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## RESEARCH ARTICLE

# Student Evaluation of Pre-clinical Teaching on a Dental Simulator

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## Abstract

**Context:** Student evaluation of teaching (SET) is a pedagogical tool which is part of a quality control process of teaching.

**Material and methods:** An anonymous and voluntary e-questionnaire was sent to all 3rd year students of the Faculty of Dentistry in university Mohamed VI of sciences and health at the end of the academic year 2021–2022 in order to evaluate the progress of practical pre-clinical learning by dental simulator in conservative dentistry. The aim was to evaluate the teaching tools, the organization of the lessons, the content of the program as well as their overall perceptions of this practical pre-clinical teaching, according to a 4-level Likert scale. A descriptive statistical analysis of the data collected was carried out using the spss20 software.

**Results:** We collected 51 questionnaires out of 58, which is a response rate of 87.93%. More than half of the students consider the use of clinical iconography, demonstration videos, handouts and live demonstrations during practice sessions to be very useful. The organization of the teaching and the program taught seem to be adapted by more than half of the students in terms of availability of courses on the hosting platform, number of students, number of supervisors, time, volume and chronological development of the program. 45% of the students found the dental simulator suitable for pre-clinical preparation and more than half of them found that they were able to perform dental procedures on patients thanks to their previous achievements on dental simulators. Regarding their general perceptions of the practical learning, 51% felt average stress during these sessions, while 41% of the students gave them a score 15–20 out of 20.

**Conclusion:** Several studies show that the SET alone cannot measure the effectiveness of teaching, but it is a useful tool for improving teaching practices and its quality.

**Keywords:** Evaluation of teaching by students, Teaching effectiveness, Quality of learning

## 1. Introduction

Teaching evaluation is a complex but necessary process that ensures quality control of courses and programs in order to improve teaching and learning procedures [1]. The student is a main actor in the teaching process, and his assessment is the first level of evaluation of teaching in Kirkpatrick's model [2]. Student evaluation of teaching (SET) is a pedagogical approach that consists of collecting students' opinions, perceptions and judgements of the quality of the teaching received and which will

be taken into account in the processes of regulation, adaptation and improvement of teaching [2,3].

This practice, which is not unanimously supported by the teaching staff, originated in the 1960s in Anglo-Saxon universities and has since become a major element in university policies to promote the quality of teaching [4]. This approach enables teachers to obtain feedback from students on certain aspects of their teaching (organization and course materials, teaching methods, interactions, learning assessments).

It also allows students to express their views on the learning environment and helps teachers to

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better understand their expectations and preferences [1]. Typically, SET is conducted during the last weeks of the course, before final grades are awarded, at the end of the semester or the end of the year. The students receive evaluation forms by an anonymous questionnaire which records their views on the instructors and the courses, using a 4,5, 6,7 item Likert scale ranging from Strongly Disagree to Strongly Agree. Many characteristics of the instructors can be examined, including their knowledge, clarity of explanations, organization, enthusiasm, friendliness, fairness available and accessibility [1,4]. Practical pre-clinical training in conservative dentistry is a fundamental part of the dental study. In the third year, practical sessions are carried out on a conventional dental simulator which acts as a simulated patient, and prepares the students for the clinical management of patients the following year.

The objective of our work is to carry out an evaluation by the students of the practical pre-clinical teaching in terms of the program taught, the organization of the teaching, teaching tools and to free up the students to express their personal feelings.

## 2. Materiel and methods

This is an exhaustive descriptive cross-sectional study with the objective of evaluating pre-clinical teaching by 3rd year students at the Faculty of Dentistry at UM6SS. All 3rd year students were included in this study while students from other levels were not. A self-administered e-questionnaire consisting of 22 closed questions and one open question was developed from a literature review. In addition to socio-demographic data, it included five other categories: teaching aids, organization of teaching, educational program, feelings, and overall evaluation. A Likert scale with 4 modalities was used to classify the answers: 1:totally disagree – 4:totally agree. The questionnaire was then tested with the residents of the conservative odontology department to evaluate the time required (15 min) and the understanding of all the items; the ethical considerations were respected in this survey: respect for privacy and confidentiality of data. The voluntary and anonymous nature of participation were taken into account. An information note and an informed consent form attached to the questionnaire were sent via the institutional email to all students of the 3rd year of the Faculty of Dentistry of Casablanca at the end of the academic year 2021/22. A descriptive statistical analysis of the data collected was carried out using the spss20 software.

## 3. Results

The population of this study corresponds to 61 students with 38 women and 23 men. 51 students returned their answers, i.e. a response rate of 83.6%. Average age is 20.421 years old  $\pm$  0.753. The socio-demographic data are summarized in Table 1. More than half of the student (68.8%) were satisfied with the teaching tools used in the practical pre-clinical teaching. 85.2% of students approved the organization of teaching. The program taught seems suitable for 79.65% of students in terms of availability on the platform of presentations, the number of students, the number of supervisors, the number of hours and the chronological sequence of the program.

Thus,74% of students find that the dental simulator is suitable for pre-clinical preparation and 66% of students find that they are able to perform dental procedures with patients thanks to their prior achievements on dental simulators. Regarding their general perceptions of practical learning, 51% of students feel average stress during the practical sessions in conservative dentistry while 41% of learners give this practical learning a mark on an interval 15 to 20 out of 20 and 50% of them a score between 10 and 15 out of 20. The results are summarized in Tables 2–6 and Fig. 1.

We then concluded with an open question where 58% of the students questioned felt that the teaching received in practical learning is of high quality, 16% of the students expressed the need for more sessions, 14% of the students wished to have more video demonstration and 8% of students mentioned fatigue and stress during the practical session.

## 4. Discussion

According to Romainville, to evaluate is to measure and then assess, using criteria, the achievement of objectives [5]. Thus, the evaluation of the education system must take into account the level of achievement of objectives, the updating content, the

Table 1. Socio-demographic data.

	Number	Percentage
Gender		
Female	31	60,8%
Male	20	39,2%
Secondary education		
Public school	3	5,9%
Private school	45	88,2%
Mission of foreign cooperation	3	5,9%
Presence of a dental family member	12	23,5%
Higher level of education		
Father	37	72,5%
Mother	26	51%

Table 2. Evaluation the educational tools.

Educational tools:	Totally disagree	Disagree	Agree	Totally agree
Iconography used (photo and diagram)is useful	–	2%	30%	68%
Practical learning is accompanied by sufficient Iconography	4%	34%	48%	14%
The demonstration videos are useful	2%	8%	12%	78%
Practical learning is accompanied by a sufficient number of demonstration videos	12%	58%	26%	4%
The explanatory leaflet of the APP seems useful	–	10%	38%	52%
	3,6%	22,4%	25,6%	43,2%

effectiveness of teaching methods, consistency and reliability of knowledge and skills assessment instruments [6]. This teaching quality control process is complex and multifactorial, it uses an arsenal of evaluation tools, including the evaluation of teaching by students [2]. It is a device for investigation and exchange of information between teacher and learner on the effectiveness of the transmission of knowledge, in a framework of respect and freedom which aims to identify the strengths and weaknesses of a teaching in order to make improvements [6,7].

SET has two functions: summative and formative [7–9]. The administrative summative role allows to control the quality of teaching for the purposes of promotion, contract renewal or sanction of members of the teaching staff; this property applies particularly at the Anglo-Saxon universities [6,4 10]. The formative role allows teachers to improve their practices, develop their teaching skills and improve their professional performance. This formative education tends to become generalized in Europe [2,11].

In Morocco, in its report n° 05/2019 concerning the reform of higher education, the Higher Council for Education Training and Scientific Research (CSEFRS) recommends the involvement of students in the evaluation of lessons in a formative logic and a training approach centered on the learner [2,3]. Thus, we undertook at the faculty of dentistry at UM6SS and for the sake of formative self-evaluation an evaluation by 3rd year students of the practical pre-clinical learning in conservative odontology at the end of the 2021–2022 school year.

SET is still debated in academia. For its followers, the SET makes it possible to improve the teachings through an external vision of its practice and thus to initiate a reflection on the strong and weak points and the possible adjustments to be made, it is an inexpensive instrument, easy to implement, valid, faithful and reliable [3,12–14].

For critics of the SET, they question the legitimacy of students to evaluate their teachers given their lack of objectivity and competence in judging the work provided by their own teachers [3,21]. Part of the teaching staff feel reticence, even resistance to any form of judgment on their teaching activity and fear an inflation of marks and an intrusive drift towards a control of their freedom [6].

According to Horntein's 2017 study, there is no convincing evidence that student evaluation of teaching is reliable measures of instructors' teaching competence [20]. Furthermore Utle's and Strobe's meta-analysis in 2017 and 2020 reinforces this observation by stipulating that students do not learn more from professors who receive the highest marks [4,15].

Indeed, studies show that these evaluations can be biased by certain factors including the sex and physical attractiveness of the instructors, the difficulty and type of the course, the race and ethnicity, the motivation of the students or even the moment of the training, the day and the size of the classroom [1,15–17]. Indeed, using the SET to make high-stakes administrative decisions about hiring, firing, merit pay, and promotions instructors is currently very controversial even across the Atlantic and has

Table 3. Evaluation of organization of lessons.

Organization of lessons	Totally disagree	Disagree	Agree	Totally agree
The demonstrations seem useful	–	2%	14%	84%
Presentations sent before are suitable media	2	20	48	30
the content of the presentations is suitable for immediate practical implementation	–	32	58	10
The number of supervisors is sufficient	6	6	62	26
The number of students per group is adequate	–	6	56	38
	1,6%	13,2%	47,6%	37,6%

Table 4. Evaluation of the program.

The program:	Totally disagree	Disagree	Agree	Totally agree
the number of hours devoted to practical work	—	26	58	16
The chronological sequence of the program is adapted	2	16	66	55,6
The duration of a session of 4h30 is sufficient	16	32	34	18
The simulator is suitable for pre-clinical practice	8	18	46	28
Practical sessions are sufficient in number	0,5	11	58	28
Control of knowledge before each session is necessary	8	20	58	14
Practical assessment of skills is adapted	2	20	64	14
	5,21%	20,42%	54,85%	24,8%

been heavily criticized by the American Sociological Association in 2019 and Strobe's meta-analysis in 2020 [4,5,13,15]; it may even contribute to poor teaching and inflation of grades [15]. These evaluations should not be used as evidence of teaching effectiveness, but rather as part of an overall trainer evaluation that includes peer observation, exam results and self-assessment as well as digital educational support platforms [7,11,15,18,19].

Our work is purely formative and constitutes feedback for the personal use of the faculty of dentistry at UM6SS, while taking into account that health science students in general are more critical and have higher expectations of the quality of teaching. They also provide lower evaluation scores to teachers compared to students in other disciplines [1].

In our study, we presented our SET results without comparison because our aim is to improve our teaching practices. The evaluation focused on 3rd year students, which is the last year before hospital practice. As such, their responses may have significant value as a judgement. Valid assessment should be done via a brief, anonymous, proactive questionnaires distributed and returned exclusively in person or by email [1,6,9,10,20].

We chose to send an anonymous e-questionnaire in order to collect the results automatically and to expose them in statistics, at the end of the school year so that the students have a global vision of the practical teaching in conservative dentistry. We collected 51 responses out of 61, i.e. a response rate

of 83.6%, which makes our evaluation representative and significant. For an evaluation to be valid, certain recommendations must be respected. The questionnaire should contain simple, clear and direct closed questions and free open questions that allow students to express themselves and describe positive and negative aspects of the course as well as their suggestions [4,7]. In order to decipher the closed questions collected, we do not try to obtain 100% positive answers through the SET, but we can consider that below 60% agreement on a proposal, it is necessary to review the aspect of the course [18]. In our evaluation, only question 4, which concerns the presence of a sufficient number of video illustrations, received an agreement of almost 30%. In a reflective approach and in order to improve the quality of our teaching, we have made available to the students of the next class of 2022–2023 an updated practical guide, richly illustrated with diagrams and photos explaining the different sequences of the practical pre-clinical learning, as well as a list of the most important elements.

A last open question was devoted to the free expression of the students where 58% spontaneously evoked a teaching and a pedagogy of quality, 16% of the interviewed students estimate to need more sessions. Thus in an approach of accompaniment of the students in difficulty of learning, the students were encouraged to come and train on the dental simulator while dental haptic simulators will soon be made available to them in order to reinforce their practical learning.

This evaluative survey is a first phase of our approach, we plan to carry out a longitudinal comparison of student evaluations over the years to get an overall picture of teaching quality and performance.

Table 5. Evaluation of perception and skills obtained by practical learning.

	Totally disagree	Disagree	Agree	Totally agree
Perception of the practical learning: it generates stress	12%	14%	52%	22%
Skills obtained/ dental simulators: Are you ready to move into 1st year clinical	4%	30%	44%	22%

Table 6. Practical learning note by students.

Rating given to the practical learning	0-5/20	5-10/20	10-15/20	15-20/20
	4%	4%	50%	42%

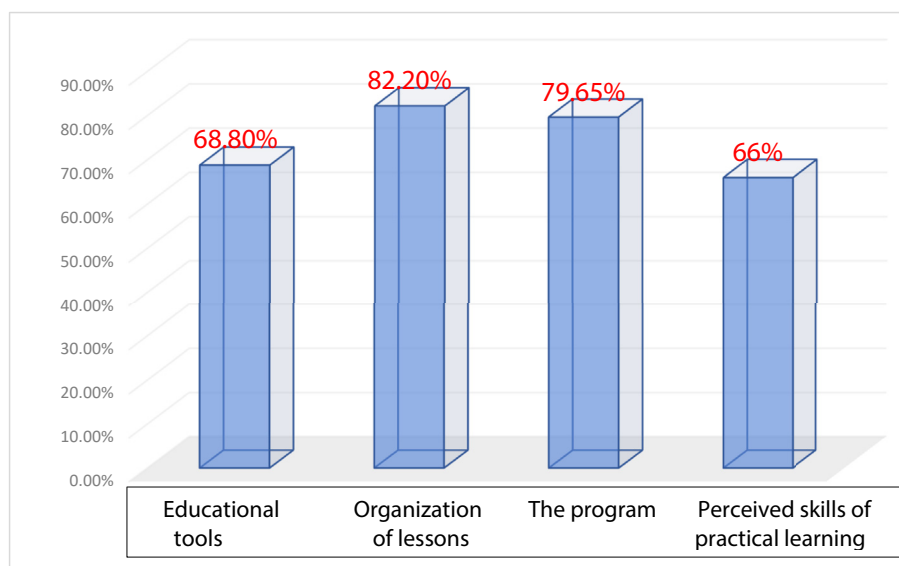


Fig. 1. Satisfaction of students in pre-clinical practical education.

## 5. Conclusion

With a view to ameliorate effectiveness and quality teaching and in a formative and participative approach, we noted the largely positive opinion of the 3rd year students regarding the practical teaching of conservative dentistry. Our institution has also set up an innovative dental simulation center which will allow the improvement of the practical and clinical performance of our students.

## Authors' contributions

The participation of each author corresponds to the criteria of authorship and contributor ship emphasized in the Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals of the International Committee of Medical Journal Editors. Indeed, all the authors have actively participated in the redaction, the revision of the manuscript and provided approval for this final revised version.

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## Conflict of interest

The authors declare no competing interests.

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