Evaluating Dental Clinical Supervision with the Maastricht Clinical Teaching Questionnaire

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Abstract: **This research described faculty and student perceptions regarding clinical supervision in a Philippine dental school. It identified the factors which affect faculty and student perceptions, and whether both perceptions are congruent. Forty-eight faculty and two hundred ninety-five students (N=343) of a private dental university in the Philippines answered the Maastricht Clinical Teaching Questionnaire (MCTQ). Survey results showed both faculty and students had positive assessments of clinical supervision, however, their ratings of the domains differed. The faculty had a significantly positive overall assessment than the students, according to the two-sample Kolmogorov-Smirnov test conducted. Two-tailed T-tests revealed that student perceptions were not affected by sex and year level. On the other hand, ANOVA revealed that faculty perceptions were affected by the number of years in teaching, with 'experts' having more positive ratings. There is a significant difference in faculty and student perceptions on clinical supervision. Faculty characteristic, specifically number of years in teaching, has a significant difference in faculty perception on clinical supervision.**

Keywords: **clinical supervision, domains of clinical supervision, dental education, student perception, faculty perception, MCTQ.**

I.   INTRODUCTION

Dental education involves a complex pedagogical procedure. Like most health professions, the practice of dentistry involves not only intellectual and technical skills but interpersonal skills as well. This makes the dental education complex since it involves not only acquiring the necessary cognitive information but honing the psychomotor skills and right attitudes– which develop through time and practice. This makes teaching and learning difficult for both the teacher and student. Learning is not only achieved with reading and memorizing information, but with developing and heightening skills as the student goes through increasing year levels. In dental education, this transfer of skills happens when clinicians work with tooth models and much later, actual patients in dental operatories, sometimes called simply as 'clinics.'

In the clinics, students gain knowledge through experience. Learning is the process whereby knowledge is created through the transformation of experience. Through experiential learning, these students gain exposure to similar cases which they will handle later as professionals. Cox described the clinical learning cycle which consists of teaching and learning activities to facilitate learning. The clinical learning cycle can be divided into two interrelated cycles: experience and explanation [Figure 1].

Fig 1: Clinical learning cycle (Adapted from Cox, 1993 as cited in Sana, editor, 2013)

In clinical dentistry in the Philippines, the experience cycle starts at the preparation which occurs in the classroom. Most clinical subjects have laboratory counterparts, such that a subject with only a lecture component usually incorporates a practical aspect of learning by activities in the classroom. Briefing in the clinics is done through a clinician's assembly wherein the clinical chairman introduces the learning opportunities that students can find, as well as the rules and regulations. Clinical practice instruction occurs during actual patient treatment. Clinical supervisors utilize various teaching strategies to provide opportunities for students to develop clinical skills. Unlike in medicine, where the clinical encounter happens in a hospital and patients are plenty, dentistry students usually bring in patients to accomplish specific requirements. The explanation cycle on the other hand is the post-discussion and reflection after the patient encounter.

Clinical supervision in dentistry is complex because the procedures are usually long, spanning several appointments. The procedures vary in the different departments, thus the manner of teaching and checking on the students vary as well. One procedure may require multiple clinical supervisors who will check on the case because of the faculty schedule. Another procedure may require several clinical supervisors checking because the procedure is a long one, for example, complete dentures in prosthodontics or root canal treatment in endodontics. Also, the success of clinical supervision is a subjective experience which may be seen by the faculty (the facilitator) and the student (the learner) from different perspectives. The perception of the faculty may differ from that of the student. It is noteworthy to see at which aspects of clinical supervision do the faculty and students' perceptions coincide, and at what aspects do their perceptions differ. This is significant since it can be a potential source of feedback on the efficiency of the teaching and learning occurring in the clinics. This complexity and congruence, or lack of congruence, between the faculty and the students' perceptions is what makes clinical supervision in dentistry unique and important to study.

II.   METHODOLOGY

The population involved all clinical supervisors who were currently on duty during the first semester of academic year 2019-2020. The study design was approved by the local ethics committee before proceeding. The students who took part in the study were the junior and senior students enrolled in clinical courses. Informed consent forms were attached prior to proceeding to the actual survey questionnaire. It contained explicit statements regarding voluntary participation and withdrawal process, and probable risks and measures taken to eliminate such. Absence of penalty, compensation, and expenses to the participants were also indicated. Confidentiality, anonymity, and data privacy were assured all throughout the research process.

The Maastricht Clinical Teaching Questionnaire was developed by Stalmeijer et. al. starting in 2007. It is based on the theoretical constructs of Cognitive Apprenticeship Model by Collins in 1989 which aims to provide individual clinical supervisors with feedback on clinical teaching. It is a 15-item questionnaire which includes the five domains: modelling, coaching, articulation, exploration, and learning environment. Each statement is scored using a Likert scale (1 = fully disagree to 5 = fully agree). An overall judgement of clinical teaching with a scale of 1-10 (where below 6 is insufficient) is the last question. Permission to use the MCTQ was granted by the main author. The MCTQ was pilot tested prior to its use. Estimated amount of time to accomplish the questionnaire was 10 minutes.

Data obtained from the MCTQ was treated as nominal data and was coded in Microsoft 365 Excel version 2108 (Microsoft Corporation, Washington, USA). Descriptive statistics were utilized such as mean, percentage, and standard deviation to identify significant characteristics of the different domains of supervision as perceived by faculty and students. Percentage was used to illustrate the respondents' demographic characteristics. Mean was used to average the answers of the respondents according to the different domains of clinical supervision. Standard deviation was used to describe how far the answers are from each other, and in comparing the answers of the two groups, faculty and students. Statistical analysis was performed using SPSS version 25 (IBM, Armonk, NY). Two-tailed T-tests were used to analyze whether faculty perception on clinical teaching is affected by sex, highest educational attainment, and number of clinical departments on duty. The same tests were used to analyze whether student perceptions on clinical teaching is affected by sex and year level. Analysis of variance tests were used to analyze whether faculty perception on clinical teaching is affected by employment status, number of years teaching, and the number of hours of clinical teaching per week. Two-sample Kolmogorov-Smirnov test was used to compare the congruence of faculty and student perceptions. An alpha level of 0.05 was accepted for statistical significance for all statistical tests.

III.   RESULTS

There were 48/58 faculty responses (82.7% response rate) and 295/458 student responses (64.4% response rate). Table 1 and Table 2 present the demographic characteristics of the faculty and student respondents respectively.

Table I: DISTRIBUTION OF FACULTY ACCORDING TO DEMOGRAPHIC CHARACTERISTICS (N=48)

Demographic characteristics	N (%)
Sex	
Male	23 (47.9%)
Female	25 (52.1%)
Highest educational attainment	
Doctor of Dental Medicine	13 (27.1%)
Master's	31 (64.6%)
Doctorate	4 (8.3%)
Years in teaching (Developmental Stage)	
Novice	8 (16.7%)
Competent	6 (12.5%)
Proficient	12 (25.0%)
Expert	22 (45.8%)
Teaching hours in a week	
≤ 12 hours	5 (10.4%)
13-20 hours	14 (29.2%)
> 20 hours	29 (60.4%)
Number of departments	
1-2	40 (83.3%)
≥3	8 (16.7%)
Employment status	
Semester-to-semester	25 (52.1%)
Probationary	5 (10.4%)
Regular	18 (37.5%)

Table II: DISTRIBUTION OF STUDENTS ACCORDING TO SEX AND YEAR LEVEL (N=295)

Demographic characteristics	N (%)
Sex	
Male	81 (27.5%)
Female	214 (72.5%)
Year level	
Third	153 (51.9%)
Fourth	142 (48.1%)

Faculty clearly rated themselves higher in all items compared to the students [Table 3]. It also shows how individual items fared. The item under the domain of coaching which were given highest rating by the faculty were items #2 (giving useful feedback during or immediately after) and #12 (giving sufficient opportunities for the student to perform the task

independently), while it was only item #12 which were rated highest by the students. The items under articulation which ranked highest for the faculty was item #8 (asking items aimed at increasing understanding), while it was a tie for items #3 (providing a rationale for the student's action) and #8 for the students. Item #14 (faculty showed respect for the student) was rated the highest in mean per item by the faculty, and item #6 (faculty created sufficient opportunities for students to observe him / her) as the lowest. For the students, item #12 (giving sufficient opportunities for the student to perform the task independently) was rated as the highest in mean per item, and item #10 (faculty was genuinely interested in the student) as the lowest. It is interesting to note that highest rating given by the faculty was for item #14 (faculty showed respect for the student) and the lowest rating given by the students was for item # 10 (faculty was genuinely interested in the student) are both in the domain of learning environment.

Table III: MEANS AND STANDARD DEVIATIONS PER MCTQ ITEM

Items	Faculty		Student	
	Mean	SD	Mean	SD
Modelling				
1. The faculty consistently demonstrated how to perform clinical skills.	4.3	0.85	3.6	0.85
6. The faculty created sufficient opportunities for me to observe him/her.	4.1	0.83	3.4	0.98
11. The faculty served as a role model as to the kind of doctor I would like to become.	4.5	0.71	3.9	0.92
Coaching				
2. The faculty gave useful feedback during or immediately after direct observation of my patient encounters.	4.5	0.58	3.9	0.84
7. The faculty adjusted his/her teaching activities to my level of experience.	4.4	0.74	3.4	1.01
12. The faculty offered me sufficient opportunities to perform activities independently.	4.5	0.62	4.0	0.80
Articulation				
3. The faculty asked me to provide a rationale for my actions.	4.5	0.62	3.9	0.87
8. The faculty asked me questions aimed at increasing my understanding.	4.6	0.64	3.9	0.87
13. The faculty stimulated me to explore my strengths and weaknesses.	4.4	0.77	3.7	0.92
Exploration				
4. The faculty encouraged me to formulate learning goals.	4.3	0.77	3.7	0.85
9. The faculty encouraged me to pursue my learning goals.	4.6	0.65	3.8	0.92
Learning environment				
5. The faculty created a safe learning environment.	4.5	0.68	3.8	1.00
10. The faculty was genuinely interested in me as a student.	4.4	0.57	3.2	0.92
14. The faculty showed that he/she respected me.	4.7	0.46	3.7	0.96

Student ratings ranged from 3.2-4, whereas the faculty ranged from 4.1 -4.7 [Figure 2]. The means and standard deviations of perceptions according to domains of clinical supervision were computed. For the faculty, the domains of coaching, articulation, and learning environment were rated as the highest with a mean of 4.5. On the other hand, the students rated the domains of coaching, articulation, and exploration as the highest with a mean of 3.8. Moreover, modelling had the lowest score for the faculty, while it is the domain of learning environment that the students rated the lowest. Graphic representation of the combined means for the domains of clinical supervisions again reveal that faculty rated themselves highly compared with those of the students [Figure 3]. For the overall judgement of clinical supervision, faculty and students gave satisfactory ratings with a mean of 8.3 and 7.5 respectively.
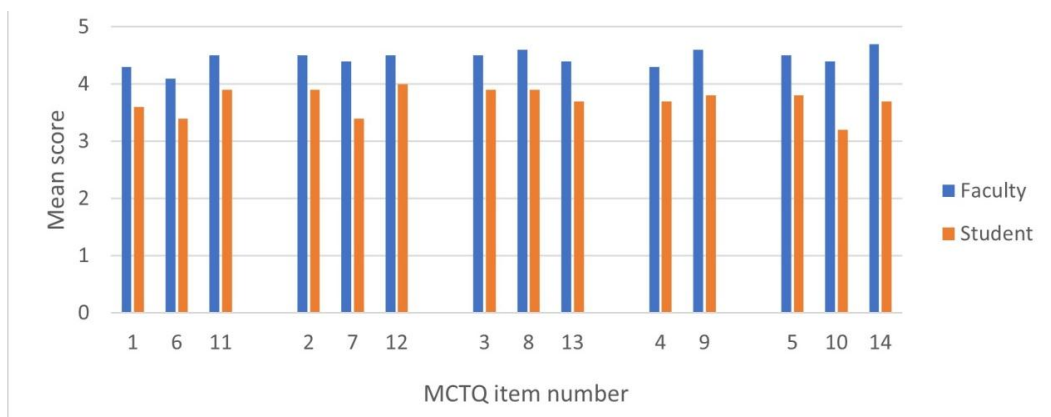

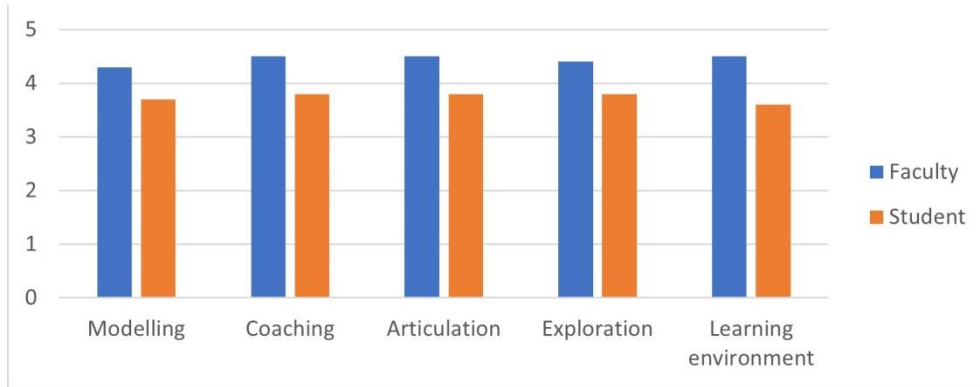**Fig 2: Mean scores of faculty and students per MCTQ item**

Fig 3: Mean scores of faculty and students according to domains of clinical supervision

Faculty characteristics which were studied include sex, educational attainment, years in teaching, teaching hours in a week, number of departments, and employment status. Inferential statistics was run on the faculty demographics, the domains of clinical supervision, and overall judgement to see if there are any significant differences on their answers based on the characteristics of the faculty members. There is a significant difference ($P = 0.002$) based on the faculty members' years in teaching which is seen at coaching and articulation [Table 4]. Coaching and articulation domains showed higher ratings of the expert compared to the novice [Figure 4]. Inferential statistics was run on the student demographics and the domains of clinical supervision to see if there are any significant differences on their answers based on the characteristics of students.

Table IV: ANOVA OF THE DOMAINS OF CLINICAL SUPERVISION BASED ON FACULTY'S HIGHEST EDUCATIONAL ATTAINMENT, YEARS IN TEACHING, TEACHING HOURS, AND EMPLOYMENT STATUS

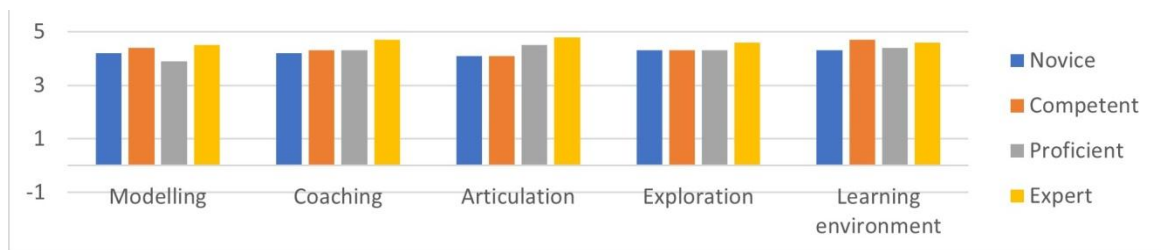|	Highest educational attainment	Years in teaching	Teaching hours	Employment status
Modelling df MS F Sig	2 0.732 1.941 0.155	3 0.924 2.594 0.065	2 0.392 1.000 0.376	2 0.407 1.038 0.363
Coaching df MS F Sig	2 0.273 1.163 0.322	3 0.720 3.545 0.022	2 0.171 0.714 0.495	2 0.417 1.826 0.173
Articulation df MS F Sig	2 0.169 0.586 0.561	3 1.285 5.972 0.002	2 0.387 1.386 0.260	2 0.136 0.471 0.628
Exploration df MS F Sig	2 0.012 0.027 0.973	3 0.475 1.156 0.337	2 0.583 1.430 0.250	2 0.077 0.180 0.836
Learning environment df MS F Sig	2 0.211 1.422 0.252	3 0.259 1.807 0.160	2 0.090 0.586 0.561	2 0.137 0.903 0.413

Fig 4: Mean scores of clinical supervision based on faculty's years in teaching

A two-sample Kolmogorov-Smirnov test was used to compare the answers of the faculty with those of the students. Since the data gathered are nominal and ordinal in nature, a nonparametric test was used wherein the two independent samples are drawn from the same population [Table 5]. The asymptotic significance assumes that the data set is large. Since the values are less than 0.05 on all domains of clinical supervision, there is a significant difference ($P = 0.000$) on the responses on the faculty and students.

Table V: TWO SAMPLE K-S TEST COMPARING FACULTY AND STUDENT ANSWERS ON THE DOMAINS OF CLINICAL SUPERVISION

Response	Modelling	Coaching	Articulation	Exploration	Learning environment
Most Extreme Differences Absolute Positive Negative	0.272 0.272 0.000	0.346 0.346 0.000	0.384 0.384 0.000	0.338 0.338 0.000	0.402 0.402 0.000
K-S Z	1.747	2.220	2.469	2.173	2.585
Asymp. Sig. (2-tailed)	0.004	0.000	0.000	0.000	0.000

IV. DISCUSSION

Majority of the faculty and students expressed positive feedback in all criteria of the domains of clinical supervision. Faculty clearly rated themselves higher than students in all domains. They rated coaching, articulation and learning environment as one of the highest domains in clinical supervision. Students rated coaching, articulation, and exploration as the highest domains of clinical supervision. In contrast to the faculty perceptions, the learning environment was rated the lowest by the students. The climate produced during interaction of faculty and student is an important component in the clinics.[4] Students seem to be apprehensive and nervous of faculty reactions when things go wrong especially at the chairside. This confirms the value of feedback in skills acquisition. The linear model of clinical teaching based on MCTQ says that articulation directly affect overall judgement of clinical teaching. Haden in 2006 identified this as the humanistic environment. He described this humanistic approach as characterized by close professional relationships between faculty and students, fostered by mentoring, advising, and small group interaction. These are important because if students have unmet needs to explore their personal feelings, it may adversely affect their learning and the quality of care they give to their patients. Furthermore, students who are respected, will also respect their patients in the present and in the future.

For the faculty, there were six characteristics which were studied, namely sex, highest educational attainment, years in teaching, teaching hours in a week, number of departments, and employment status. Of these characteristics, only the years in teaching showed a significant difference in the responses between faculty members on the coaching and articulation domain. Coaching and articulation faculty perceptions differ in adjusting teaching to students' level and stimulating learners' strengths through questioning. This may be because novice faculty are still learning how to perform well while receiving help from co-faculty members. Their most immediate concern is developing a repertoire of teaching skills and minding the clinic protocols. As they climb the faculty career ladder, they become more confident about their abilities and performances, able to refine teaching strategies, enjoy peer recognition, become satisfied with their work, and later be in a respected position where they orient new colleagues to the academic life. This may be the reason why there were differences in faculty perceptions regarding their clinical supervision. 'Expert' teachers believe faculty competencies affect quality of clinical supervision such as knowledge of clinical protocols, experience in handling

different students with different learning styles, and experience in a variety of teaching strategies. In the linear model of clinical teaching, when the MCTQ was validated, it was shown that coaching directly affects articulation, which may be the reason why both domains were tied to each other. Faculty competence encompasses the faculty being a practitioner and a teacher at the same time. Faculty with formal teaching qualifications are valued far more highly by students. Although faculty members were once students, formal teaching and mentorship would be of clear benefit especially to the novice faculty. A different skill set is needed as a clinical educator to be able to apply it in the clinics. But it is important to note that teaching effectiveness can decline with added experience, which can be partly due to the absence of continuing faculty development. Faculty development approaches should differ depending on the career of the teacher since they have varying needs. One or a combination of organizational, personal, and instructional faculty development programs may be done to address advances in dental education, enhance satisfaction of the teacher, and improve teaching and learning in dental education. This further reinforces that shadowing / mentorship of 'expert' faculty by 'novice' and 'competent' ones may help those with specific weaknesses in some domains of clinical supervision. Careful faculty selection does not mean hiring only 'expert' faculty. Instead, it is making sure that faculty are open to formative evaluation for improvement. Identification of their weaknesses and guidance on their strengths can be used as a starting point. The college can also benefit from the formative evaluation by utilizing it as initial data when hiring new clinical supervisors.

An overall significant lack of congruence in perceptions between the faculty and students based on the different domains of clinical supervision was seen. Faculty consistently rated themselves higher. On individual domains, learning environment is rated highest by faculty but lowest by students. The lack of congruence from the faculty and students was seen in different studies already. It may not be a surprise anymore because faculty felt they were doing the best they could even if they have their weaknesses, thus their self-perception is higher. While having different perceptions, faculty and students work together as different stakeholders within the same location, the clinics. Thus, congruent perceptions are believed to contribute to optimal teaching-learning processes and help the students achieve the learning outcomes. Faculty perceptions are related to their teaching behavior. Student perceptions influence their learning and study behavior and determine the nature and quality of learning processes. Differences in faculty and student perceptions thus imply that behaviors are not congruent and are not directed towards the same goal. This difference may cause a decrease in students' learning and thinking skills, which later can make the student feel unmotivated to finish the clinical requirements. An institutionalized intervention is clearly needed; to be truly outcomes-based, both students and faculty should be guided on focusing all their activities on the course outcomes. The lack of congruence shows a suboptimal communication between the faculty and students. The clinical supervisor may not be the faculty-in-charge in the classroom, thus being unable to gauge prior level of knowledge on a procedure. The clinician, on the other hand, may interpret this as unclear or confusing feedback from the faculty, thus affecting their perception. In the clinical learning cycle, teaching and learning goes beyond the patient encounter (experience cycle). Rather, post-discussion and reflection (explanation cycle) is essential for the students to build on their previous knowledge, thus fostering their skill. Thus, there is a need for planned opportunities for the explanation activities to take place. The use of journals and feedback forms may help process thoughts to facilitate reflection on clinical supervision. Each faculty must remember that a safe learning environment allows the students to develop and refine their clinical skills as they become professional dentists in the future.

V. CONCLUSION

First, there is a significant difference in faculty and student perceptions on clinical supervision. Second, faculty characteristic, specifically number of years in teaching, has a significant difference in faculty perception on clinical supervision.

Among the personal characteristics, only the faculty's number of years in teaching showed significant effect on perceptions, with 'experts' giving higher ratings. Both students and their more novice colleagues agree that more expert teachers have more experience in clinical protocols, dealing with varieties of students, and teaching-learning strategies in the clinics. It might be worth looking into the practice of shadowing / mentoring of novice faculty by expert faculty and incorporating workshops on the best practices of clinical supervision and training in the domains of clinical supervision for the 'novice' faculty.

An ongoing research on best practices on clinical supervision across departments of the univesity, and inter-universities, using MCTQ as the common tool to facilitate communication and comparison of results. Applying the MCTQ to other dental universities across the Philippines is recommended to strengthen the validity and reliability of the questionnaire to

the Filipino population. Future research in the Philippines can compare the clinical teaching of other dental schools, thus forming a better picture of Philippine dentistry. This will ensure standardized quality of clinical teaching in the future.

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