

Evaluation by Tunisian dental students of their flipped classroom experience in Learning removable Partial Denture

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Introduction : The flipped classroom is a pedagogical approach in which the theoretical part of the course is exported outside the classroom, while class time is rather devoted to do the applications in the presence of a teacher to tutor the students.

The objective of this article was to explore the perceptions and satisfaction of dental students in relation to their first experience of a newly applied inverted classroom at the Faculty of Dentistry of Monastir.

Methodology: a descriptive cross sectional study carried out among students in the 3rd year of dental medicine at the Faculty of Dentistry of Monastir for the year 2022-2023. The measuring instrument was a questionnaire specially developed for this study.

Results: 81 students participated in this study, among them 69 students were satisfied with this new pedagogical approach. (96.28%) of students agreed that their motivation was increased for attendance at the lecture hall following this experience and 93.82% would like to follow other courses in "flipped classroom" mode. For 75 students this method was useful for anchoring new knowledge and it could even help them to prepare for the exam. 88.88% of students considered that the interaction with the teacher was sufficient and 93.83% liked the group work in class.

Conclusion:

The flipped classroom experience was very promising, the generalization of this pedagogical practice for other disciplines requires the cooperation of teachers for the creation of content as well as the sharing of experiences to optimize the application of the flipped classroom.

Keywords : flipped classroom, active pedagogy, satisfaction

1- Introduction

In recent years, there has been a growing interest among academic institutions in Western countries in alternative education models to lecture-based learning, as the latter is no longer considered effective in preparing students for the demands of today's working world. Reverse pedagogy is currently the focus of attention for educators around the world, part of initiatives to make courses less lecture-based and students less passive. [1,2]

The 'flipped classroom' or 'inverted classroom' is defined by Marcel Lebrun as a teaching strategy in which the transmissive part of the teaching is done 'at distance' prior to a face-to-face session, and where learning based on activities and interactions is done 'face-to-face' (e.g. exchanges between the teacher and students and between peers, laboratory activity, seminar, etc.) [3,4].

The flipped classroom (FCL) model can be seen as a reversal of the traditional teaching process, so instead of the teacher giving lectures in class and then giving homework assignments, the lecture will instead be consulted by students at home and the activities will be done in class [5].

Since its emergence, interest in this pedagogical model has continued to grow. [6-10]

In this context, the idea of applying 'the flipped classroom' at the Faculty of Dental Medicine (Tunisia), where most of the theoretical knowledge is provided by the classic lecture-based class model, was very motivating since it opens the doors to a more active pedagogy developing the students' capacity for autonomy in their learning processes.

The aim of this study was to explore the perceptions and satisfaction of Tunisian dental students with their first experience of the flipped classroom (FCL).

2- Methodology:

A descriptive study was conducted among third-year dental students at the Faculty of Dental Medicine ,Monastir (Tunisia) during the 2022-2023 academic year, as part of the experimentation of a removable partial denture course presented using the 'flipped classroom' approach.

The study was approved by the Ethic comitee of the Faculty of Dental Medicine.

- **Presentation of the course that will be used to apply the FCL approach:**

The FCL experiment took place in a course of removable partial prosthesis entitled 'metallic clasps', this course occupies a total time volume of 6 hours in its traditional version (lecture-based class).

In the new version used for the FCL, the designers produced educational video capsules and used the Scenari editorial chain (Editorial Chain Design System for Digital, Adaptable, Reusable and Interactive Content) with its Opale (OPen Academic Learning) documentary model to design self-learning modules relating to the topic of "metallic clasps".

The overall objectives were broken down into various intermediate objectives, with each intermediate objective (or possibly two intermediate objectives) giving rise to the construction of a learning sequence.

As the course was designed according to an action-oriented perspective. Each sequence systematically included a self-learning section on basic knowledge and a face-to-face session enabling various practical exercises to be carried out. The face-to-face sessions were also an opportunity to answer questions and carry out formative assessments.

- **FCL steps :**

1-Prior to the face-to-face session: one week before the face-to-face session, the students were invited to consult at home the self-learning modules relating to the "metallic clasps" course on the Faculty's website and to complete the associated activities.

An individual message was sent to each student via the Faculty platform.

The average time taken to consult the course and complete the self-assessment activities was around 90 minutes.

2- During the face-to-face session : two face-to-face sessions (2hours each one) were designed in order to :

- clarify the concepts perceived as difficult by learners by answering their questions
- carry out practical exercises

- assess the learning acquired by students

Before starting the flipped course, the students were given explanations about how the flipped classroom would work.

- Data collection :

A questionnaire comprising a number of closed, mixed and open-ended questions to explore students' perceptions and their evaluations of the "flipped classroom" as a teaching method.

Students were also, given the opportunity to write a free comment about their experience of the 'flipped classroom'. This questionnaire was filled in anonymously by the students during the face-to-face session of the course.

Microsoft Excel was used to analyse the data and to create graphical representations.

3- Results:

Eighty-one (81) students participated in this study. The overall distribution of students according to sex was as follows: 62 females (76.54%) and 19 males (23.45%), corresponding to a sex ratio of 0.3.

Fifty-three (65.43%) students consulted the course made available to them on the faculty website before coming, and 28 (34.57%) did not. However, 34.56% of students reported having difficulties accessing the internet.

The course was consulted:

- the day before the face-to-face session by 45 students
- two days before by 7 students
- Only one student consulted the course more than two days before the face-to-face session.

Among the students who consulted the course, 45 consulted it only once and 8 consulted it twice (figure 1).

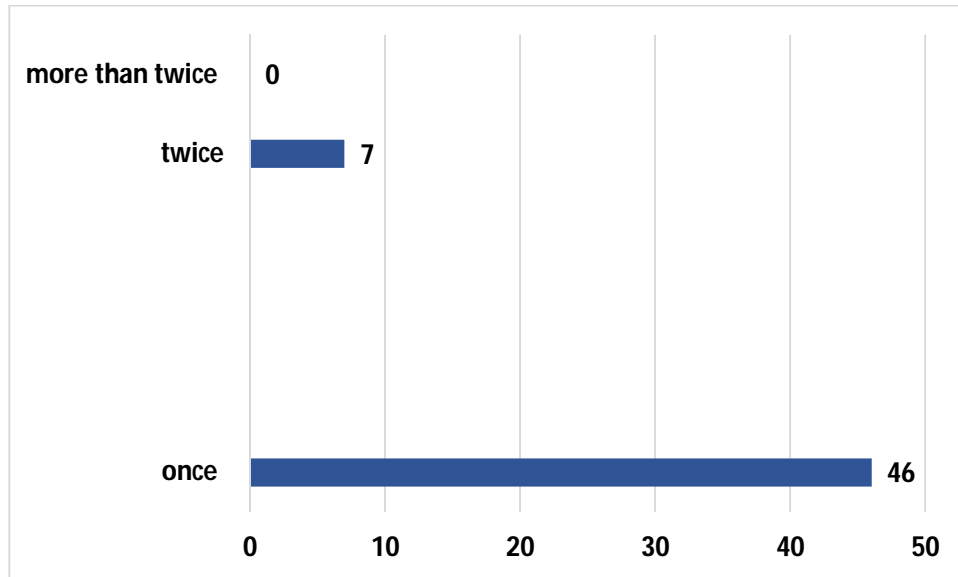


Figure 1 : Number of course consultations by students

The total time allocated by students to consult the materials provided at home is represented in the diagram below (figure 2), only 9 students spent more than 60 min of work at home.

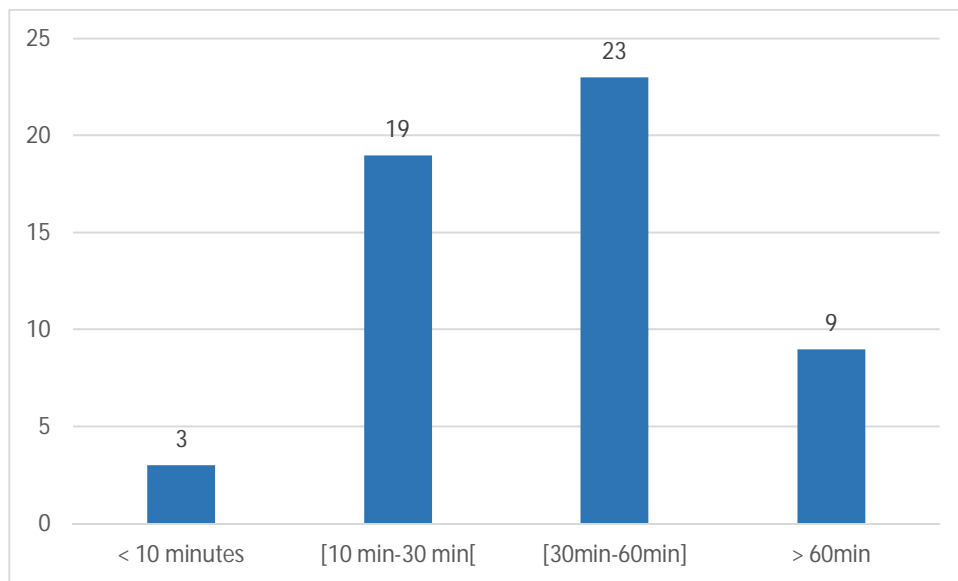


Figure 2 : Students' working time at home

Students' opinions on the usefulness of consulting the course before coming were divergent: 37% of them considered it "very important", 53% responded that it is "important" and 10% found it "not important".

Sixty-nine learners were satisfied to very satisfied with this new educational approach. (Figure 3)

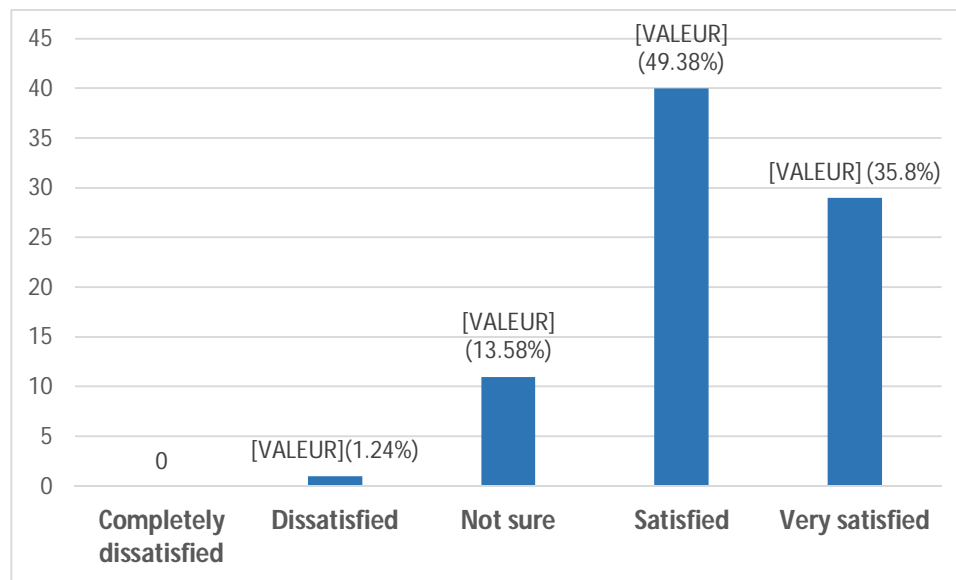


Figure 3 : Distribution of students according to their satisfaction level

A summary of the students' evaluation of their FCL experience is available in Table I.

- Seventy-six students considered that the stated objectives of the course had been achieved.
- For 75 students, this method seemed to be useful for anchoring new knowledge and could even help them to prepare for the exam.
- Most students (96.28%) agreed that their motivation to study removable partial denture had increased.

Following this experience, 93.82% would like to take other courses in 'flipped classroom' mode. 88.88% of students thought the interaction with the teacher was sufficient and 93.83% liked the group work during the face-to-face session.

Table I: Summary of student evaluation of this flipped classroom experiment

	<i>Totally agree</i>		<i>Somewhat agree</i>		<i>Somewhat disagree</i>		<i>Totally disagree</i>		<i>TOTAL</i>	
	N	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Course objectives achieved	22	27.16	54	66.67	05	6.17	0	0.00	81	100
Do you find this method useful for anchoring new knowledge	49	60.49	28	34.56	04	4.50	0	0.00	81	100
The teaching method used in the course has kept you motivated in your study of removable partial dentures	44	54.32	30	37.03	07	8.64	0	0.00	81	100
The teaching method used in this course will help you prepare for the exam	47	58.00	28	34.56	06	7.41	0	0.00	81	100
Do you enjoy group work in the flipped classroom?	52	64.20	24	29.63	04	4.94	1	1.23	81	100
During this lesson there was enough interactivity with the teacher	35	43.20	37	45.68	08	9.87	1	1.23	81	100

The students' responses regarding their preference between lecture-based class and flipped classroom were as follows : 70 preferred flipped classroom, 06 preferred lecture and 05 had no preference.

4. Discussion :

Eighty-one students attended the face-to-face session of the flipped classroom; this number was considered acceptable; especially with the current tendency of medical science students to attend lecture theatres less and less.

Among the students who were present, 26 rarely attended lecture-based class sessions; the fact that they came to the inverted classroom can be explained by curiosity on their part, especially

since the teachers of the Faculty of Dental Medicine were not in the habit of posting courses in advance on the faculty website or contacting them to ask them to come.

Preparation of our students before the course: The FCL approach requires work and involvement on the part of the students: A lack of preparation for the course upon entering the classroom was noted among 28 students who didn't view the materials provided beforehand.

Most of the students who consulted the course did so the day before the FCL session, only 7 consulted it twice. The time allocated by the majority of students for homework before the face-to-face session was less than the average homework time estimated at around 90 min.

The quality of the student/course preparation must be considered, as Bristol explains [11], « the quality of a student's preparation for a course is one of the central elements of the flipped classroom ». This is necessary for the smooth running of the course and its success, since the activities proposed in class are designed based on the principle that learning has been achieved beforehand. Bristol suggests that the quality of preparation may be the main obstacle to the implementation of this approach.

Students who do not work with the materials provided beforehand are unable to do application exercises in class. To overcome this problem, some authors [12] recommend using short summative questionnaires at the beginning of the class to motivate students to consult the course before coming.

However, there may be "free rider" behavior in the summative questionnaire: the student may copy the answers of another student without the teacher realizing.

Other authors have chosen to implement their classes without formally controlling the preparation. According to them, at the beginning the students, not being used to such approach, reproduced their old pattern. However, in the following weeks, the researchers observed better preparation: the students who hadn't carried out this prior preparation ended up understanding the importance of doing it [13, 14].

Another point that was discussed in this same context in relation to the use of ICT (Information and Communication Technologies for Education), is that the content viewed online could be

checked by the teacher. Aware of the information left in the electronic platform regarding their preparation (or lack of preparation), students would have additional pressure to read the course.

Students' perception of the quality of their learning in the "flipped classroom":

In the free comment that the student must make to justify their preference or not for the "flipped classroom", we were able to conclude that the most of students perceived the positive impact of the latter on the quality of their learning.

For a big part of students, this method allowed them to retain information better than in a traditional classroom. They were also able to improve some skills that they consider important for their work after their studies, for example: research skills, social skills, autonomy, independence and responsibility. These responses are consistent with the comments of several authors [15,16] who consider the development of transversal skills that are essential for success in the world of work, as an additional advantage of the flipped classroom. From the results it seems to us that the factor that played an important role in the positive feedback regarding the flipped classroom is the fact that students felt more active in their learning. Hamdan et al. [17] talk about changing the learning culture so that teaching becomes learner-centered.

Impact of the inverted class on student motivation:

According to Dufour [18] "the inverted class promotes the motivation of the student, because he is more involved in the learning process. He therefore feels more in control. In the inverted class, students are more engaged in their learning and seem more motivated because they no longer undergo the course in class, but live it dynamically"

Out of the total of 81 students, 91.36% stated that the teaching method used in the course helps to stay motivated for the study of removable partial prosthesis. Some reasons stated for their motivation were directly linked to the characteristics of the inverted classes such as diversity, flexibility, time efficiency, novelty, the impression of integrating the material more easily, better memorization, more relevant and interesting questions. Another possibility that could explain the motivation of students is that 92.59% of them find that the inverted class offers the possibility to better prepare for the exam.

The possibility of exchange established by the "flipped classroom" within the framework of group work and the dynamics that were established between the members of the group could in turn generate motivation, 64.2% of students appreciated the group work during the face-to-face session. That being said, the role of teacher-student interaction should not be underestimated: indeed, establishing a more horizontal relationship, encouraging exchanges with learners can only increase motivation and commitment in their learning process. This point was highly appreciated by the students, 88.88% of whom felt that the interactivity with the teacher was sufficient.

Impact of the flipped classroom on student satisfaction:

The overall satisfaction rate was 80.88%, this was in line with data from the literature where most research has documented a higher satisfaction rate following the implementation of the flipped classroom compared to the traditional lecture course [12,19]. 70 students responded that they preferred this new approach compared to the traditional approach, this could be explained by the interests of the inverted class that they approved by experiencing it.

However, several authors [14,20,21] have observed a certain dissatisfaction among students. The percentage of dissatisfaction in the study of Leicht and Zappe [21] was 21%, the authors noted that there could be a link between student satisfaction and the design of the course, as well as the general quality of the production of the teaching material.

Mason et al. [22] pointed out in their study that students only really got used to the approach after a certain time.

Another way to interpret this dissatisfaction is the disparity between the teaching model proposed in the inverted class (facilitator model) and the lecture model (transmissive model) [23]: Students had expectations formed on the teaching models they had previously been confronted with. The mismatch between these expectations and what actually happens in the classroom could cause dissatisfaction among some of them [24].

Among the significant experiments conducted at the university, the Pedagoginnov project [25] suggests that students adhere very differently to the inverted classroom system. Some more than others show resistance to change without it being possible to truly explain the cause.

As far as we are concerned, the need to develop professional autonomy for future dentists justifies that we must promote a certain autonomy in their learning, which very well justifies our use of this method.

According to Bissonette and Gauthier [26], it is more appropriate to combine the inverted classroom and the traditional classroom in order to meet the needs of a maximum number of students.

Study limitations:

Despite the results collected during this first Tunisian study in relation to the application of the FCL, certain limitations existed in relation to the particularity of the system itself, which presents a form of inverted classroom among others, which constitutes a limitation; in fact, our experimental system does not reach level III or "the super inverted classroom".

The effectiveness of the inverted classroom in terms of student success was not addressed by our study, on the one hand it requires "a test group" and a "control group" which could reveal an ethical problem.

Conclusion

The inverted classroom is an approach likely to irrigate university innovation and promising change because it integrates many psychological, pedagogical, techno-pedagogical approaches. A better knowledge of these will make it possible to build a more effective teaching practice for learning dentistry.

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