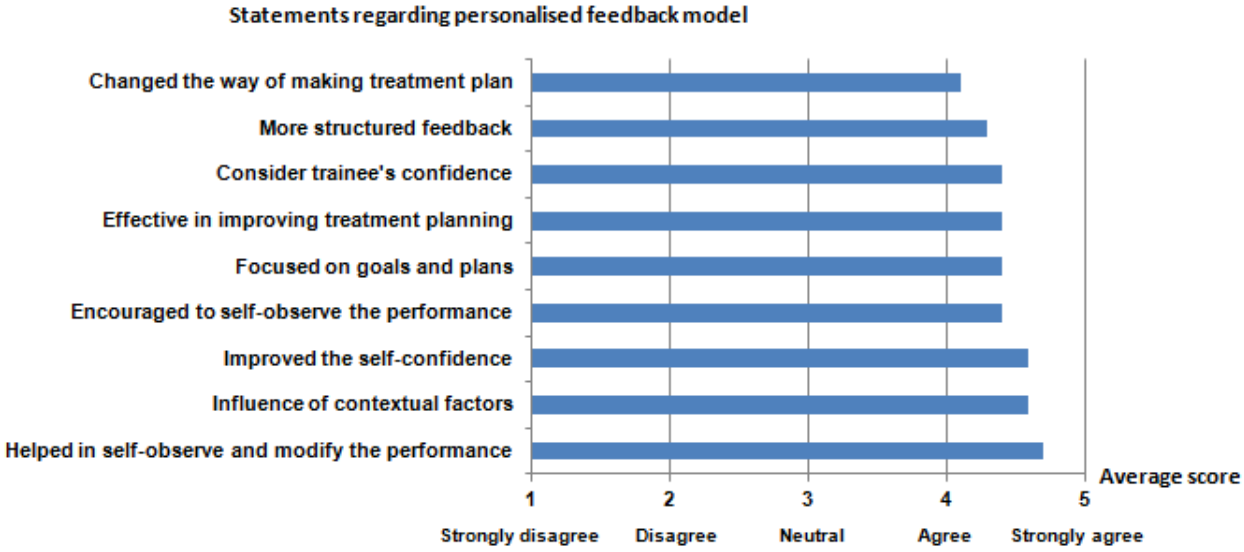


Figure 14. Showing the agreement with the statements ranging from 1: strongly disagree to 5: strongly agree when asking trainees about the personalised feedback model at the structured interviews.

3.6.2 Trainees' Perceptions of Strengths and Weaknesses of the Personalised Feedback Model

Trainees were asked about the strengths and weaknesses of receiving feedback in this way. The strengths of this model according to trainees were that the model covered all the aspects of a consultation clinic and was well structured. They found that the trainer's sheet provided a good template for the trainer to follow for providing the personalised feedback. Positively, many trainees (five trainees out of seven) did not see any obvious weaknesses. Two trainees were confused with the third question of the trainer's sheet regarding paying attention throughout the session even though the researcher (SN) met with all trainees before the consultation session and explained all the questions in advance. These strengths and weaknesses of the personalised feedback model were analysed using summative content analysis and summarised in table 11.

Strengths of the model	**Number of trainees who mentioned it**	**Weaknesses of the model**	**Number of trainees who mentioned it**
Well structured	6	No obvious weaknesses	5
Clear questions	4	Questions need to be simpler	2
		Unclear third question	2
		Query about applicability in busy clinic	1
		Time-consuming in already busy clinic	1

Table 11. Showing trainees' perceptions of strengths and weaknesses of the personalised feedback model.

Two trainees suggested to keep records of precise conclusive written feedback for each trainee at the end of consultation clinics. While another trainee mentioned that their trainer did not ask them all the four questions at the end of the session. That trainee thought that it could be because of the busy clinic that day or it could be that the trainer needed more time to use the model. Despite what happened with that trainee, they actually liked the model and suggested to hang the forms on wall of the clinic so that future trainees can benefit from the model:

> *"We know about the structure in advance. However, if you administer the model in future consultation clinics, the trainee will not have any idea about the questions from the trainer's sheet. I suggest if you can hang the paper (the trainer's sheet) on wall of the clinic so that trainees know that these are the points that they will be asked about in consultation clinic to receive the personalised feedback".* (Trainee 2)

3.6.3 Trainees' Views on Improving the Feedback

Trainees' opinions regarding improving this method of receiving the personalised feedback were sought. Most trainees (five trainees out of seven) believed that the number of patients assigned to each trainee needed to be controlled to allow more time for the delivery of the personalised feedback immediately after the consultation session. As two trainees had to treat more patients in a busy consultation session, the personalised feedback could not be received immediately after the session and they waited few days for their notes to be authorised and the personalised feedback to be received from their trainers:

> *"I did not receive the personalised feedback on the same day of the consultation session due to time contraints and the number of patients. I prefer to receive the personalised feedback immediately after the session".* (Trainee 6)

> *"No, I did not receive the feedback on the same day. The supervisor (trainer) was willing to provide the personalised feedback; however, there was not enough time to do it on the same day. The trainer provided the personalised feedback three days afterwards".* (Trainee 5)

Moreover, four trainees suggested that treating fewer patients per consultation would allow them to have more time for the personalised feedback. Another trainee mentioned that it would be feasible for each trainee to treat three patients as long as one trainer was assigned to

supervise a maximum of three trainees. Since most consultation clinics consisted on average of five to six trainees, it would be wise to allocate two trainers to supervise them:

> *"I think if we can control the number of patients and the number of the supervisors (trainers) by assigning each supervisor (trainer) to three post-graduate students (trainees), we will receive proper feedback".* (Trainee 6)

Furthermore, two trainees mentioned that they spent more time when treating patients with complex medical histories at consultation clinics as they needed to search for the dental file (hard copy) and read more about the medical condition, the dental protocol and dental requirements for that specific patient. They suggested the assignment of such patients in advance under the name code of the trainee attending that specific consultation session:

> *"It might be helpful to discuss the complicated cases that were booked in advace. If I knew that I would see this complicated case, then I would read the letters and discuss the case with my supervisor (trainer). So, we will be already prepared for the cases at the busy consultation session".* (Trainee 2)

> *"Assigning complicated cases in advance to trainees would be a good idea. We will have more time to have a good preparation for our patients in order to implent a better diagnosis and treatment".* (Trainee 4)

On the other hand, one trainee suggested to divide the four questions to expand more on all the factors in the trainer's sheet knowing that it would take even more time. Despite that suggestion, that trainee truly believed that the personalised feedback model by itself was also effective in improving the clinical decision making.

Two trainees believed that the model covered all the aspects and they were happy with the personalised feedback they received. They even suggested to continue using the trainer's sheet for the personalised feedback in future consultation clinics not only for the purpose of carrying out this study:

> *"I wish to contiue receiving the feedback this way in the next rotation. I think it is really useful. If supervisors (trainers) can take it into consideration to be implemented for all trainees, It will be a very useful tool to improve trainees' learning".* (Trainee 4)

4.0 DISCUSSION

4.1 Introduction

This study aimed to determine whether the personalised feedback provided to trainees was more effective than the traditional feedback which had been routinely provided by trainers in the new patient clinics at LDI. The study design was descriptive, qualitative, prospective longitudinal which involved trainers and trainees attending consultation clinics at LDI from September to December 2018. There was no previous research specifically investigating the effects of the personalised feedback among dental trainees. However, a previous PhD thesis investigated the effects of personalised feedback among medical undergraduate students and found the personalised feedback was more effective in improving their clinical decision making than the traditional routine feedback (Leggett et al, 2016).

4.2 Discussion and Critique of the Results

4.2.1 Phase 1: Perceptions of the Traditional Routine Feedback

4.2.1.1 Clinical Interaction

Time constraint was the most important factor that affected trainees' confidence. The consultation clinic at LDI is one of the busiest clinics in the paediatric department. Patients tend to wait at the reception area until the trainee calls their name. Some patients may wait for a long period of time to be called by any free trainee. Trainees are required to treat one patient after another without any breaks during the consultation session. So, trainees have to treat patients in a timely manner knowing that there are more patients waiting for them.

All trainees had specific goals with the appropriate plan to achieve these goals. The most important goal in consultation clinics when the trainee examined a new patient was to reach an appropriate diagnosis by taking a detailed history and examination with the help of radiographs in order to discuss different treatment options with the patient/parent to reach an appropriate treatment plan for that particular patient.

Most of trainees were able to keep track of their clinical decision making during the interaction. All trainees who participated in this study had a minimum of one academic year experience in consultation clinics at LDI. So, trainees had learned how to reach an accurate diagnosis and treatment plan whilst receiving traditional routine feedback.

This traditional routine feedback improved trainees' average confidence levels in the ability to make successful diagnostic decisions in similar cases in the future. In addition to that, discussions conducted with the trainer played a major role in that increase in trainees' average confidence levels. It is pertinent to note that there is a high chance of treating similar cases in the future in such clinics, so paying attention to the traditional routine feedback can improve the trainee's performance the next time they treat a similar case.

4.2.1.2 The Traditional Routine Feedback at the End of the Consultation Session

Trainees mentioned that they received traditional routine feedback either occasionally or very frequently after the consultation session, which is to say that they were not receiving such feedback all the time. One of the main reasons for this could be time constraint as there is often little time for the traditional routine feedback to be provided in such busy clinics. From trainers' point of view, trainees took a long time to write their notes and it is unrealistic to ask a consultant to wait around and miss lunch or stay until 6:30 at night.

The majority of trainees noted that they received feedback about the treatment plan (table 9). Moreover, trainees found that the traditional routine feedback provided by their trainer was effective in improving their clinical decision making when treating similar cases in the future.

Trainers used to give most of the traditional routine feedback to their trainees at the end of the consultation clinics. It was stated that traditional routine feedback was provided to trainees either very frequently or always after the consultation session, which seemingly might indicate that there is a small chance of missing providing such feedback to trainees in such busy clinics.

The period of providing the traditional routine feedback varied between trainers depending on the trainee and the case complexity. Although trainers believed that the traditional routine feedback on trainees' clinical decision making was useful, they reported that it was somewhat effective in improving trainees' clinical decision making for future clinical interactions.

4.2.1.3 Perceptions of Different Aspects of the Traditional Routine Feedback

Trainees mentioned that the traditional routine feedback occasionally focused on several aspects of the consultation session (figure 6). These aspects included the overall outcome, medical/dental knowledge, goals and plans, steps followed during the consultation and paying attention. Trainees believed that the feedback should be focused and frequently delivered on these aspects. Managing the busy consultation clinics left trainers with little time to provide feedback to their trainees. This was based on the analysis of the findings regarding the traditional routine feedback.

From a trainer's point of view, the most common motif of the traditional routine feedback was trainees' medical/dental knowledge (figure 10). Moreover, the traditional routine feedback concentrated on the overall outcome of the clinical interactions and the techniques employed by trainees to achieve an appropriate treatment plan very frequently (figure 10). The traditional routine feedback provided by trainers occasionally focused on aspects, such as trainees' goals set out to be achieved, the process that trainees followed to aid their clinical decision making and trainees ability to adapt to make a treatment plan in light of information gathered during the clinical interaction.

Trainees treat a variety of cases including medically compromised patients, patients with dental developmental anomalies, patients with behaviour difficulties or patients with multiple carious cavities in the primary and permanent dentitions. Hence, trainees need to be well-prepared to treat any patient at the consultation clinics.

4.2.2 Perception versus Reported Scores with Regards to Trainees' and Trainers' Awareness of Different Influences on the Clinical Decision Making

4.2.2.1 The Dental Environment

A clear difference was noticed between perception and reported scores with regards to trainees' response to time constraint, noise and the setting of the consultation clinic as influences on trainees' clinical decision making (figure 7). It was obvious that trainees thought that feedback on time constraint and noise occasionally influenced their clinical decision making. Moreover, they thought that feedback on the setting of the clinic influenced their clinical decision making very frequently, and yet they rarely received any feedback regarding the influence of these dental environment factors with the traditional routine feedback.

Another difference was also noted between perception and reported scores with regards to trainers' response to the influences on trainees' clinical decision making (figure 11). Trainers evidently thought that feedback on the environment they were in occasionally influenced trainees' clinical decision making. Despite that fact, they seldom provided feedback regarding the noise or the setting of the clinic. However, they occasionally provided feedback about the time constraint. The main reason for the difference between reported and perception scores could be the time constraint in such busy clinics and the attempt of the trainer to focus on a more critical aspect of the traditional routine feedback in such limited time.

Finding sufficient time for supervison can be a problem (Kilminster et al, 2000). Patel in 2016 evaluated the patterns and practices of educational supervison in post-graduate medical education in the UK. He found that the supervisors would appreciate more support from the Trusts/hospitals in the form of being valued and supported to help them enhance the supervision for trainees. He believed that improving the quality of the feedback would be highly valuable (Patel et al, 2016). These findings support the consideration of the time constraint as a limiting factor and the need to improve the quality of the feedback.

4.2.2.2 Characteristics of Patients

A clear contrast was noticed between perception and reported scores with regards to trainees' responses to the attitude toward the patient, the attitude of the patient and the communication barriers as influences on trainees' clinical decision making (figure 8). Trainees thought that feedback about the characteristics of the patient occasionally influenced their clinical decision making. However, they rarely received any feedback regarding the attitude toward the patient, the attitude of the patient and communication barriers.

When it comes to trainers' responses, perception and reported scores of those specific influences were similar (figure 12). We could say that trainers were aware about the effects of the characteristics of the patient, such as the attitude toward the patient, the attitude of the patient and communication barriers, as perception and reported scores were exactly the same according to each characteristic (figure 12). Based on trainers awareness about the effects of each characteristic, trainers provided feedback about the communication barriers quite frequently, the attitude of patients occasionally and the attitude toward patients rarely.

Physicians perceptions' of patients were influenced by patient's race and socio-economic status. Patient's race was related to physicians' assessment of patient's intelligence and

adherence to medical advice, while the patient's socio-economic status was associated with the perception of the personality, abilities and behavioral tendencies (Ryn et al, 2000). Dental health knowledge and attitudes were influenced by patient's socio-demographic characteristics. It was found that those living in deprived areas, being Asian and parents with no further education have less chance of obtaining high levels of dental knowledge and positive dental attitudes (Williams et al, 2002).

Hodges and his colleagues in 2013 studied the impact of cone-beam computed tomography (CBCT) on orthodontic diagnosis and treatment planning. They found that the frequency of changing the diagnosis and treatment plan varied widely by patient characteristics. Unerupted teeth, severe root resorption or severe skeletal discrepancies accounted for most of the changes in orthodontic diagnosis and the treatment plan (Hodges et al, 2013). Orthodontic treatment time was influenced by the patient characteristics and the clinical decisions. However, it was possible to predict the duration of orthodontic treatment based on a small number of patient characteristics and treatment plan decisions. Patient characteristics included gender, age at the start of the treatment, cooperation, oral hygiene, elastic wear, failed appointments and the number of rebonds due to bracket breakages (Skidmore et al, 2006). The findings of these studies support the consideration of the patient characteristics as an influence in trainees' clinical decision making. Patient characteristics affected the frequency of changing the treatment plan (Hodges et al, 2013) and the treatment time (Skidmore et al, 2006).

Feeling uncomfortable with communication creates barriers that impede discussion and causes others to feel inferior and dependent (Lunenburg et al, 2010). Communication barriers were found to be negatively and significantly correlated with knowledge sharing (Chen et al, 2017). Some parents and children treated at consultation clinics do not speak English really well and can ask for an interpreter to be available throughout the visit. More time is needed for translation in such busy clinics and this could affect the knowledge sharing and discussion duration.

Coudeyre and his colleagues in 2006 found that French general practitioners were negatively affected by their fear-avoidance beliefs about lower back pain. They noticed that 16% of French general practitioners were reluctant to recommend physical activity for patients with lower back pain as they believed that physical activity may be harmful for common lower back pain and should be avoided despite the fact that guidelines recommend physical activity in these cases (Coudeyre et al, 2006).

Roberts and his colleagues in 1994 studied the relationship between the physician and the patient during breast cancer diagnostic interviews. The most important component perceived by patients during the interviews was the physician's caring attitude. This caring attitude was shown through expressing empathy, allowing sufficient time for patients to absorb the cancer diagnosis, providing information and engaging the patient in treatment decision making (Roberts et al, 1994). The findings of Roberts's study support the consideration of the attitude toward the patient as an influence in trainees' clinical decision making. Trainees need to express empathy with chaild dental pain, provide information regarding dental diagnosis and engage parents in treatment decision making.

Brennan and his colleague in 2005 studied the role of dentist, practice and patient factors in the provision of dental services. They found that restorative rates were higher for dentists that rated patient's preferences more highly whilst treatment planning. They also found that the extraction rates and the prosthodontic rates were lower for dentists treating cooperative compliant patients (Brennan et al, 2005).

The findings of these studies support the consideration of communication barriers (Lunenburg et al, 2010; Chen et al, 2017) and the attitude towards patients (Coudeyre et al, 2006; Roberts et al, 1994; Brennan et al, 2005) as an influence in trainees' clinical decision making. To overcome the communication barriers in the form of language barriers between the parent or the patient and the trainee, an interpreter should be booked in advance. Although the interpreter would facilitate the communication between the patient and the trainee, the treatment planning for these particular patients would take longer time than the usual. This would leave the trainee with even less time to receive any feedback in these busy consultation clinics. Moreover, the trainee need to communicate properly with the child and the parent. Receiving feedback on this area is very helpful in developing trainees' communication skills with a wide age range and children with disabilities. On the other hand, the trainee's caring attitude would facilitate the discussion with the patient and the parent regarding the different treatment options and reaching the appropriate treatment plan. Rather than the trainee's beliefs about dental treatment, the trainee should follow the guidelines when treating patients at the consultation clinics.

4.2.2.3 Trainee Factors

Perception scores were quite unlike reported scores with regards to trainees' response to their confidence as an influence on their clinical decision making (figure 9). It seemed apparent that trainees thought that feedback on their confidence would influence their clinical decision making very frequently. However, they only occasionally received feedback regarding their confidence to make an accurate treatment plan.

On the other hand, trainees thought that feedback regarding their medical/dental knowledge and experience influenced their clinical decision making very frequently. Perception and reported scores were almost similar (figure 9) as trainees actually received feedback with regards to their medical/dental knowledge and experience frequently.

No difference was noted between perception and reported scores with regards to trainers' responses to trainees' confidence and medical/dental knowledge as an influence on trainees' clinical decision making (figure 13). Trainers, observably, were aware about the effects of trainees' confidence to make an accurate treatment plan and their medical/dental knowledge as perception and reported scores were excatly the same. Figure 13 shows that trainers were aware of the effects of these factors and that was why they provided the feedback on trainees' confidence and medical/dental knowledge very frequently.

Confidence has been consistently related to positive effects, whereas a lack of confidence has been linked with depression, dissatisfaction and anxiety (Vealey et al, 1988). Students' performance and confidence were influenced by their ability and locus of control (Klein et al, 1990). Moreover, sport performance was facilitated by having high confidence levels through its positive effects on athletes' thoughts, feelings and behaviours (Hays et al, 2009). The findings of these studies support the consideration of the level of trainees' confidence as an influence on their clinical decision making.

Cotter and her colleagues in 2011 studied the factors affecting dental hygienists performance while screening for oral cancer. They found that the dental hygienists' knowledge about oral cancer was not up to date and their confidence levels with carrying out the oral cancer screenings were low. They believed that the confidence levels had a significant influence on their performance. The more confident the hygienists felt with the technique, the more likely they were to perform oral cancer screenings. On the other hand, the knowledge levels did not affect

their performance. However, poor performance highlighted the need to strengthen the education about the importance of these screenings (Cotter et al, 2011).

The findings of Cotter's study support the consideration of trainees' confidence as an influence on their clinical decision making. On the other hand, the consideration of trainees' knowledge as an influence on clinical decision making was contradicted in another study (Cotter et al, 2011). Cotter in her study emphasised the importance of improving the education when observing poor performance. This contradiction could be explained as Cotter studied the knowledge of the dental hygienists regarding oral cancer and the task of performing the oral cancer screenings. So, dental hygienists could continue performing the task of screening for oral cancer even if their knowledge was not up to date. Whereas in this study, the trainee's knowledge needed to be up to date in order to perform all the steps to reach an appropriate diagnosis and an accurate treatment plan.

4.2.2.4 Summary of the Difference between Perception and Reported Scores with Regards to the Trainees' and Trainers' Awareness of Different Influences on Clinical Decision Making

Perception and reported scores showed a discrepency that was noticed in trainees' responses regarding the influences on their clinical decision making when receiving feedback about the dental environment, the characteristics of the patient and the trainee factors. In general, trainees thought that receiving feedback about the dental environment, the characteristics of the patient and the trainee factors often could influence their clinical decision making; however, they actually received feedback less often on these influences.

Time constraint could be considered as an example to support the previous statement. Trainees thought that receiving feedback about time constraint could occasionally influence their clinical decision making; however, they rarely received any feedback with regards to time constraint or suggestions of ways to work when they are under time pressure (Figure 7).

In other words, trainees received feedback about these influences less than what they thought that they needed to receive in order to influence their clinical decision making. The main reason for the difference between reported and perception scores could be the time constraint in such busy clinics and the attempt of the trainer to focus on a more critical aspect of the traditional routine feedback in such limited time.

On the other hand, the influence that had the least difference between perception and reported scores was trainees' medical/dental knowledge and experience. In other words, trainees received feedback about this influence almost similar to what they thought that they needed to receive in order to influence their clinical decision making (Figure 9).

When it came to trainers' responses, perception and reported scores also had some discrepencies regarding trainees' clinical decision making when providing feedback about the dental environment. Trainers thought that providing the feedback about time constraint, noise and the setting of the clinic could influence trainees' clinical decision making to a certain point; however, they actually provided the feedback on this influence less than what they believed was required. In other words, trainers provided the feedback about the dental environment less than what they thought that they needed to provide in order to influence trainees' clinical decision making. The main reason for the difference between reported and perception scores could be

the time constraint in such busy clinics and the attempt of the trainer to focus on a more critical aspect of the traditional routine feedback in such limited time.

On the other hand, perception and reported scores were equivalent in trainers' responses regarding the influence on trainees' clinical decision making when providing feedback about the characteristics of the patient and the trainee factors. In other words, trainers provided feedback about the characteristics of the patient and the trainee factors exactly similar to what trainers thought that they needed to provide in order to influence trainees' clinical decision making (Figures 12 and 13).

By comparing trainees' and trainers' responses with regards to the influences (the characteristics of the patient and the trainee factors) on trainees clinical decision making, a difference was observed. Trainees received less feedback than what they thought they needed with regards to the effect of these influences on their clinical decision making; however, trainers provided feedback exactly similar to what they perceived with regards to these influences.

The main reason for this could be that trainees did not fully understand the feedback received from the trainer. Trainees would not be aware that the feedback was on a specific influence if they did not fully understand the feedback.

Another reason might be that trainees only counted the discussion at the end of the consultation session as the traditional routine feedback while the trainer might provide the feedback routinely during the interaction and at the end of the session. Also, the trainer might not repeat the feedback on a specific influence at the end of the consultation session if it was already provided during the interaction. Therefore, trainees need to take notice of all discussion with the trainer and not just at the end of a three hour session.

Some trainees might believe that if feedback was routinely provided at the end of a session and they might not count the feedback if it was not given at the end of the session while discussing the cases with the trainer to authorise the notes. Feedback was very effective if it was provided directly after the task, but feedback was less effective when provided during the task (Swart et al, 2019).

4.2.3 Phase 3: Perceptions of the Personalised Feedback

4.2.3.1 The Personalised Feedback at the End of the Consultation Session

Two trainers felt that there was an obvious change in the way they provided feedback to their trainees as opposed to the way they routinely did. They believed that this change was useful in helping their trainees to improve their clinical decision making.

Trainers agreed that the trainer's sheet (Appendix 12) helped them to provide the personalised feedback to their trainees. However, they found that providing such detailed feedback was time consuming and some questions were difficult to interpret by trainees. Providing the personalised feedback this way could be considered as an extra task for the trainer after a long and busy consultation session; however, trainers tried their best to provide the personalised feedback knowing the positive effects on their trainees' clinical decision making.

Trainees felt that there was an obvious change in the way they received the feedback and that was very useful in improving their clinical decision making. They were happy that trainers took their time to provide more detailed and structured feedback. They found that receiving feedback this way was more effective in improving their clinical decision making as compared to the traditional routine feedback. The main reason for this could be that receiving the feedback through the personalised feedback model which focused on the four major components might help trainees to evaluate and observe the progress of their performance at the consultation clinics throughout the rotation.

Trainees agreed that receiving such feedback through the personalised feedback model helped them in self-observing and modifying their performance at consultation clinics (Figure 14). The third question from the trainer's sheet focused on this aspect and that explained the agreement as trainers were providing feedback about paying attention throughout the clinical interaction. However, a number of trainees did not fully understand this question when asked by their trainers.

4.2.3.2 Perceptions of the Strengths of the Personalised Feedback Model

The strengths of this method according to trainers were the structured model, the engagement of both the trainer and the trainee, the trainee's reflection and the focus on the clinical outcome. Trainers found that the trainer's sheet guided them to provide the personalised feedback by focusing on several aspects of the trainee's performance and encouraged reflection at consultation clinics.

The strengths of this model according to trainees were that the model covered all the aspects of consultation clinic and was well structured as trainers were using the trainer's sheet as a guide to provide the personalised feedback.

4.2.3.2.1 Structured Feedback

Bhattacharyya and his colleagues in 2020 studied the perception of third year medical students and supervisor regarding structured feedback in India. They fabricated a standardised format for the one-to-one verbal delivery of structured feedback. The supervisors in Bhattacharyya's study followed a five-step process to provide the structured feedback. In the first step, the supervisor was instructed to begin the conversation with their student by outlining the goal of the session. The second step was to illustrate what was expected from the student in relation to the assigned task. The third step was to mention what was performed correctly and to highlight the mistakes. In the forth step, the student was asked to reflect on their performance, and finally the session was summarised with a word of encouragement. The majority of students (84%) believed that the structured feedback helped them to understand their mistakes by identifying weakness, improving performance and building a rapport with the supervisor. The supervisors were motivated to provide the structured feedback; however, only 20% of the supervisors believed that it was easy to provide such feedback. This method could be incorporated into the curriculum due to the acceptance from both the students and the supervisors as long as the feedback was structured and constructive. Bhattacharyya and his colleagues concluded that this method would become much easier and an integral part of the routine assessment process if it was consistently practised (Bhattacharyya et al, 2020).

Joseph and his colleagues in 2017 studied the impact of the structured feedback on the graphical complexity of concept mapping performed by physiotherapy students. Concept mapping is an educational tool for evaluating conceptual knowledge. Their study focused on physiotherapy students who created concept mappings targeting the integration of two

knowledge domains within a case-based teaching example. The structured feedback in Joseph's study was defined as the feedback that addressed correction, reinforcement, forensic diagnosis, bench marking and longitudinal development on concept mappings prior to the final submission. They found that the structured feedback improved the graphical complexity of students' examples. Furthermore, they concluded that their study provided preliminary evidence of the effect of structured feedback on students' improved understanding of critical topics in physiotherapy undergraduate education (Joseph et al, 2017).

The findings of these studies support the consideration of structured feedback as a crucial element of the strengths of the personalised feedback model. The trainer's sheet was a standarised format that trainers could use to deliver the personalised feedback to trainees.

4.2.3.2.2 Engagement of Both the Trainer and the Trainee

Nisar and Scott in 2011 identified key attributes of a modern surgical trainer as defined by trainees and the consultant training faculty members in the United Kingdom. They demonstrated the different beliefs and priorities between trainees and trainers regarding the attributes of a good surgical trainer. Key attributes identified by trainees were providing feedback, setting targets for trainees and patience, while engaging other trainers and being patient were the key attributes identified by trainers (Nisar et al, 2011). Trainee engagement with their trainers like feeling involved, enthused and energised by the training was an important element to facilitate the learning (Rangel et al, 2015).

The findings of these studies support the consideration of the engagement of both the trainer and the trainee as an important element of the personalised feedback model's strengths. When trainers used the trainer's sheet to ask their trainees the four questions, they were actually engaging with the discussion regarding trainees' confidence, goals and plans, paying attention and awareness of any contextual factors in addition to their influence on trainees' clinical decision making.

4.2.3.2.3 Reflection

In a recent study, self-regulated learning guided trainees to perform independently. Trainees decided if they could treat the patient alone or if they should consult the supervisor based on their confidence levels. They deliberately used the feedback on their performance and engaged in the reflection. The crucial aspects of self-regulated learning in practice were self-confidence, support from the supervisor, reflection and feedback (Sagasser et al, 2017).

Case-based discussions are one of the main formative assessments to evaluate an advanced trainee's professional judgement in clinical cases. Phillips and his colleagues in 2016 reviewed the use of these case-based discussions by surgical trainees. They found that trainees considered these case-based discussions as a positive feature that allowed the discussion of complicated cases and encouraged higher thinking and reflection (Phillips et al, 2016).

The findings of these studies support the consideration of reflection as an important element of the personalised feedback model's strengths. Trainees were reflecting themselves by answering the questions from the trainer's sheet in addition to receiving the personalised feedback to improve their clinical decision making.

4.2.3.2.4 Focus on Clinical Outcome

Roney and his colleagues in 1995 studied the influence of the outcome focus on motivation and emotion. The participants of their study were asked to solve anagrams and were given a specific goal to attain. After each attempt of solving the anagrams, the participants received a feedback that was framed with either a positive outcome focus or a negative outcome focus. Roney and his colleagues found that the performance feedback framed with a positive outcome focus led to a better performance on solvable anagrams than the feedback framed with a negative outcome focus did (Roney et al, 1995).

The findings of Roney's study favored the idea of focusing on the clinical outcome as a crucial element of the strengths of the personalised feedback model. This was obvious from the second and third questions from the trainer's sheet which focused on the goals and plans and paying attention throughout the consultation clinics to reach an appropriate treatment plan for all patients.

4.2.3.3 Perceptions of the Weaknesses of the Personalised Feedback Model

The weaknesses of this method as mentioned by trainers were that the model was more time-consuming and the questions may need further development. It was mainly the third question from the trainer's sheet that focused on paying attention throughout the interaction. Trainers needed more time during the session to provide the personalised feedback as compared to the traditional routine feedback.

The clinical teaching process is complex and adequate time must be provided for planning, instructing and reflecting. The supervisor can spend time to review the daily schedule with a trainee before the clinic. This step will allow the discussion regarding the cases and identify the instructional needs before treating patients (Skeff et al, 1997). This can not be applied in a dental consultation clinic with several trainees who review all patients under the supervisor name. One of the suggestion to overcome this struggle could be the distribution of patients among trainees so each trainee reviews few patients under their names instead of the supervisor name.

Too often, teaching is carried out rapidly in one-to-two-minute burst which often involves little direct observation of trainees and virtually no feedback (Irby et al, 1995). With increasing pressures for time efficiency, the supervisors have less time to directly observe trainees, less time for patient care and less time for trainee-centered instruction. The actual time available for the supervisors is dependent upon the number of patients attending the clinic. Reflection is generally not recognised as being part of the process of clinical teaching. However, the supervisors must reflect on their teaching in order to identify ways to improve and recognise the barriers, such as time constraint that impede crucial teaching activities (Skeff et al, 1997).

Trainers were already lacking time to provide feedback in busy clinics. Moreover, they would need more time to use the model to provide the personalised feedback at the end of the consultation clinics. This would be an extra task that trainers need to make time for in a busy clinic, making it quite a challenging feat.

On the other hand, most trainees did not find any obvious weaknesses. However, a number of trainees mentioned that the weaknesses of this method were the questions that may need development or subdivision into many simple questions and the applicability of this model in such busy consultation clinics. Only two trainees at the end of a long and busy consultation session were confused with the third question of the trainer's sheet.

4.2.3.4 Trainers' and Trainees' Views on Improving the Feedback

Trainers suggested improving the wording of one open-ended question as it was difficult to interpret by their trainees. The third question from the trainer's sheet (Appendix 12) was: "Did you feel that you are able to keep track of your diagnostic decision making during the interaction? How?". That question focused on paying attention throughout the interaction. Although the researcher (SN) had already met trainers and trainees separately before the third phase and explained all the questions on the trainer's sheet, some trainees found it difficult to interpret during a busy consultation session.

Trainees believed that the number of patients assigned to each trainee needed to be controlled to allow more time for the delivery of the personalised feedback immediately after the consultation session. By controlling the number of patients at each consultation session, trainers could have enough time to provide the personalised feedback straight away after the consultation session and not to wait for few days after a busy consultation session. Skeff in 1997 believed that the number of patients attending the clinic affected the actual time available for the supervisors to observe and instruct trainees (Skeff et al, 1997).

Xakellis and his colleagues in 1996 tried to figure out the acceptable cost-efficient trainee-to-supervisor ratios without sacrificing the quality of education. They found that using two supervisors led to the supervision of more than double the number of trainees and higher utilisation of the supervisor time than did using only one supervisor. They concluded that the two-supervisor approach allowed the supervision of sufficient number of trainees and the teaching costs could be covered from the revenues of patient care (Xakellis et al, 1996).

Since most consultation clinics consisted on average of five to six trainees, it would be wise to allocate two trainers to supervise them despite the high cost of this approach. The practical way of carrying out the consultation session that way would be to assign each trainer with three trainees in order to facilitate the personalised feedback delivery at the end of the session. The consultation clinic with this approach will include two trainers and six trainees who will treat approximately a total of 18 patients per session.

On the other hand, trainees mentioned that they spent more time treating patients with a complex medical history at the consultation session as they needed to search for a hard copy of the dental file and read more about the medical condition, the dental protocol and dental requirements for that specific patient. They suggested the assignment of such patients in

advance. This suggestion would allow the trainee to attend the consultation session well-prepared and treat complex patients in a timely-manner allowing time for the personalised feedback at the end of the session.

DaRosa and her colleagues in 1997 emphasised the importance of attending the busy clinic well-prepared and its influence on education. They found that spending more time in preparation before the busy clinic enhanced trainees' educational experiences, made best use of the clinic time and expertise and did not disrupt the efficiency of the clinic (DaRosa et al, 1997).

4.3 Discussion and Critique of the Methods

4.3.1 Study Design, Sample size and Selection of Participants

The study was a descriptive, qualitative study so no sample size calculation was required. The plan was to approach all trainers and trainees attending the consultation clinics at LDI in September 2018 (phase 1) in order to follow them up until December 2018 (phase 3). The total number of participants in (phase 1) was three trainers and eight trainees; however, one trainee was excluded from the study due to a research commitment that prevented them from attending the last consultation clinic.

In phase 1, trainer A supervised three trainees (one of them was the excluded trainee), while trainer B supervised two trainees, and trainer C supervised another two trainees. One trainee was scheduled to attend two consultation clinics with two different trainers (trainer A and trainer B). To avoid a situation in which that trainee switched between trainers, a decision was made to include them with only one trainer. This decision made it easier for that particular trainee to participate in the study, and the results attained would not be biased by this trainee's response. Due to the small sample size and trying to achieve equal distribution of the eight trainees at the beginning of study to the three trainers, it was decided to allocate them to trainer B who had fewer trainees. By the end of phase 1 of this study, trainer A, trainer B and trainer C supervised three trainees, three trainees and two trainees, respectively.

This careful allocation prevented duplication in trainees' responses. Moreover, it prevented the allocation of the majority of trainees to one trainer. At the end of the study, each trainer had been allocated to two trainees except for the second trainer who was allocated to three trainees.

4.3.2 Pilot Study

First cycle questionnaires were piloted with three trainees and one trainer in September 2018 before phase 1. The purpose of the pilot study was to make sure that first cycle questionnaires were clear and easy to understand.

These questionnaires were the modified version of the validated questionnaires that had previously been used for medical under-graduate students (Leggett et al, 2016). Following feedback of the piloted study, minor changes were made to the validated questionnaires. The original questionnaire included two questions with a scale rating from one to ten while the majority of the remaining questions had a scale rating from one to five. It also included the word

(medical) in almost all the questions as it was focused on medical students. A decision was made to use the scale rating from one to five in all the scale rating questions and to replace the word (medical) to (dental) in order to make it clear for dental trainees. This decision made the analysis easier to interpret.

Other modifications made to the questionnaire were the addition of lines after open-ended questions to make it clear that a more detailed answer was required. Additionally, a number of questions were divided into (a) and (b) to break up the questions and to aid the flow of the questionnaire. Moreover, the supervisors (RB, JT and HL) suggested the addition of two questions to explore further the frequency of receiving/providing feedback, and whether trainees/trainers appreciate such feedback. Furthermore, one more question was added to the trainer's questionnaire regarding the estimated duration of the feedback to each trainee.

Questionnaires are prone to recall bias; however, that was the most suitable way of gaining as much information as possible in such busy clinics. It was noted that, on occasions, the consultant authorised the dental notes and provided the feedback several days after the consultation clinic. This may have led to not recalling specific details from the consultation clinic which had occurred few days before, and that could have affected the quality of the feedback delivered to trainees. It may also have influenced the trainee on being able to use that feedback if they could not remember the details either. Researcher (SN) believed that trainees need to improve their writing of dental notes so that they can receive feedback in a more timely fashion.

Immediate feedback leads to a better performance than delayed feedback (Azevedo et al, 1995). Anderson and his colleagues in 1995 reported that the immediate feedback kept the students attentive while performing the task as it allowed them to carry on with the task while receiving the feedback (Anderson et al, 1995). Furthermore, Corbett and his colleagues in 1997 recommended the delivery of the feedback as early as possible while the relevant information was still available (Corbett et al, 1997).

4.3.3 Phase 1: Trainees' and Trainers' Perceptions of Traditional Routine Feedback

Patients who attended the consultation clinics at LDI were either new patients or review patients. The majority of patients were new patients referred by their general dental practitioner or a medical specialist. The trainee would read the referral letter and proceed to taking an appropriate medical/dental history and dental/radiographic examination in order to reach an accurate diagnosis and treatment plan. The trainer usually provided the traditional routine

feedback at the end of the session after authorising the dental notes. Some aspects of the traditional routine feedback might have been provided during the process of reaching the treatment plan; however, the trainee might not have been aware of that due to the lack of time in such busy clinics.

On the other hand, a minority of patients treated at the consultation clinics at LDI were review patients who had attended multiple treatment sessions at LDI. The trainee would go through all the treatment records for that review patient if dental notes were not written properly in addition to the referral letter. As such, the preparation time for the review patient would be much longer than the new patient, and this might affect the confidence of the trainee in such busy clinic.

A decision was made for this study to only include new patients to standardise the procedures that trainees would face at the consultation clinics. In this phase, trainers were providing the traditional routine feedback in the same way they used to deliver without any instructions (i.e., trainer's sheet) to their trainees. Additionally, trainees answered first cycle questionnaires based on the traditional routine feedback received when treating new patients.

4.3.4 The Personalised Feedback Model (Appendix 1)

The model concentrated on four components, which were: the trainee's level of confidence in their ability to perform the task, their set goals and plans for the task, their ability to pay attention throughout the consultation and the awareness of any contextual factors that may affect the clinical decision making.

4.3.4.1 Confidence Level on Successfully Diagnosing/Planning the Treatment

Lynch and his colleagues in 2010 studied the effect of community-based clinical teaching programmes on the confidence of senior dental undergraduate students at Cardiff University. They found an improvement in self-reported confidence of students receiving the training in a community-based clinical outreach teaching programme when performing a wide range of clinical tasks. The largest improvement was in the area of endodontics and provision of bridgework (Lynch et al, 2010). Additionally, another study that was performed by Smith and his colleagues in 2006 supports the positive effect of the outreach programme on the dental students' confidence. They believed that the dental outreach training in primary care settings was more effective than the dental school training alone in improving the students' confidence in performing the clinical tasks. They suggested considering the primary care outreach

experiences as an adjunct to the traditional dental school-based training (Smith et al, 2006). Confidence has been considered as a crucial educational outcome as it has been linked to the clinical competence (Lynch et al, 2010; Smith et al, 2006).

The findings of these studies support the use of examining the confidence level as a component of the personalised feedback model. It was easily applied in this study through the first question at the trainer's sheet which was "How confident do you feel about successfully diagnosing/planning the treatment for this patient?". Trainers asked this scale rating question and provided the personalised feedback to their trainees based on their answers with the help of this personalised feedback model.

4.3.4.2 Goals and Plans from the Consultation Visit

Dombrowski and his colleagues in 2016 studied the relationship between plan specificity and weight loss goals. They concluded that the mixture of high weight loss goals with detailed plans for altering the dietary behaviours might be the most effective method to lose weight within a highly motivated population (Dombrowski et al, 2016). Goals were the main focus of decision making (Beach et al, 1987). Yet, little is known regarding the development of goal setting (Galotti et al, 2005).

The findings of these studies support the setting of the goals and plans as a component of the personalised feedback model. It was easily applied in this study through the second question at the trainer's sheet which was "What are your goals and plans from this consultation?". Trainers asked this question and provided the personalised feedback to their trainees based on their answers with the help of the personalised feedback model.

4.3.4.3 Keeping Track (Paying Attention) of the Diagnostic Decision Making During the Interaction

It was extremely difficult for trainers to observe all the steps from all trainees. Each trainer supervised on average four to five trainees per consultation session. Trainers supervise post-graduate dental students in addition to registrars and other dentists attending the consultation clinic. Each trainee treats a new patient at the start of the consultation session; so on average four to five patients were seen separately at the beginning of that session. Furthermore, any trainee that finished the treatment of the first patient would move to the second patient after the

approval from their trainer. So, the trainer needed to observe all their trainees treating patients and make sure that they were on the right track by checking on the main steps.

The state of mind that promotes the experience of the present moment is called mindfulness, and it was suggested to have a positive influence on performance (Marianetti et al, 2009). The findings of this study support paying attention as a component of the personalised feedback model. It was easily applied in this study through the third question at the trainer's sheet which was "Did you feel that you are able to keep track of your diagnostic decision making during the interaction? How?". Trainers asked this question and provided the personalised feedback to their trainees based on their answers with the help of the personalised feedback model.

4.3.4.4 Awareness of any Contextual Factors

Distractions, such as interruption or noise within the clinical environment, could affect the clinical decision making of complex cases (Speier et al, 1999). Moreover, time constraint for each consultation in the case of busy clinics would negatively affect the clinician decision making because of the pressure and the need to reach the treatment plan faster so that the clinician could see the following patients (Smith et al, 2008). Additionally, motivation was the most important patient factor in the clinical decision making (Bos-Touwen et al, 2017).

The findings of these studies support the use of the contextual factors as a component of the personalised feedback model. It was easily applied in this study through the fourth question at the trainer's sheet which was "Are you aware of any factors in the environment, the patient or yourself today that may influence your decision making?". Trainers asked this question and provided the personalised feedback to their trainees based on their answers with the help of the personalised feedback model. So, this model considered how trainees handled these contextual factors.

4.3.5 Phase 2: Delivering the Training Course

The one-to-one meetings had several advantages. These meetings facilitated the delivery of the knowledge that was not written, but gained through experience. These one-to-one meetings also enabled the participants to more easily learn about the skills required to perform the task (Griffith et al, 2003). Although planning and organising the one-to-one meetings could be costly and difficult, it could send a message of value to the participants (Storper et al, 2004).

Fortunately, the value of organising these one-to-one meetings outweighs the cost of utilising at least 90 minutes of consultant (trainer) time. These one-to-one meetings were easier to arrange than the group meeting of all three trainers simultaneously.

4.3.6 Phase 3: Trainers' and Trainees' Perceptions of the Personalised Feedback

Djuricich in 2004 measured the knowledge and skills of 44 internal medicine and paediatrics residents before and after implementing a quality improvement project that lasted over a month-long period. Djuricich found that the project helped in improving the registrars' knowledge and skills; however, he stated that the one-month period was not long enough to assess the impacts of the project on resident competency in certain aspects of practice-based learning and improvement (Djuricich et al, 2004). Similarly, Henley in 2002 found that a six-week course improved medical students' knowledge and confidence (Henley et al, 2002).

In this study, several consultation clinics were run on a weekly basis at LDI. A trainer would supervise on average two consultation clinics per week. The two-month study period was judged to be sufficient time to explore the effects of the personalised feedback model especially that most trainers and trainees attending the consultation clinics in that particular rotation were included. This decision was aided by the findings of Djuricich in 2004 which stated that the duration period should be over one month (Djuricich et al, 2004). It was also supported by Henley's findings in 2002 that the six-week course was efficient in improving the students' knowledge and confidence (Henley et al, 2002).

4.3.7 In-Person Structured Interviews

Trainees were asked to attend in-person structured interviews to explore their opinions regarding the personalised feedback model. The interviewer (SN) used a questionnaire to guide the interview in addition to a few open-ended questions. This allowed gathering more information as compared to only using questionnaires.

Though trainees were able to attend these interviews, trainers could not be asked to attend due to their busy schedule with clinical/research commitments. Researcher (SN) and the supervisors (RB, JT and HL) thought that excluding trainers from attending the structured interviews would make their participation in this study much easier. An agreement was settled on using second cycle questionnaires with open-ended questions to explore trainers' opinions. Little information was obtained from these second cycle questionnaires as most of the answers to the open-ended questions were short answers. The researcher (SN) believes that more information would be collected if trainers attended structured interviews.

4.3.8 Data Analysis

Two types of data were extracted from first cycle questionnaires of trainers and trainees, trainers' second cycle questionnaires and trainees' interviews. These data were quantitative and qualitative data.

4.3.8.1 Quantitative Data

Quantitative data extracted from the scale rating questions were entered into an electronic database and analysed using SPSS Statistics software (version 26). Figures were used to view these quantitative data.

4.3.8.2 Qualitative Data

Qualitative data extracted from the open-ended questions in questionnaires and transcripts of trainees' interviews were analysed using summative content analysis. Content analysis is carried out by identifying variable codes and categories of the data provided to analyse the content of these data (Grbich et al, 2013). There are three approaches to qualitative content analysis, which are conventional, directed, or summative (Hsieh et al, 2005).

In conventional content analysis, the researcher relies on the text data to generate the coding categories. Open-ended questions would help the researcher with the coding process as participants would answer freely to these open-ended questions. The researcher (SN) did not rely on this approach simply because questionnaires did not have a large number of open-ended questions.

That is not the case with directed content analysis where the researcher relies on the findings of relevant research or theory to guide them with the initial codes. This approach was not

appropriate because there is a lack of the literature regarding the effects of feedback on diagnostic decision making (Leggett et al, 2016).

The summative content analysis, on the other hand, involves identifying and counting keywords in the text with the purpose of understanding the contextual use of these keywords (Hsieh et al, 2005). Questionnaires in this study were focused on identifying the elements, such as factors, goals, plans, strengths and weaknesses. The researcher (SN) believes that counting these elements with the purpose of understanding the contextual use of these keywords would be the appropriate approach to analyse the qualitative data from the participants' responses.

Unfortunately, the findings from using summative content analysis approach are limited by counting the keywords or any other words that led to the same meaning (Hsieh et al, 2005). The researcher (SN) believes that using structured interviews played a role in limiting the findings. The structured interviews were guided by a questionnaire that contained twelve scale rating questions and five open-ended questions. The twelve scale rating questions limited the responses to just mentioning a scale rather than speaking comfortably regarding a certain point.

Alternatively, in-depth interviews could be performed to explore trainees' opinions of the personalised feedback model further, as open-ended questions are mainly used in this type of interview. As in-depth interviews are time-consuming and may discourage the participants' from being in this study, the researcher (SN) believed that structured interviews would achieve the aim of describing trainers' and trainees' views with regards the personalised feedback model.

4.4 Limitations

4.4.1 Lack of Literature

There is a lack of literature regarding the effects of feedback on diagnostic decision making (Leggett et al, 2016). Very few studies have focused on this aspect without defining the feedback in detail or mentioning the elements that were taken into considerations. Leggett in 2016 was the first to study the effects of personalised feedback on clinical decision making in the medical under-graduate students at University of Leeds (Leggett et al, 2016). No one has studied the effects of this personalised feedback model at the specialist trainee's level. As this study was conducted at a dental specialist trainee level, it was difficult to rely on only one study which was performed at the medical student's level.

4.4.2 Time Constraint

As previously noted in this thesis, time was the biggest limiting factor of continuing the use of the personalised feedback model. Trainers were asked to provide the personalised feedback using the personalised feedback model and the trainer's sheet, and as mentioned previously, this was considered an extra task that was challenging to perform at the end of the consultation clinics. Although these consultation clinics were already very busy, trainers were happy to use the model and discuss the cases with their trainees. Trainers used the model as they agreed to participate in the research. However, there is no guarantee that trainers would continue the use of the model after the research has finished.

On one hand, treating large numbers of patients at the expense of education is not preferable in these educational clinics, on the other, using a very long time to educate the trainee through the personalised feedback model at the expense of treating very small number of patients is not acceptable. There should be a balance between education and the number of patients treated since the treatment is carried out at University dental hospital clinics under the supervision of consultants and honorary in the National Health Service (NHS).

Ricer and his colleagues in 1997 aimed to quantify the cost of teaching a trainee in a family physician's office at the University of Cincinnati College of Medicine. They estimated the cost by considering the time spent in teaching in addition to the productivity, which was reflected through the number of patients seen per day with and without trainees. There was no significant difference in the number of patients seen by the physicians with or without trainees. Most of the

time spent by the physician with their trainee (3.79 hours) was spent on treating patients. The best estimate of the extra time spent by the physician would be the time used for teaching, listening to the trainee's presentations, and an estimated 20% of the time spent seeing patients with trainees. The total extra time was 1.23 hours. At a rate of $60 per hour, the cost of the extra time used by the physician would be $73.80 per day, or $1,254.60 per trainee for a typical four-week rotation (Ricer et al, 1997).

4.4.3 Trainer's Sheet

The trainer's sheet (Appendix 12) was used as a guide to deliver the personalised feedback at the end of the consultation clinics. It included four questions, as previously mentioned, with an illustration on how to provide the personalised feedback based on the trainee's answers.

However, two trainees and one trainer clearly mentioned that the third question needs to be revised as it was unclear to trainees. This question was as follows: "Did you feel that you are able to keep track of your diagnostic decision making during the interaction? How?". This question focused on the ability of the trainee to pay attention to the different steps at consultation session in order to reach an appropriate diagnosis and treatment plan. The trainer might provide some comments to the trainee to guide them reach the goal of the consultation session.

If the trainee understood these comments, they would direct their course to success. Conversely, the trainee would not know whether they were following the right pathway or not if they did not understand the comments from their trainer.

Another way of asking this question would be through inquiring about the understanding of the trainer's comments in order to adjust the pathway to success. The new question format would be: "Did you understand your trainer's comments with regards your pathway to reach an accurate diagnosis and treatment plan during the interaction? How did you adjust your pathway based on these comments?" or "Were you able to take all the factors into consideration? Factors like medical history, dental history, clinical picture, radiographs, child behaviour and parents comments in coming to a decision about the diagnosis and the treatment plan?".

4.5 Implications for Future Research

The findings from this research support the preliminary evidence for a new approach of providing feedback on clinical decision making that was provided by Leggett's thesis (Leggett et al, 2016). The findings clarify the usefulness and effectiveness of a structured approach of providing the feedback on clinical decision making. They also support the simple approach of the model to help trainers in providing the structured, personalised feedback to trainees on their clinical decision making. Furthermore, the personalised feedback model could be viewed as an applicable intervention that facilitates feedback provision in future research.

Positively, the personalised feedback model intervention is not specific to one element of performance. It can be extended to offer a structured approach that provides feedback on any element of performance, since the questions can be adjusted to focus on any skill where a trainee is observed. With additional research, the personalised feedback model has the potential to facilitate the delivery of structured feedback on specific elements of performance, aiding in the improvement of exchange of knowledge in future.

The current findings, as witnessed in this research study, are restricted to the feedback on trainees' clinical decision making at consultation clinics. They are limited by the evaluation methods and the small sample size, but they offer provisional support for the usefulness and effectiveness of the personalised feedback model and highlight the need for future research that could develop this approach further.

4.6 Conclusion

The traditional routine feedback that trainers provide to their trainees was shown to be effective to a limited extent in improving trainees' clinical decision making. Trainees believed that they received feedback routinely on different factors, such as the dental environment, characteristics of patients and the trainee factors, less than what they thought they should receive to influence their clinical decision making. On the contrary, trainers believed that they provided feedback routinely on different factors as required to influence trainees' clinical decision making.

The two major reasons for the difference in perception and reported scores with regards to trainees and trainers responses to the feedback routinely being provided at consultation clinics were time constraint and understanding the feedback. The consultation clinics were crowded most of the time and that delayed the delivery of the feedback a few days due to the lack of time. Moreover, trainees might have not fully understood the comments from their trainers or did not consider the comments during the interaction as feedback due to the fact that trainees used to receive the feedback routinely at the end of the session while trainers were authorising the dental notes.

Trainers were coached by an experienced trainer (HL) in order to start providing a more structured feedback through the personalised feedback model. This model concentrated on four components, which were: the trainee's level of confidence in their ability to perform the task, their set goals and plans for the task, their ability to pay attention throughout the consultation and the awareness of any contextual factors that may affect the clinical decision making.

Both trainers and trainees agreed that the personalised feedback was more effective in improving trainees' clinical decision making as compared to the traditional routine feedback. Trainers appreciated the trainer's sheet which guided them to provide more structured feedback. As for trainees, they appreciated the impact of the personalised feedback model on their clinical decision making. Trainees understood the influence of being confident and setting goals and plans before treating patients. Additionally, trainees acknowledged the importance of paying attention and understanding the trainer's comments throughout the interaction, which lead to an accurate diagnosis and treatment plan. Finally, both trainers and trainees considered the influence of different contextual factors in the environment, the patient or the trainee on trainees' clinical decision making. Lack of time in these busy sessions was one of the biggest limitations to using this model.

It should be acknowledged that more time for the delivery of the personalised feedback would be available through controlling the number of patients attending these clinics, and by assigning patients with complex medical histories to specific trainees in advance. Another suggestion to be considered is, with slight improvement on the trainer's sheet, printing it and having it accessible at LDI clinic as a guide for trainers could maximise the benefits from the personalised feedback model in the future.

References

Adam, L., McLean, A., Meldrum, A. & Rich, A. 2016. Guidelines for providing feedback in the clinical dental setting. Otago University Teaching Development Grant Final Report, New Zealand. Available at: https://www.otago.ac.nz/council/committees/otago610994.pdf [accessed December 2020, 1st final report].

Alexander, G., Hopcraft, M., Tyas, M. & Wong, R. 2014. Dentists restorative decision-making and implications for an 'amalgamless' profession. Part 2: a qualitative study. *Australian Dental Journal*, 59(4), 420-431.

Alexander, P., Schallert, D. & Hare, V. 1991. Coming to terms: How researchers in learning and literacy talk about knowledge. *Review of Educational Research*, 61, 315-343.

Anderson, J., Corbett, A., Koedinger, K. & Pelletier, R. 1995. Cognitive tutors: Lessons learned. *The Journal of the Learning Sciences*, 4, 167-207.

Anderson, V., Rich, A. & Seymour, G. 2011. Undergraduate dental education in New Zealand: 2007-2009 final-year student feedback on clinical learning environments. *New Zealand Dental Journal*, *3*, 85-90.

Azevedo, R. & Bernard, R. 1995. A meta-analysis of the effects of feedback in computer-based instruction. *Journal of Educational Computing Research*, 13(2), 11-127.

Balzer, W., Doherty, M. & O'Connor, R. 1989. Effects of cognitive feedback on performance. *Psychological Bulletin, 106*(3), 410-433.

Beach, L. & Mitchell, T. 1987. Image theory: Principles, goals, and plans in decision making. *Acta Psychologica*, 66(1987), 201-220.

Bhattacharyya, H., Vagha, J., Medhi, G., Pala, S., Chutia, H. & Bora, P. 2020. Introduction of structured feedback for MBBS students: Perception of students and faculty. *Journal of Education and Health Promotion*, 9, 285-291.

Boehler, M., Rodgers, D. & Schwind, C. 2006. An investigation of medical student reactions to feedback: a randomised controlled trial. *Medical Education*, 40, 746-749.

Bos-Touwen, I., Trappenburg, J., Wulp, I., Schuurmans, M. & de Wit, N. 2017. Patient factors that influence clinicians' decision making in self-management support: A clinical vignette study. *Public Library of Science One*, 12(2): e0171251.

Boud, D. & Molloy, E. 2013. Rethinking models of feedback for learning: The challenge of design. *Assessment & Evaluation in Higher Education,* 38, 698-712.

Brennan, D. & Spencer, A. 2005. The role of dentist, practice and patient factors in the provision of dental services. *Community dentistry and Oral Epidemiology*, 33, 181-195.

Brophy, J. 1981. Teacher praise: A functional analysis. *Review of Educational Research, 51*, 5-32.

Butler, D. & Winne, P. 1995. Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Research,* 65, 245-281.

Cantillon, P. & Sargeant, J. 2008. Giving feedback in clinical settings. *British Medical Journal*, 337, 1292-1294.

Chen, M-H. & Agrawal, S. 2017. Do communication barriers in student teams impede creative behaviour in the long run? - A time-lagged perspective. *Thinking Skills and Creativity*, 26, 154-167.

Coia, L. 2012. Providing quality feedback for your VDR. *NHS Education for Scotland.* Available at: https://www.nes.scot.nhs.uk/media/1533892/start-providing-quality-feedback.pdf [Accessed June 2020].

Corbett, A., Koedinger, K. & Anderson, J. 1997. Chapter 37: Intelligent tutoring systems. In M.G. Helander, T.K. Landauer & P.V. Prabhu (Second Edition), *Handbook of Human-Computer Interaction*, 849-874. Elsevier Science Limited, Amsterdam.

Correa, M., Peres, M., Horta, B., Barros, A. & Demarco, F. 2012. Amalgam or composite resin? Factors influencing the choice of restorative material. *Journal of Dentistry*, 40, 703-710.

Cotter, J., McCann, A., Schneiderman, E., De Wald, J. & Campbell, P. 2011. Factors affecting the performance of oral cancer screenings by Texas dental hygienists. *The Journal of Dental Hygiene*, 85(4), 326-334.

Coudeyre, E., Rannou, F., Tubach, F., Baron, G., Coriat, F., Brin, S., Revel, M. & Poiraudeau, S. 2006. General practitioners' fear-avoidance beliefs influence their management of patients with low back pain. *International Association for the Study of Pain*, 124, 330-337.

DaRosa, D., Dunnington, G., Stearns, J., Ferenchick, G., Bowen, J. & Simpson, D. 1997. Ambulatory teaching "lite": Less clinic time, more educationally fulfilling. *Academic Medicine*, 72(5), 358-361.

Department of Education and Communities, State of New South Wales. 2015. Types of feedback. Strong start, Great teachers – phase 3. Available at: http://www.ssgt.nsw.edu.au/documents/1types_feedback.pdf [Accessed June 2020].

Djuricich, A., Ciccarelli, M. & Swigons, N. 2004. A continuous quality improvement curriculum for residents: Addressing core competency, improving systems. *Academic Medicine*, 79(10), S65-67.

Dohrenwend, A. 2002. Serving up the feedback sandwich. *Family Practice Management*, 9, 43-46.

Dombrowski, S., Endevelt, R., Steinberg, D. & Benyamini, Y. 2016. Do more specific plans help you lose weight? Examining the relationship between plan specificity, weight loss goals, and plan content in the context of a weight management programme. *British Journal of Health Psychology*, 21, 989-1005.

Durning, S. & Artino, A. 2011. Situativity theory: a perspective on how participants and the environment can interact: AMEE Guide no. 52. *Medical Teacher,* 33, 188-199.

Earl, L. 2003. Assessment as learning: Using classroom assessment to maximise student learning. *Thousand Oaks, Corwin Press*.

Edmonds, L., Fisher, T., Pinnock, R., Gray, A., Vandervis, Z. & Gibbs, J. 2016. Evaluation of paediatric outpatient teaching clinics. Otago University Teaching Development Grant final Report, New Zealand. Available at: https://www.otago.ac.nz/council/committees/otago610994.pdf [accessed December 2020, 2nd final report].

Ende, J. 1983. Feedback in clinical medical education. *The Journal of the American Medical Association*, 250(6), 777-781.

Fry, M. & MacGregor, C. 2014. Confidence and impact on clinical decision-making and behaviour in the emergency department. *Australasian Emergency Nursing Journal*, 17(3), 91-97.

Fugill, M. 2005. Teaching and learning in dental student clinical practice. *European Journal of Dental Education, 9*, 131-136.

Galotti, K. 2005. Setting goals and making plans: How children and adolescents frame their decisions. In J. E. Jacobs & P. A. Klaczynski (Eds.), *The development of judgment and decision making in children and adolescents,* 303-326. Mahwah, NJ: Lawrence Erlbaum.

General Medical Council. 2013. Good Medical Practice. London, United Kingdom: *General Medical Council*.

Grbich, C. 2013. Qualitative data analysis: An introduction. 2nd ed. Croydon*: SAGE Publications limited.*

Grembowski, D., Milgrom, P. & Fiset, L. 1988. Factors influencing dental decision making. *Journal of Public Health Dentistry*, 48(3), 159-167.

Griffith, T., Sawyer, J. & Neale, M. 2003. Virtualness and knowledge in teams: Managing the love triangle of organisations, individuals and information technology*. Management Information Systems Quarterly*, 27(2), 265-287.

Griffiths, G. 2017. Improving feedback and reflection to improve learning. A practical guide for trainees and trainers. *Academy of Medical Royal Colleges*. Available at: http://www.aomrc.org.uk/publications/reports-guidance/improving-feedback-reflection-improve-learning-practical-guide-trainees-trainers/ [Accessed December 2020].

Hattie, J. & Timperley, H. 2007. The power of feedback. *Review of Educational Research,* 77, 81-112.

Hays, K., Thomas, O., Maynard, I. & Bawden, M. 2009. The role of confidence in world-class sport performance. *Journal of Sports Sciences*, 27(11), 1185-1199.

Henley, E. 2002. A quality improvement curriculum for medical students. *The Joint Commission Journal on Quality Improvement*, 28(1), 42-48.

Hodges, R., Atchison, K. & White, S. 2013. Impact of cone-beam computed tomography on orthodontic diagnosis and treatment planning. *American Journal of Orthodontics and Dentofacial Orthopedics*, 143, 665-674.

Howie, E., Sy, S., Ford, L. & Vicente, K. 2000. Human-computer interface design can reduce misperceptions of feedback. *System Dynamics Review, 16*(3), 151-171.

Hsieh, H. & Shannon, S. 2005. Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277-1288.

Irby, D. 1995. Teaching and learning in ambulatory care setting: A thematic review of the literature. *Academic medicine*, 70(10), 898-931.

Isaacson, J., Posk, L., Litaker, D. & Halperin, A. 1995. Resident perception of the evaluation process*. Journal of General Internal Medicine*, 10:89.

Joseph, C., Conradsson, D., Wikmar, L. & Rowe, M. 2017. Structured feedback on students' concept maps: the proverbial path to learning?. *BioMed Central Medical Education,* 17:90.

Karabenick, S. & Knapp, J. 1991. Relationship of academic help seeking to the use of learning strategies and other instrumental achievement behaviour in college students. *Journal of Educational Psychology, 83*, 221-230.

Kilminster, S. & Jolly, B. 2000. Effective supervision in clinical practice settings: A literature review. *Medical education*, 34, 827-840.

Klein, J. & Keller, J. 1990. Influence of student ability, locus of control, and type of instructional control on performance and confidence. *Journal of Educational Research*, 83(3), 140-146.

Kluger, A. & DeNisi, A. 1996. The effects of feedback interventions on performance: A historical review, a meta-analysis, and a preliminary feedback intervention theory. *Psychological Bulletin, 119*(2), 254-284.

Kruger, J. & Dunning, D. 1999. Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology,* 77, 1121-1134.

Leggett, H. 2016. Helping clinical educators provide effective feedback to medical trainees on their diagnostic decision making: An educational design research approach [PhD thesis]. Leeds, United Kingdom: University of Leeds.

Lunenburg, F. 2010. Communication: The process, barriers, and improving effectiveness. *Schooling, 1:1.*

Lynch, C., Ash, P., Chadwick, B. & Hannigan, A. 2010. Effect of community-based clinical teaching programmes on student confidence: A view from the United Kingdom. *Journal of Dental Education*, 74(5), 510-516.

Marianetti, O. & Passmore, J. 2009. Mindfulness at work: Paying attention to enhance well-being and performance. In A. Lindley (ed.), *Oxford Handbook of Positive Psychology and Work*, 189-200. Oxford, United Kingdom: Oxford University Press.

McIlwrick, J., Nair, B. & Montgometry, G. 2006. 'How am I doing?' Many problems but few solutions related to feedback delivery in undergraduate psychiatry education. *Academic Psychiatry*, 30(2), 130-135.

Newman, R. & Schwager, M. 1993. Students' perceptions of the teacher and classmates in relation to reported help seeking in math class. *Elementary School Journal, 94*, 3-17.

Nisar, P. & Scott, H. 2011. Key attributes of a modern surgical trainer: Perspectives from consultants and trainees in the United Kingdom. *Journal of Surgical Education*, 86(3), 202-208.

Oxford English dictionary, online edition. *Oxford University Press*. Available at: http://oed.com [accessed November 2020].

Patel, P. 2016. An evaluation of the current patterns and practices of educational supervision in post-graduate medical education in the UK. *Perspectives on Medical Education*, 5, 205-214.

Patel, R., Tarrent, C., Bonas, S., Yates, J. & Sandars, J. 2015. The struggling student: A thematic analysis from the self-regulated learning perspective. *Medical Education*, 49(4), 417-426.

Pendleton, D., Schofield, T., Tate, P. & Havelock, P. 2003. The consultation: An approach to learning and teaching. Oxford: *Oxford University Press*.

Phillips, A., Lim, J., Madhavan, A. & Macafee, D. 2016. Case-based discussions: UK surgical trainee perceptions. *The Clinical Teacher*, 13, 207-212.

Puschmann, T. 1966. A history of medical education. *New York: Hafner Publishing* [Originally published 1891].

Rangel, B., Chung, W., Harris, B., Carpenter, N., Chiaburu, D. & Moore, J. 2015. Rules of engagement: the joint influence of trainer expressiveness and trainee experiential learning style on engagement and training transfer. *International Journal of Training and Development*, 19(1), 18-29.

Ricer, R., Horne, A. & Filak, A. 1997. Costs of preceptors' time spent teaching during a third-year family medicine outpatient rotation. *Academic Medicine*, 72(6), 547-551.

Richardson, G. 1991. Feedback thought in social science and systems theory. Philadelphia: *University of Pennsylvania Press*.

Robers, C., Cox, C., Reintgen, D., Baile, W. & Gibertini, M. 1994. Influence of physician communication on newly diagnosed breast patients' psychologic adjustment and decision-making. *CANCER Supplement*, 74, 336-341.

Roney, C., Higgins, T. & Shah, J. 1995. Goals and framing: How outcome focus influences motivation and emotion. *Society for Personality and Social Psychology*, 21(11), 1151-1160.

Ryn, M. & Burke, J. 2000. The effect of patient race and socio-economic status on physicians' perceptions of patients. *Social Science & Medicine*, 50, 813-828.

Sadler, D. 1989. Formative assessment and the design of instructional systems. *Instructional Science,* 18, 119-144.

Sagasser, M., Kramer, A., Fluit, C., Weel, C. & Vleuten, C. 2017. Self-entrustment: How trainees' self-regulated learning supports participation in the workplace. *Advances in Health Sciences Education,* 22, 931-949.

Sargeant, J., Mann, K. & Lockyer, J. 2007. Facilitated reflection: A strategy for aiding performance feedback acceptance and use. *Poster presentation at the Association for Medical Education in Europe*, August 25-29, 2007, Trondheim, Norway. Abstracts.

Schartel, S. 2012. Giving feedback - An integral part of education. Best practice & research. *Clinical Anaesthesiology*, 26, 77-87.

Sender-Liberman, A., Liberman, M., Steinert, Y., McLeod, P. & Materissian, S. 2005. Surgery residents and attending surgeons have different perceptions of feedback. *Medical Teacher*; 27 (5), 470-472.

Skeff, K., Bowen, J. & Irby, D. 1997. Protecting time for teaching in the ambulatory care setting. *Academic Medicine*, 72(8), 694-697.

Skidmore, K., Brook, K., Thomson, W. & Harding, W. 2006. Factors influencing treatment time in orthodontic patients. *American Journal of Orthodontics and Dentofacial* Orthopedics, 129, 230-238.

Smith, M., Higgs, J. & Ellis, E. 2008. Factors influencing clinical decision making. In: Higgs, J., Jones, M., Loftus, S. & Christensen, N. (eds.), *Clinical reasoning in the health professions*, 89-100, 3rd ed. Amsterdam: Butterworth Heinemann.

Smith, M., Lennon, M., Brook, A. & Robinson, P. 2006. A randomised controlled trial of outreach placement's effect on dental students' clinical confidence. *Journal of Dental Education*, 70(5), 566-570.

Speier, C., Valacich, J. & Vessey, I. 1999. The influence of task interruption on individual decision making: An information overload perspective. *Decision Sciences*, 30(2), 337-360.

Storper, M. & Venables, A. 2004. Buzz: Face-to-face contact and the urban economy. *Journal of Economic Geography*, 4, 351-370.

Swart, E., Nielen, T. & Jong, M. 2019. Supporting learning from text: A meta-analysis on the timing and content of effective feedback. *Educational Research Review,* 28, 1-23.

Van De Ridder, J., Stokking, K., Mcgaghie, W. & Ten Cate, O. 2008. What is feedback in clinical education? *Medical Education,* 42, 189-197.

Vealey, R. & Campbell, J. 1988. Achievement goals of adolescent figure skaters: Impact of self-confidence, anxiety and performance. *Journal of Adolescent Research*, 3, 227-243.

Victoroff, K. & Hogan, S. 2005. Students' perceptions of effective learning experiences in dental school: A qualitative study using a critical incident technique. *Journal of Dental Education, 70*(2), 124-132.

Williams, N., Whittle, J. & Gatrell, A. 2002. The relationship between socio-demographic characteristics and dental health knowledge and attitudes of parents with young children. *British Dental Journal,* 193, 651-654.

Winne, P. & Butler, D. 1994. Student cognition in learning from teaching. In T. Husen & T. Postlethwaite (Eds.), *International encyclopaedia of education* (2nd ed.), 5738-5745. Oxford, England: Pergamon.

Xakellis, G., Gjerde, C., Xakellis, M. & Klitgaard, D. 1996. A break-even analysis of optimum faculty assignment for ambulatory primary care training. *Academic Medicine*, 71(12), 1337-1343.

APPENDICES

Appendix 1: The Personalised Feedback Model

The PFM Handbook

How to use the Personalised Feedback Model

A Model for Giving Effective Feedback to Dental Trainees on Their Decision Making after Initial Dental Consultations with Children

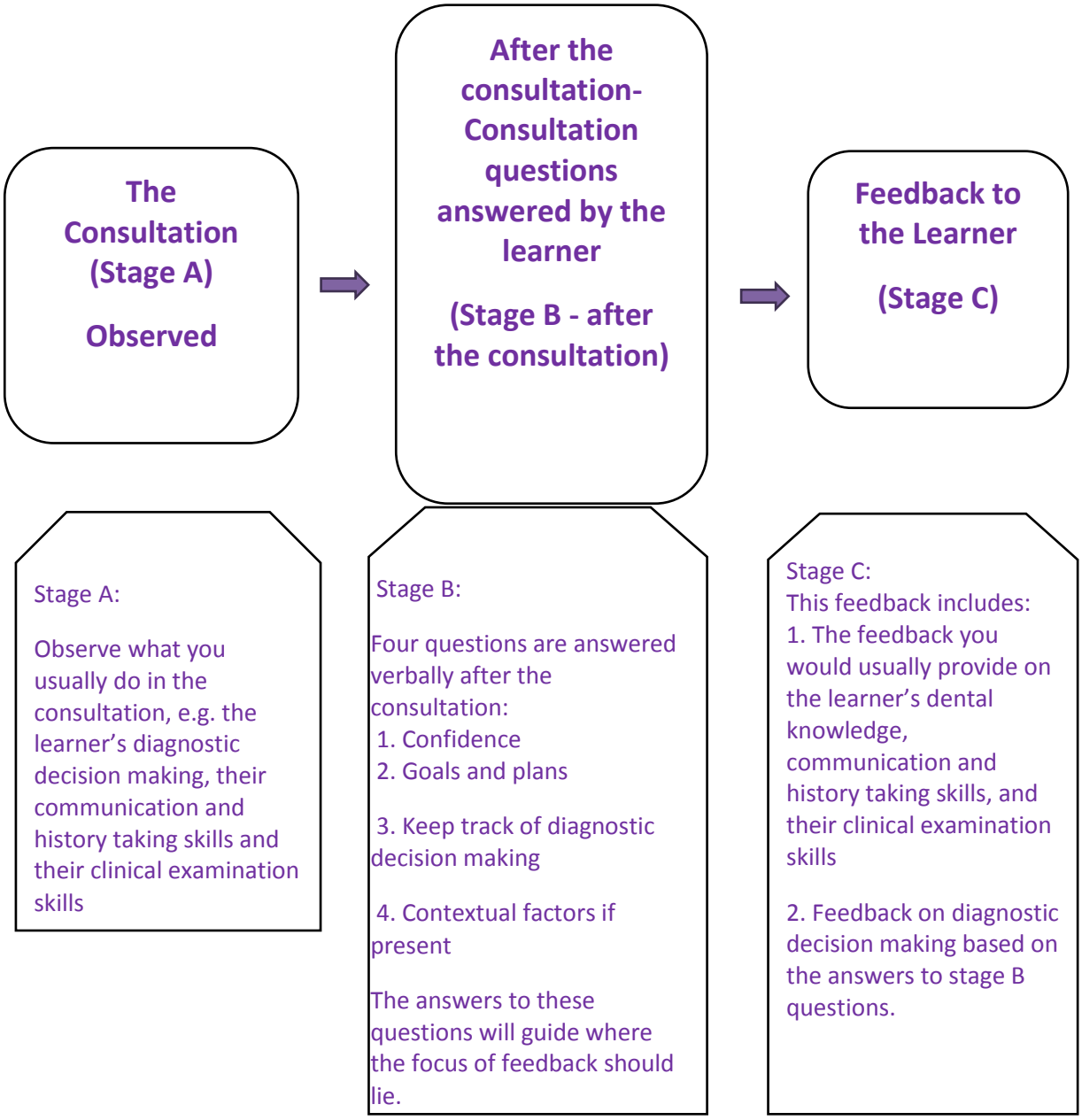
The Model

The Personalised Feedback Model is designed to equip you with a more structured and focused method of providing feedback to dental trainees after diagnostic decision making. It is designed to be utilized in line with your current methods and style of teaching and providing feedback. However, it adds an extra layer of detail and personal information for the learner. **The model does not promote a specific way of teaching diagnostic decision making and is to be used alongside your usual feedback provision but in relation to diagnostic decision making- not consultation skills in general**. It is suggested that using the model to provide feedback is employed at least once a week in a planned session where you can spend a few moments longer than usual feeding back to the learner. The diagram outlines the feedback model. It entails the following:

a. The consultation is observed by yourself.

b. After the consultation, before you provide feedback the learner will answer four questions regarding the consultation and their diagnostic decision making (these are shown below). The learners' answers to these questions will then influence what feedback is provided on their diagnostic decision making and where the focus of the feedback should lie.

c. You provide individualised feedback to the learner in a private setting. Invite them to reflect on their performance in the consultation as a whole, including their diagnostic decision making.



Collecting Information from the Trainee

The trainee should answer the four questions verbally at the end of consultation. This is to limit the disruption between yourself and the learner to the consultation. The trainee should answer four questions at the end of the consultation (stage b). The flow diagrams which follow demonstrate how the answers will then influence what information is fed back to the learner in terms of their diagnostic decision making.

The specific questions are shown in the worksheet at the end of this document but they are also outlined below:

Post consultation questions- (Stage b):

1. Confidence in ability to make a successful diagnostic decision in the consultation.
2. In terms of diagnostic decision making-what the trainee intended to achieve (goals) and how they intended to achieve this (plans).
3. Awareness of the trainee's ability to self-observe or keep track of his diagnostic decision making during the consultation.
4. Awareness of any contextual factors in the environment, the patient or the trainee that may influence diagnostic decision making in a positive or negative way.

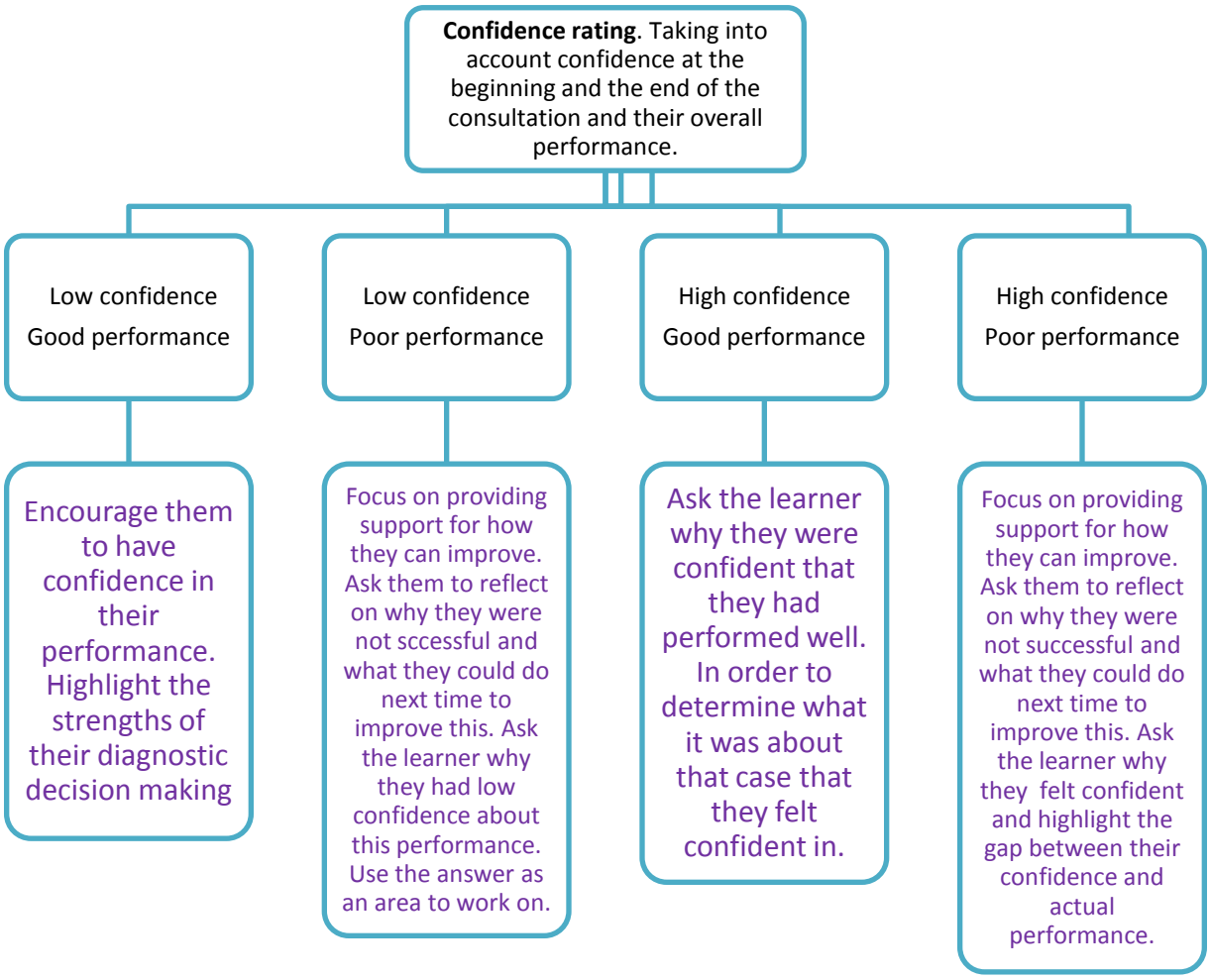
Giving Feedback

It is important to note that **you should still give the learner feedback as you usually would. This includes feedback regarding their dental knowledge**, **their communication and history taking skills**, **their clinical examination skills and the extent to which their differential diagnosis is correct.** The Personalised Feedback Model can be viewed as providing envelope of additional feedback on diagnostic decision making.

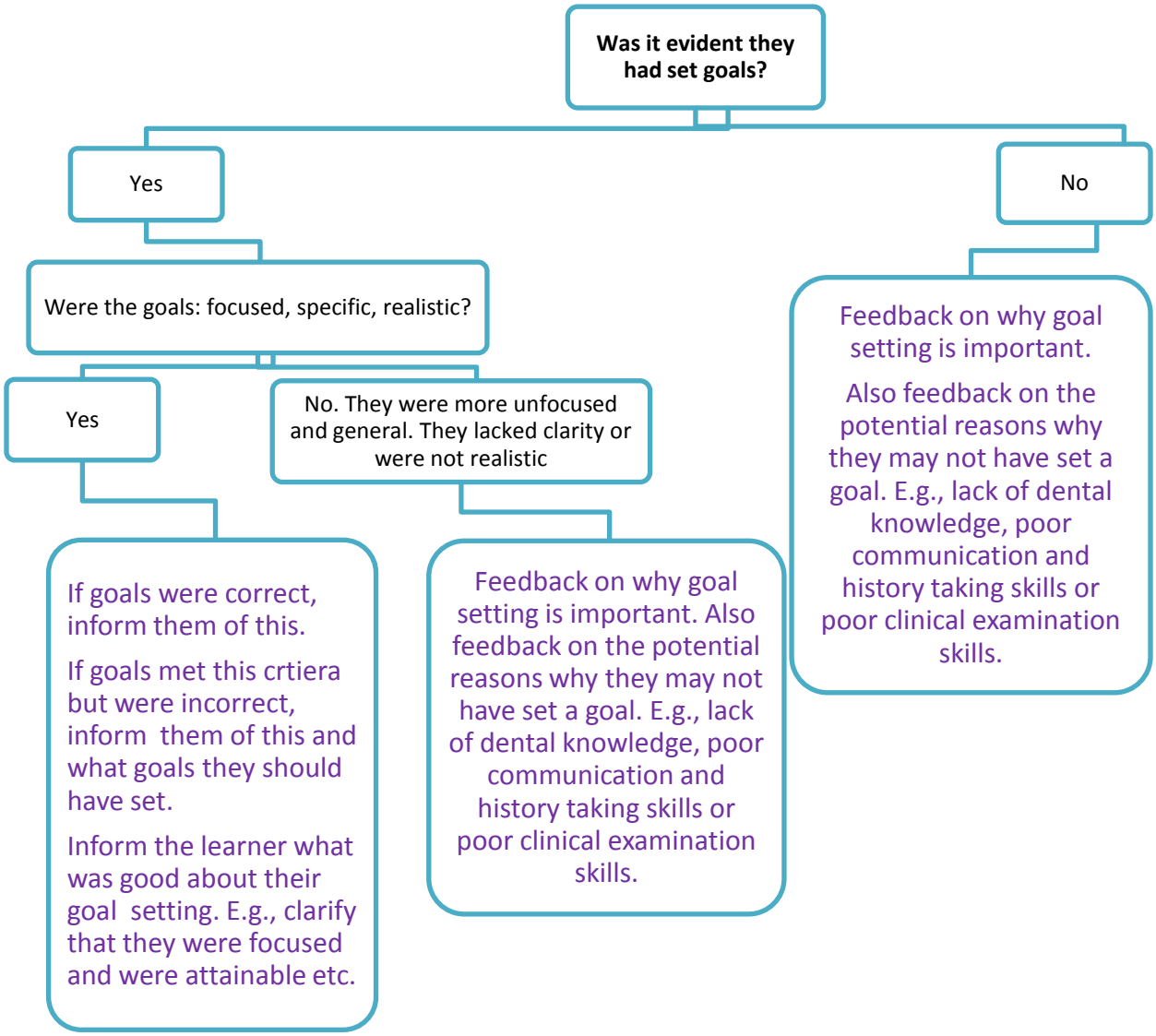
After providing feedback as you normally would, you can use the flowcharts as a guide to use the learners' answers to the questions (described above) to determine the focus of your feedback.

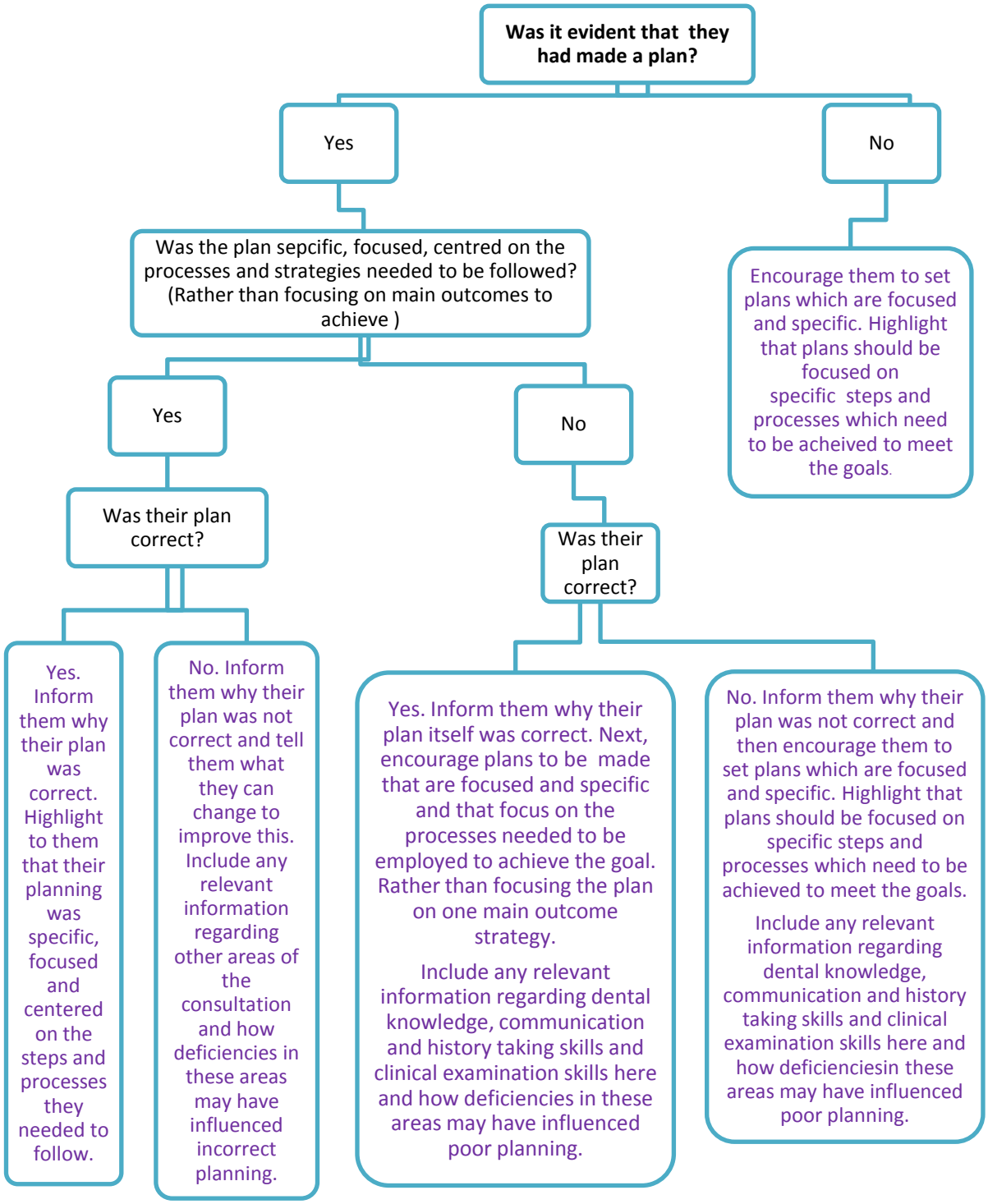
There is also a more detailed explanation behind the importance of each of the four areas which may help you in providing feedback. You may find this is a lot of information to take in; before you first use this model you may find it useful to read this booklet, the flowcharts in particular, a few times.

Questions 1: Assessing Confidence and How it Relates to Actual Performance

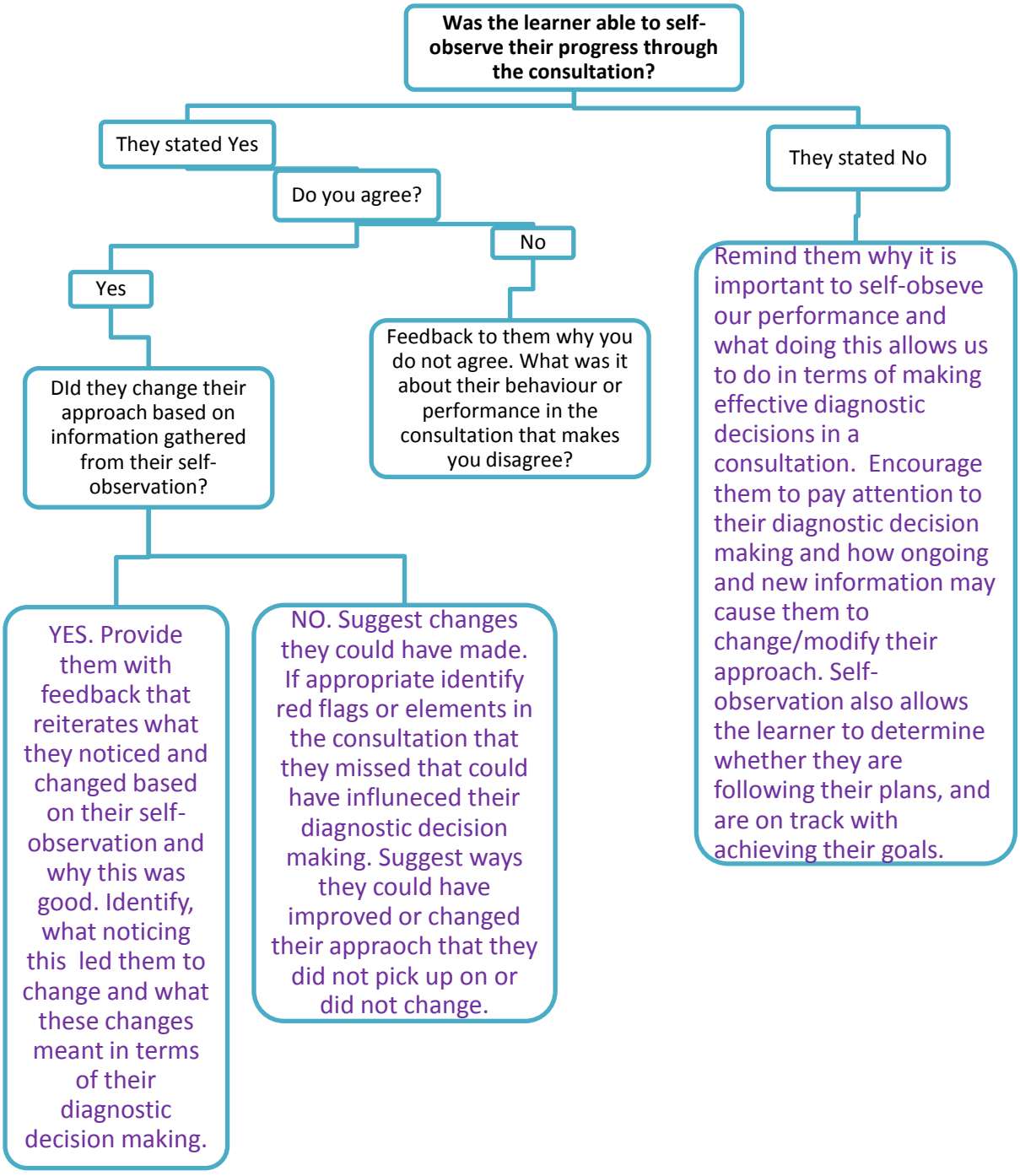


Question 2. Whether the Learner Set Goals and Plans e.g., an Appropriate Diagnosis and Treatment Plan

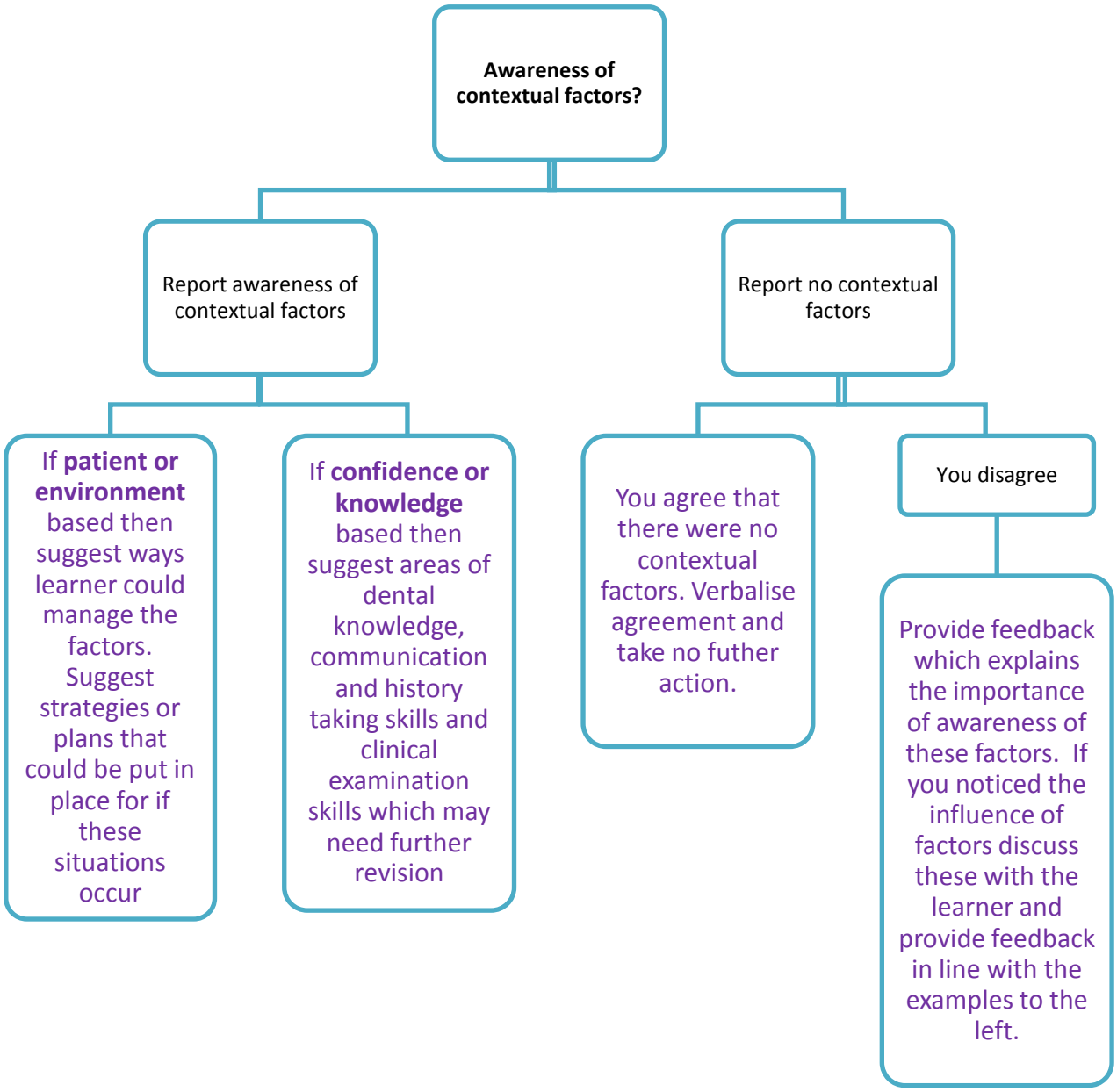



Was it evident that they had made a plan?
Yes
No
Encourage them to set plans which are focused and specific. Highlight that plans should be focused on specific steps and processes which need to be acheived to meet the goals.
Was the plan sepcific, focused, centred on the processes and strategies needed to be followed? (Rather than focusing on main outcomes to achieve)
Yes
No
Was their plan correct?
Was their plan correct?
Yes. Inform them why their plan was correct. Highlight to them that their planning was specific, focused and centered on the steps and processes they needed to follow.
No. Inform them why their plan was not correct and tell them what they can change to improve this. Include any relevant information regarding other areas of the consultation and how deficiencies in these areas may have influenced incorrect planning.
Yes. Inform them why their plan itself was correct. Next, encourage plans to be made that are focused and specific and that focus on the processes needed to be employed to achieve the goal. Rather than focusing the plan on one main outcome strategy.
Include any relevant information regarding dental knowledge, communication and history taking skills and clinical examination skills here and how deficiencies in these areas may have influenced poor planning.
No. Inform them why their plan was not correct and then encourage them to set plans which are focused and specific. Highlight that plans should be focused on specific steps and processes which need to be achieved to meet the goals.
Include any relevant information regarding dental knowledge, communication and history taking skills and clinical examination skills here and how deficienciesin these areas may have influenced poor planning.

Question 3. Were they Able to Keep Track of their Diagnostic Decision Making During the Interaction?



Question 4: Whether the Learner is Aware of any Contextual Factors that may Influence their Diagnostic Decision Making.



Additional Feedback Points to Remember.

In addition to the above, the following factors are important in providing effective personalised feedback.

- You must provide feedback as you usually would on the learners' dental knowledge, communication and history taking skills, their clinical examination skills and the extent to which their differential diagnosis is correct.
- This feedback model provides an envelope of feedback provision in addition to the feedback you usually provide.

- Feedback is provided on the plans and goals that were set by the learner.
- Feedback is provided that focuses on the strategies and processes that the learner employed in order to achieve the diagnostic decision making.
- Feedback is provided on whether the learner was self-monitoring their performance and was able to adapt to any changes within the consultation.
- Feedback corrects or clarifies any mistakes the learner may have made. Real life examples could be used to explain your points.
- Feedback takes into account how confident the learner is and whether they felt their diagnostic decision making was influenced by their knowledge or previous experience.
- Feedback is provided on the potential influence of the environment and the patient characteristics on the diagnostic decision making.
- Feedback should be provided as soon after the event as possible in a private setting by an individual who has observed the learner.
- Feedback should be specific so that the learner can reflect on it.

Why is it Important to Provide Feedback with a Focus on these Points?

The following section explains why it is important to provide feedback on each of the four areas the learner is questioned on. This section explains why feedback with a focus on these areas will aid the individuals learning and performance. For each area the information helps to direct you toward knowing what feedback to provide and why this is important. The reasons and examples can be used in the feedback you provide.

Why is it Important to Set Specific Goals and Plans?

- It is most advantageous if a learner sets specific, process orientated goals.
- It is also beneficial that they think and plan in terms of strategies during task preparation and goal setting.

- This encourages the learner to focus on the processes and sequence of their actions that they need to do rather than just focusing on the outcome that they are aiming for. This stops them from being blinded by/or hampered by things that crop up/throw them in the consultation.

- It is important to set specific goals to achieve/meet at the beginning of a consultation. Goals will serve to motivate the learner by providing them with something to aim toward and provides them with standards that they can measure themselves against.

    - Example of a specific goal and plan- "*My goal is to develop a better idea of what may be causing the toothache at night experienced by the patient. This will assist me in diagnosing him and developing a treatment plan. To do this, I will take a detailed history and carry out a clinical exam. Depending on the outcome of these approaches I will decide on the need and the types of radiographs required in reaching an accurate diagnosis and treatment plan"*.

    - Example of a vague, outcome focused goal and plan-*"My goal is to diagnose the patient. I plan to do this by taking a history and using my dental knowledge".*

- However, deficiencies in the learners' dental knowledge may negatively influence their goal setting or planning despite their best efforts. Additionally, poor communication, history taking skills or clinical examination skills may also reduce the effectiveness of the learners' goals.

- If the learner has poor dental knowledge, poor communication and history taking skills or poor clinical examination skills then this may influence the processes and strategies they are able to plan for and the effectiveness of these. Consequently, these other areas of the consultation need to be taken into account when providing the learner with feedback on their goal setting. E.g., is their goal setting and planning effective but let down by their lack of dental knowledge?

Why is it Important to Recognise the Potential Impact of Contextual Factors on Diagnostic Decision Making?

- Contextual factors are evident in everyday life. They include various factors within the setting itself, the characteristics of the patient or how we feel about ourselves at that moment in time.
- These factors may act as distractors or influences and may potentially affect the learners thought patterns, their reasoning and their diagnostic decision making.
- Sometimes the learner may notice these and sometimes they may not. Sometimes they may realise they have been influenced or their diagnostic decision making has been affected and other times they would not.

- The learner needs to be encouraged to focus on these contextual factors when making diagnostic decisions so that they can recognise the affect they may have or be having on their diagnostic decision making and thus take steps to limit their influence.
    - Sometimes this may result in a change in practice *e.g., (Noise in the setting)"I get distracted by the people outside if we leave the window open"- solution; shut the window*.
    - Other times this may be a mental reminder to oneself to not let that factor (*patient presenting characteristics)* influence their decision making e.g., *the mother of this cooperative patient was pushing to do all treatment in one visit under general anaesthesia although dental treatment can be carried out under local anaesthesia but in multiple visits.*

Why is it Important to Keep Track of their Diagnostic Decision Making During the Interaction?

- Self- observation of one's performance enables the learner to be aware of their progress through the consultation, the processes involved and the outcomes of the consultation.

- This enables the learner to evaluate the effects of their progress and whether they need to make any modifications to the strategies/process/plan they are using/following. These may include the way in which they take a history from the patient, the way they examine them, or the examination they perform.

- This enables the learner to make effective decisions in the consultation and for them to be aware of the mistakes that may have been made.

- If the learner does not monitor their progress they may not be aware of any modifications or changes they need to make to the strategies and processes they are using. This makes it more likely that their decisions will be less effective and they may be less aware of mistakes made since they have missed information and other pathways they could have taken.

- If they have not self-observed and are not aware of this information then any self-reflection on the consultation and their decision making will be less robust.

    - Example of someone who was self-observing- "*The patient presented with a dental pain in the upper right quadrant. My initial thought was that the mobile URE is the cause of this pain. However, the patient mentioned that he experienced this pain at night and it lingers after cold water. Based on this information, I thought that the mobile URE would be less likely, and so steered the consultation toward a possible small occlusal cavity affecting UR6 that needs to be investigated by BW's radiographs".*

      This dental trainee recognised the significance of the pain at night and that it lingers after cold water and so went onto further investigation (BW's radiographs) to determine the cause of the pain.

- Example of someone who was not self-observing- *"The patient presented with a dental pain in the upper right quadrant. The pain affected patient's sleeping and lingered after cold water. The patient had a mobile URE and a small occlusal cavity affecting UR6. However, I still think that the mobile URE is the cause of this pain".*

  Although this dental trainee knows that dental pain affected sleeping and lingers after cold water, he failed to integrate this information into their diagnostic reasoning, and did not pursue any other potential causes of the dental pain.

- Again, deficiencies in the learners' dental knowledge, communication or history taking skills or clinical examination skills may also reduce the learners' ability to effectively modify their use of processes and strategies. Consequently, these other areas of the consultation need to be taken into account when providing the learner with feedback on their self-observation.

Why is it Important to have an Accurate Sense of Self-Confidence?

- It is important that the learner has the confidence in themselves that they have the knowledge to have gone through the correct processes in making diagnostic decisions, it is equally important however, for them to be cautious when making decisions in case they are over confident in their perceived knowledge and abilities.

- Low confidence may cause the learner to attempt less, as they assume they cannot reach a set goal. This in turn may cause poorer performance and thus confirming their low confidence.

- Individuals with low confidence and who underperform are also in danger of not noticing the extent of their underperformance if this lack of knowledge means they fail to understand why they are underperforming or how to improve.
- High confidence can be detrimental to a learner if their knowledge or skills are actually poorer than they perceive them to be. Consequently, they may be less likely to recognise when they have underperformed. Such individuals may ignore signs of underperformance or classify them as a one off. Thus failing to identify and improve on weaknesses.

Why is this an Important Area for Dental Education?

Making a diagnosis is the cornerstone of being a competent dental practitioner. Providing learners with feedback on their diagnostic decision making is an essential method by which this skill can be improved. However, the most effective methods by which to provide feedback are not clear.

Recent research has highlighted the importance of the focus of feedback in influencing whether it is effective in helping the learner improve their performance. This focus includes the specific aspects of the performance on which feedback is provided and the external factors in the authentic clinical setting that the feedback takes into account. Specifically, feedback with a focus on the following factors appears to be important in making feedback effective; feedback on the task itself, feedback on the goals set and

plans made, feedback on the processes and strategies used to complete the task, and feedback on the learners self-monitoring of their performance and reflection. The authentic clinical setting also influences decision making and feedback since there are numerous elements that may influence how the diagnosis and decision to act is made. These can derive from the patient, the environment or the learner themselves. Consequently it is important that feedback takes these contextual factors into account.

Worksheet

I would like you to ask trainees these questions and give them feedback according to their answers.

Trainee 1:

- At the end of consultation

1. How confident do you feel about successfully diagnosing/planning the treatment for this patient? (Confidence score from 1 to 5) 1= Not very confident 5= Very confident	* **Low confidence/good performance:** encourage them + highlight the strength of their diagnostic decision making. * **Low confidence/poor performance:** support + ask why and give feedback * **High confidence/good performance:** approve * **High confidence/poor performance:** support + ask why and give feedback
2. What are your goals and plans from this consultation?	**Goals:** **Plans:**

3. Did you feel that you are able to keep track of your diagnostic decision making during the interaction? How?	
4. Are you aware of any factors in the environment, the patient or yourself today that may influence your decision making?	• **Environmental factors:** Time constraint, noise, location • **Patient factors:** Stereotype of patient/parents, communication barriers • **Trainee's factors:** Confidence, perceived lack of dental knowledge • **Others:**

Appendix 2: DREC Ethical Approval (part one: 4 July 2018)

Dear Salman

DREC ref: 220518/SN/255
Study title: Evaluation of providing trainees with personalised feedback on their decision making after initial dental consultations with children

Thank you for submitting your amended documents to the Dental Research Ethics Committee (DREC). Your application has been reviewed and I am pleased to inform you that it has been approved.

- Please ask one of your supervisors to sign on page of the attached ethics form and return to me for our records.

Documents reviewed

Document name	Version number and date
Ethics application form	Dated 02.07.2018
Research protocol	Version 1 02.03.2018
Information sheet for trainers	Version 1 12.02.2018
Information sheet for trainees	Version 1 12.02.2018
Consent form	Version 1 12.02.2018
Questionnaires	Version 1 12.02.2018

With best wishes for the success of your project.

Please note: You are expected to keep a record of all your approved documentation, as well as documents such as sample consent forms, signed consent forms, participant information sheets and all other documents relating to the study, including risk assessments. This should be kept in your study file, and may be subject to an audit inspection. If your project is to be audited, you will be given at least 2 weeks' notice.

It is our policy to remind everyone that it is your responsibility to comply with Health and Safety, Data Protection and any other legal and/or professional guidelines there may be.

Kind regards
For and on behalf of
Dr Julia Csikar
DREC Chair

Appendix 3: DREC Ethical Approval (part two: 7 September 2018)

Dear Salman

DREC ref: 220518/SN/255
Study title: Evaluation of providing trainees with personalised feedback on their decision making after initial dental consultations with children

Thank you for submitting the amendment for the above ethics application. I am pleased to inform you that the amendment has been accepted by the Dental Research Ethics Committee.

Documents reviewed:

Document name	Version number and date
Questionnaire – trainers	Version 2 05/09/2018
Questionnaire – trainees	Version 2 05/09/2018

With best wishes for the success of your project.

For and on behalf of
Dr Julia Csikar
DREC Chair

Appendix 4: Consent Form

University of Leeds - school of dentistry

Tel. +44 (0) 113 343 7497

Study Number: 1

Participant Identification Number for this trial:

CONSENT FORM

Evaluation of Providing Trainees in paediatric dentistry with personalised feedback on their decision making after initial dental consultations with children

Name of Researcher: Dr. Salman A. Nakhi

	Please initial box
• I confirm that I have read the information sheet dated 12/02/2018 Version 1 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	☐
• I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected.	☐
• I understand that relevant sections of data collected during the study, may be looked at by individuals from University of Leeds, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.	☐
• I understand that the information collected about me will be used to support other research in the future, and may be shared anonymously with other researchers.	☐
• I agree to take part in the above study.	☐

Name of Participant	Date	Signature

Appendix 5: Participant Information Sheet (Trainees)

Participant Information Sheet

UNIVERSITY OF LEEDS

Understanding feedback

We would like to invite you to take part in a research project. Before you decide to take part, it is important for you to understand why the research is being carried out and what it would involve for you. Please take the time to read the following information carefully. Ask us if there is anything that is not clear or if you would like more information. This sheet tells you about the purpose of this project and what will happen if you take part.

What is the purpose of this research?

We would like to invite you to take part in this study which aims to evaluate whether providing trainees in paediatric dentistry with personalised feedback on their clinical decision making would improve their clinical decision making for children.

Who is doing the research?

The study is being undertaken by one of the postgraduate students in paediatric dentistry at the University of Leeds, School of Dentistry.

Why have I been asked to participate?

You have been chosen because as a trainee in the paediatric dentistry programme at the University of Leeds, you are receiving feedback regularly from your supervisors regarding your clinical decision making in consultations with children.

Do I have to take part?

The study is entirely voluntary. You do not have to take part and it will not affect you in any way.

What will happen to me if I agree to take part?

If you agree to take part, you will be asked to complete a questionnaire in the consultant clinic divided into three sections; before seeing the patient, after seeing the patient and after the supervisor's feedback. The questionnaire is estimated to take between ten minutes in total. Then, a one-to-one interview after the supervisor's feedback will take place in another consultant clinic after five to six weeks. The interview, which is guided by a questionnaire, will take around ten minutes. All conversations in the interview will be audio-taped and transcribed at a later stage and will remain confidential. If during the interview you feel uneasy in any way or worried, you can refuse to answer the questions and can leave at any time without giving an explanation. You will be asked to sign a consent form to confirm you are happy to take part. You will be given a copy of the information sheet and signed consent form to keep.

What are the benefits/disadvantages of taking part?

It will take time out of your day, but every effort will be made to minimise the inconvenience and ensure your comfort. It is hoped that this work will explore the beneficial impact of personalised feedback and how it can improve dental trainees practice in the paediatric consultant clinic.

Can I withdraw from the study at any time?

If you do take part and then change your mind afterwards you can withdraw from the study at any time up until the conversations have been transcribed from the audio recording.

Will the information obtained in the study be kept confidential?

All the information that we collect about you during the course of the research will be kept strictly confidential. You will not be able to be identified or identifiable in any reports or publications. Data collected may be shared in an anonymised form to allow reuse by the research team and other third parties. These anonymised data will not allow any individuals to be identified or identifiable. Any information that might personally identify you from the interview will be removed from the written record and the audio recording will be destroyed. Only members of the research team will have access to the data which will be stored securely at the University of Leeds and handled in strict accordance with the 1998 Data Protection Act.

What will happen to the findings of the study?

At the end of the study we will publish our findings in professional and academic journals and you will not be identified in any report or publication. If you would like a copy of any publication arising from this research to read for yourself, please contact us. I am conducting this study to complete my degree in professional doctorate in paediatric dentistry.

What if there is a problem?

If you have any concerns about this study please contact a member of the research team in the first instance. If you are unhappy about any part of this project or any activity of a member of the research team and wish to complain formally, you can do this by contacting Dr Jinous Tahmassebi (Tel. +44 (0)113 343 3955 or email: j.tahmassebi@leeds.ac.uk) or Dr Richard Balmer on r.c.balmer@leeds.ac.uk

Who has reviewed this study?

This study has been reviewed by the University of Leeds Dental Research Ethics Committee.

What happens now?

If you decide you would like to take part in this study, please complete the consent form attached. You can keep this information sheet.

Thank you for taking time to read this information sheet and consider this study. If you would like to discuss the study or require further information please contact me at the email address below.

If you agree to take part, would like more information or have any questions or concerns about the study please contact
- Dr Salman Nakhi on dnsan@leeds.ac.uk
- Dr Richard Balmer on r.c.balmer@leeds.ac.uk
- Dr Heather Leggett on h.leggett@leeds.ac.uk
- Dr Jinous Tahmassebi on j.tahmassebi@leeds.ac.uk

Thank you for taking the time to read this information sheet.

Appendix 6: Participant Information Sheet (Trainers)

Participant Information Sheet

UNIVERSITY OF LEEDS

Understanding feedback

We would like to invite you to take part in a research project. Before you decide to take part, it is important for you to understand why the research is being carried out and what it would involve for you. Please take the time to read the following information carefully. Ask us if there is anything that is not clear or if you would like more information. This sheet tells you about the purpose of this project and what will happen if you take part.

What is the purpose of this research?

We would like to invite you to take part in this study which aims to evaluate whether providing trainees in paediatric dentistry with personalised feedback on their decision making would improve their clinical decision making in consultations for children.

Who is doing the research?

The study is being undertaken by one of the postgraduate students in paediatric dentistry at the University of Leeds, School of Dentistry.

Why have I been asked to participate?

You have been chosen because as a supervisor at consultant clinic at Leeds dental institute, you are providing feedback regularly for your trainees in paediatric dentistry at university of Leeds regarding their clinical decision making in consultations with children.

Do I have to take part?

The study is entirely voluntary. You do not have to take part and it will not affect you in any way.

What will happen to me if I agree to take part?

If you agree to take part, you will be asked to complete two questionnaires, these should take about 15 minutes each. After completing the first questionnaire, we will arrange a convenient time and location where you will be asked to attend a training session which is estimated to take 30 minutes. At this training session, we will explain how to give personalised feedback. After this session you will be expected to use the personalised feedback model with your trainees in the consultant clinic in paediatric dentistry. Finally, we will request you to complete the second questionnaire five to six weeks after the training session.

What are the benefits/disadvantages of taking part?

It will take time out of your day, but every effort will be made to minimise the inconvenience and ensure your comfort. It is hoped that this work will estimate the beneficial impact of the personalised feedback and how it can improve dental trainees practice in the paediatric consultant clinic.

Can I withdraw from the study at any time?

If you do take part and then change your mind afterwards you can withdraw from the study at any time.

Will the information obtained in the study be kept confidential?

All the information that we collect about you during the course of the research will be kept strictly confidential. You will not be able to be identified or identifiable in any reports or publications. Data collected may be shared in an anonymised form to allow reuse by the research team and other third parties. These anonymised data will not allow any individuals to be identified or identifiable. Only members of the research team will have access to the data which will be stored securely at the University of Leeds and handled in strict accordance with the 1998 Data Protection Act.

What will happen to the findings of the study?

At the end of the study we will publish our findings in professional and academic journals and you will not be identified in any report or publication. If you would like a copy of any publication arising from this research to read for yourself, please contact us. I am conducting this study to complete my degree in professional doctorate in paediatric dentistry.

What if there is a problem?

If you have any concerns about this study please contact a member of the research team in the first instance. If you are unhappy about any part of this project or any activity of a member of the research team and wish to complain formally, you can do this by contacting Dr Jinous Tahmassebi (Tel. +44 (0)113 343 3955 or email: j.tahmassebi@leeds.ac.uk) or Dr Richard Balmer on r.c.balmer@leeds.ac.uk

Who has reviewed this study?

This study has been reviewed by the University of Leeds Dental Research Ethics Committee.

What happens now?

If you decide you would like to take part in this study, please complete the consent form attached. You can keep this information sheet.

Thank you for taking time to read this information sheet and consider this study. If you would like to discuss the study or require further information please contact me at the email address below.

If you agree to take part, would like more information or have any questions or concerns about the study please contact

- Dr Salman Nakhi on dnsan@leeds.ac.uk
- Dr Richard Balmer on r.c.balmer@leeds.ac.uk
- Dr Heather Leggett on h.leggett@leeds.ac.uk
- Dr Jinous Tahmassebi on j.tahmassebi@leeds.ac.uk

Thank you for taking the time to read this information sheet.

Appendix 7: <u>Trainees'</u> First Cycle Questionnaires

Questionnaires to Assess the PFM: Trainees (1st form)

Before the clinical interaction

1. **How confident do you feel in your ability to make a successful diagnostic decision in this case? (Circle the number)**

   1= Not very confident. 5= Very confident. 1 - 2 - 3 - 4 - 5

2. **Are you aware of any factors related to the clinical environment, the patient or yourself today that may influence your decision making either in a positive or negative way?**

☐ Yes: What are these? There are some areas of factors listed below.
<u>If yes: please circle any that are relevant to you.</u>

Noise in the setting | Time constraint | Location of consultation
Communication barriers | Stereotype of patient | Confidence
Perceived lack of knowledge
Other factors? (List please)
……

☐ No: Why not?

After the clinical interaction

3. **What are your goals in terms of your diagnostic decision making in the clinical interaction and how are you planning to achieve these goals?**

   Goals:.....
   ……
   Plans:……
   ……

4. **Did you feel that you are able to self-observe or keep track of your diagnostic decision making during the interaction? If so were you able to gauge whether you were on the right track?**

☐ Yes**: Did you change your approach during the consultation based on this?**

If yes: **How?**

..……

……

☐ No: why do you think this was? …….....

If no: **Why did you not change your approach?**

……..……

5. **How confident do you feel in your ability to make a successful diagnostic decision in similar cases to this one in the future?**

   1= Not very confident. 5= Very confident. 1 - 2 - 3 - 4 - 5

If your confidence has changed since the beginning of the consultation, either increased or decreased, why do you think this change may have occurred? For example, what has made you more or less confident?

.....
.....
.....

What feedback do you receive?

The following questionnaire is to help me understand what feedback you are usually provided with after a clinical interaction on placements similar to this one. In particular I am interested in feedback you have received after making a treatment plan.

1. How often are you receiving feedback?

1	*2*	*3*	*4*	*5*
Never	*Rarely*	*Occasionally*	*Very Frequently*	*Always*

2. Do you enjoy receiving feedback?

1	*2*	*3*	*4*	*5*
Never	*Rarely*	*Occasionally*	*Very Frequently*	*Always*

3. Please think about the feedback you are given after making a treatment plan. What areas of the clinical interaction are you usually given feedback on?

……
……
…….....
.....

4. How useful do you find the feedback you are given on your treatment plan?

1	*2*	*3*	*4*	*5*
Not very useful	*Somewhat useful*	*Not very useful or un-useful*	*Useful*	*Very useful*

5. How effective do you find the feedback in improving your treatment planning in the future?

1	2	3	4	5
Not very effective	*Somewhat effective*	*Indifferent*	*Effective*	*Very effective*

6. How often do you use the feedback you are provided with to improve your treatment planning in the future?

1	*2*	*3*	*4*	*5*
Never	*Rarely*	*Occasionally*	*Very Frequently*	*Always*

7. When given feedback after making the treatment plan how often does the feedback focus on the following aspects?

	How often are you provided with feedback which focuses on this?				
	1	*2*	*3*	*4*	*5*
	Never	*Rarely*	*Occasionally*	*V.Freq*	*Always*
The overall outcome of the clinical interaction	1	2	3	4	5
Your medical knowledge	1	2	3	4	5
The techniques you employed to achieve the appropriate treatment plan	1	2	3	4	5
The goals you set out to achieve	1	2	3	4	5
The 'process' you followed in the interaction to aid your treatment planning	1	2	3	4	5
Whether you were able to adapt your approach to make a treatment plan in light of information gathered during the clinical interaction	1	2	3	4	5
Your ability to self-observe your progress or performance through the interaction	1	2	3	4	5

8. How often are you given feedback that takes these into account?

A. The environment you are in

	a) Perception that this influences your treatment planning					b) How often are you provided with feedback which takes this into account?				
	1	*2*	*3*	*4*	*5*	*1*	*2*	*3*	*4*	*5*
	Never	*Rarely*	*Occasionally*	*V.Freq*	*Always*	*Never*	*Rarely*	*Occasionally*	*V.Freq*	*Always*
Time constraint	1	2	3	4	5	1	2	3	4	5
Noise in the environment	1	2	3	4	5	1	2	3	4	5
The setting	1	2	3	4	5	1	2	3	4	5

B. The characteristics of the patient

	a) Perception that this influences your treatment planning 1 2 3 4 5 Never Rarely Occasionally V.Freq Always	b) How often are you provided with feedback which takes this into account? 1 2 3 4 5 Never Rarely Occasionally V.Freq Always
Attitude toward the patient	1 2 3 4 5	1 2 3 4 5
The attitude of the patient	1 2 3 4 5	1 2 3 4 5
Communication barriers	1 2 3 4 5	1 2 3 4 5

C. How you feel

	a) Perception that this influences your treatment planning 1 2 3 4 5 Never Rarely Occasionally V.Freq Always	b) How often are you provided feedback which takes this into account? 1 2 3 4 5 Never Rarely Occasionally V.Freq Always
Your confidence that you can make an accurate treatment plan	1 2 3 4 5	1 2 3 4 5
Your medical/ dental knowledge and experience	1 2 3 4 5	1 2 3 4 5

Appendix 8: <u>Trainers'</u> First Cycle Questionnaires

Questionnaires to Assess the PFM: Clinical Trainers (1st form)

What feedback do you provide?

The following questionnaire is to help me understand what feedback you usually provide students with after a clinical interaction when they are on placement with you. In particular I am interested in feedback you provide after the postgraduate student has made any treatment plan within the clinical interaction.

1. How often do you give feedback to your trainees?

1	*2*	*3*	*4*	*5*
Never	*Rarely*	*Occasionally*	*very Frequently*	*Always*

2. Do you enjoy giving feedback to your trainees?

1	*2*	*3*	*4*	*5*
Never	*Rarely*	*Occasionally*	*very Frequently*	*Always*

3. How long does it take you to give feedback to one trainee? (How many minutes?)

…….

4. Please think about the feedback you provide to trainees after observing them engage in making treatment plan in the clinical setting. What areas of the clinical interaction do you usually give them feedback on?

……
……
……
……

5. How useful do you think trainees find the feedback you give them on their treatment planning after a clinical interaction? Please explain your answer.

1	*2*	*3*	*4*	*5*
Not very useful	*Somewhat useful*	*Indifferent*	*Useful*	*Very useful*

……..

……..

6. How effective do you think your feedback is at aiding trainees in improving their treatment planning for future clinical interactions? Please explain your answer.

1	*2*	*3*	*4*	*5*
Not very effective	*Somewhat effective*	*Indifferent*	*Effective*	*V.effective*

……
……
……

7. How often do you think trainees use the feedback you provide them with to improve their treatment planning for future clinical interactions?

1	*2*	*3*	*4*	*5*
Never	*Rarely*	*Occasionally*	*very Frequently*	*Always*

8. When giving the trainees feedback after making a treatment plan in the clinical setting how often do you focus the feedback on the following aspects?

	How often do you provide feedback which focuses on this?				
	1	*2*	*3*	*4*	*5*
	Never	*Rarely*	*Occasionally*	*V.Freq*	*Always*
The overall outcome of the clinical interaction	1	2	3	4	5
The trainees medical/dental knowledge	1	2	3	4	5
The techniques employed by the trainees to achieve the appropriate treatment plan	1	2	3	4	5
The apparent goals the trainees set out to achieve	1	2	3	4	5
The apparent 'process' the trainees followed in the interaction to aid their treatment planning	1	2	3	4	5
Whether the trainees is able to adapt their approach to make a treatment plan in light of information gathered during the clinical interaction	1	2	3	4	5
The trainees ability to self-observe their progress or performance through the interaction	1	2	3	4	5

9. When giving the trainees feedback after reaching a treatment plan in the clinical setting do you ever perceive postgraduate students treatment planning to be effected by the following factors and how often do you provide feedback that takes these into account?

A. The environment they are in

	Perception that this influences trainees treatment planning *1 2 3 4 5* *Never Rarely Occasionally V.Freq Always*	How often do you provide feedback which takes this into account? *1 2 3 4 5* *Never Rarely Occasionally V.Freq Always*
Time constraint	1 2 3 4 5	1 2 3 4 5
Noise in the environment	1 2 3 4 5	1 2 3 4 5
The setting	1 2 3 4 5	1 2 3 4 5

B. Patient characteristics

	a) Perception that this influences trainees treatment planning 1 2 3 4 5 Never Rarely Occasionally V.Freq Always	b) How often do you provide feedback which takes this into account? 1 2 3 4 5 Never Rarely Occasionally V.Freq Always
Attitude toward the patient	1 2 3 4 5	1 2 3 4 5
The attitude of the patient	1 2 3 4 5	1 2 3 4 5
Communication barriers	1 2 3 4 5	1 2 3 4 5

C. How they feel

	a) Perception that this influences trainees treatment planning 1 Never 2 Rarely 3 Occasionally 4 V.Freq 5 Always	b) How often do you provide feedback which takes this into account? 1 Never 2 Rarely 3 Occasionally 4 V.Freq 5 Always
Their confidence that they can make an appropriate treatment plan	1 2 3 4 5	1 2 3 4 5
Their medical/ dental knowledge and experience	1 2 3 4 5	1 2 3 4 5

Appendix 9: <u>Trainers'</u> Second Cycle Questionnaires

Feedback provided in line with the Personalised Feedback Model-(QUESTIONNAIRE ANSWERED POST PFM ONLY) Trainers 2nd form

1. Do you feel as there has been an obvious change in the way you provide feedback to your trainees after they make a treatment plan? –This can be compared to how you were previously providing feedback to these trainees.

.....
.....

2. Do you feel as though providing feedback in this way has been more effective in helping the trainees improve their treatment planning? Please expand your answer.

1	*2*	*3*	*4*	*5*
Not very effective	*Somewhat effective*	*Not very effective or un-effective*	*Useful*	*Very useful*

.....
.....

3. Thinking back to how you usually provided feedback. Has this method been more useful in helping you provide the feedback?

1	*2*	*3*	*4*	*5*
Less useful	*Not at all more useful*	*No change*	*Useful*	*Very useful*

Please expand on your answer: for example, how has it been more useful, what specifically about this method has more useful?

.....
.....

4. How easy was it to feedback in line with the model in clinical practice?

1	*2*	*3*	*4*	*5*
Very difficult	*Difficult*	*Not particularly easy or difficult*	*Easy*	*Very easy*

5. Thinking back to the feedback you provided previously in the clinical setting can you think of any ways in which this method of providing feedback can be improved? Please expand on your answer

.....
.....

6. What do you think are the strengths and weaknesses of being providing feedback in this way? Please expand on your answer**.**

.....
.....

Appendix 10: <u>Trainees'</u> Structured Interviews

Feedback received in line with the Personalised Feedback Model -(QUESTIONNAIRE ANSWERED POST PFM ONLY) Trainees interviews

The following questionnaire is to help me understand what feedback you have been provided with since your supervisor has been providing feedback in line with the "Personalised Feedback Model" and how useful you have found this feedback to be. In particular I am interested in feedback you have received after making any treatment plan.

1. Do you feel as there has been an obvious change in the way you have been provided with feedback after making a treatment plan in this placement? –This can be compared to how you were previously provided with feedback in this placement.

1	*2*	*3*	*4*	*5*
Less useful	*Not at all more useful*	*No change*	*Useful*	*Very useful*

Please expand on your answer: for example, how has it been more useful, what specifically about this method has more useful?

2. Do you feel as though being provided with feedback in this way has been effective in helping you to improve in your treatment planning? Please expand on your answer.

1	*2*	*3*	*4*	*5*
Not very effective	*Somewhat effective*	*Not very effective or un-effective*	*Useful*	*Very useful*

3. Thinking back to how you are usually provided with feedback, has this method been more useful to you to help you improve your treatment planning?

1	*2*	*3*	*4*	*5*
Not very effective	*Somewhat effective*	*Not very effective or un-effective*	*Useful*	*Very useful*

Please expand on your answer: for example, how has it been more useful, what specifically about being provided with feedback in this way has made it more useful?

4. Thinking about being provided with feedback using this method please rate your agreement with the statements below.

Statement	Agreement. 1- Strongly disagree 3-Neutral 5-Strongly agree				
Being provided with feedback in this way has been effective in improving my treatment planning	1	2	3	4	5
Being provided with feedback in this way has changed the way in which I make treatment plan	1	2	3	4	5
This new method has provided more structured feedback	1	2	3	4	5
I find feedback that takes my confidence into account useful	1	2	3	4	5
I find feedback that takes the influence of contextual factors on my treatment planning into account useful	1	2	3	4	5
I find feedback that focuses on the goals I set myself and how I intend to achieve these goals useful	1	2	3	4	5
I find feedback that encourages me to self-observe my own performance and progress useful	1	2	3	4	5
I believe that my self-confidence has improved after being provided with feedback in this way	1	2	3	4	5
I believe that the feedback has helped me to self-observe and modify my performance during the clinical interaction	1	2	3	4	5

5. Thinking back to the feedback given previously, can you think of any ways in which this method of providing feedback can be improved?

6. What do you feel are the strengths of being provided with feedback in this way?

7. What do you feel are the weaknesses of being provided with feedback in this way?

Appendix 11: Trainers' Workbook

Workbook – Training examples

1- Patient was referred by GDP regarding pain in upper right quadrant that is affecting sleeping.
- Trainee: read referral letter, brought patient in, take history, exam, decided that he needs BW's radiograph HOWEVER thinks that the cause of spontaneous pain is mobile URE while UR6 has small occlusal cavity.

Mobile URE will not cause the pain that affects sleeping.
UR6 had a clinically small cavity.
BW's radiograph will add diagnostic information as it may show large occlusal radiolucency affecting UR6 which is the cause of the pain that affected sleeping (irreversible pulpitis). In addition to other factors from the history like pain from cold food that lingers for a long time for example.

- At the end of consultation

1. How confident do you feel about successfully diagnosing/planning the treatment for this patient? (Confidence score from 1 to 5) 1= Not very confident 5= Very confident	* **Low confidence/good performance:** Encourage them + highlight the strength of their diagnostic decision making. * **Low confidence/poor performance:** Support + ask why and give feedback. * **High confidence/good performance:** Approve. * **High confidence/poor performance:** Support + ask why and give feedback.
2. What are your goals and plans from this consultation?	Discuss what the proper diagnosis and treatment plan would be. Discuss what would be the cause of this type of pain. Feedback about the goals and plans whether correct or incorrect goals and/or plans.

3. Did you feel that you are able to self-observe your diagnostic decision making during the interaction? How?	- Spot it and change their mind to UR6 → Approve. - Did not change and did not spot it → Feedback about importance of self-observe + encourage them to pay attention with history + BW's.
4. Are you aware of any factors in the environment, the patient or yourself today that may influence your decision making?	• **Environmental factors:** Time constraint, noise, location • **Patient factors:** Stereotype of patient/parents, communication barriers • **Trainee's factors:** Confidence, perceived lack of dental knowledge • **Others:**

2- Patient was referred by GDP regarding pain in baby teeth. Patient has Cardiac disease or bleeding disorder.

- Trainee: Did not take proper medical history

  Importance of taking history
  Medical history can change our treatment plan
  Cardiac → extract
  Bleeding → restoration

- At the end of consultation

1. How confident do you feel about successfully diagnosing/planning the treatment for this patient? (Confidence score from 1 to 5) 1= Not very confident 5= Very confident	* **Low confidence/good performance:** Encourage them + highlight the strength of their diagnostic decision making. * **Low confidence/poor performance:** Support + ask why and give feedback. * **High confidence/good performance:** Approve. * **High confidence/poor performance:** Support + ask why and give feedback.
2. What are your goals and plans from this consultation?	Discuss what the proper diagnosis and treatment plan would be. Feedback about the goals and plans whether correct or incorrect goals and or plans.

3. Did you feel that you are able to keep track of your diagnostic decision making during the interaction? How?	- Took detailed medical history and changed Treatment plan → Approve. - Did not change and did not take detailed history → Feedback about importance of self-observe + encourage them to pay attention when taking medical history and ask appropriate questions.
4. Are you aware of any factors in the environment, the patient or yourself today that may influence your decision making?	• **Environmental factors:** Time constraint, noise, location • **Patient factors:** Stereotype of patient/parents, communication barriers • **Trainee's factors:** Confidence, perceived lack of dental knowledge • **Others:**

3-Trainee missed to document an important element of consultation clinic in SALUD at the end of the session. Important elements can be one of: (reason patient is here today, medical history, chief complaint, exam finding, radio report, diagnosis, and treatment plan).

E.g., caries charted in C's but not mentioned in the plan (restore/extract/monitor until normal exfoliation)

Feedback on

- Importance of appropriate documentation.
- Easy for everyone to read
- Pay more attention when writing the note

Motivate him knowing that he is writing during his lunch time or after 17:00 as clinic was overbooked as usual and there is no time to write between patients.

- At the end of consultation

1. How confident do you feel about successfully diagnosing/planning the treatment for this patient? (Confidence score from 1 to 5) 1= Not very confident 5= Very confident	* **Low confidence/good performance:** Encourage them + highlight the strength of their diagnostic decision making. * **Low confidence/poor performance:** Support + ask why and give feedback. * **High confidence/good performance:** Approve. ***High confidence/poor performance:** Support + ask why and give feedback.
2. What are your goals and plans from this consultation?	Discuss what the proper diagnosis and treatment plan would be. Feedback about the goals and plans whether correct or incorrect goals and or plans.

3. Did you feel that you are able to self-observe your diagnostic decision making during the interaction? How?	- Document appropriately → Approve. - Did not change and did not document all elements→ Feedback about importance of self-observe + encourage them to pay attention when writing their notes in Salud + new patient form etc.
4. Are you aware of any factors in the environment, the patient or yourself today that may influence your decision making?	• **Environmental factors**: Time constraint, noise, location • **Patient factors:** Stereotype of patient/parents, communication barriers • **Trainee's factors:** Confidence, perceived lack of dental knowledge • **Others:**

Appendix 12: Trainer's Sheet

Trainer's sheet

I would like you to ask the trainees these four questions and give them feedback according to their answers.

At the end of consultation. Trainee 1:

1. How confident do you feel about successfully diagnosing/planning the treatment for this patient? (Confidence score from 1 to 5) 1= Not very confident 5= Very confident	• **Low confidence/good performance:** Encourage them + highlight the strength of their diagnostic decision making. • **Low confidence/poor performance:** Support + ask why and give feedback. • **High confidence/good performance:** Approve. • **High confidence/poor performance:** Support + ask why and give feedback.
2. What are your goals and plans from this consultation?	Goals: Plans:
3. Did you feel that you are able to keep track of your diagnostic decision making during the interaction? How?	
4. Are you aware of any factors in the environment, the patient or yourself today that may influence your decision making?	• **Environmental factors:** Time constraint, noise, location • **Patient factors:** Stereotype of patient/parents, communication barriers • **Trainee's factors:** Confidence, perceived lack of dental knowledge • **Others:**