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Difficulties of Learning Endocrinology: Case Study of ENS Tetouan Students in Morocco

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ABSTRACT

This study was conducted in the Ecole Normale Supérieure in Tetouan to detect the major difficulties that Moroccan students encounter in their learning of endocrinology and hormonal communication. To do this, we used semi-directive interviews to receive the opinions of these students in their learning of this subject. The final results of this survey have allowed us to identify the following difficulties according to the students: the inability to memorize the number of hormones, the complexity of the notions of endocrinology, the absence of material for practical work, the lack of supervised work sessions and the insufficiency of the time allocated to this subject. In conclusion, it turned out that the best way to help these students in their learning of endocrinology is to offer them a learning environment based on the diversified use of information and communication technologies. In other words, the well-thought-out use of tools such as digital animations could significantly increase the number of practical exercises to be performed.

INTRODUCTION

The increasing importance of science and technology in our lives has led to the recognition of science education as one of the major issues for the future of our societies. There has been a growing emphasis on science education, that is, the need for young people to acquire a basic education in science to enable them to use knowledge in the varied contexts of their daily and social lives and to encourage them to pursue specialized studies in scientific or technical fields at the graduate level (Nasser et al., 2017).

Indeed, endocrinology is the science that studies hormones and regulations related to the endocrine glands from a physiological and pathological point of view (Makrane, 2020). Let us specify that this discipline is closely linked to the notion of hormones. It is in fact a concept that was born during the impact of scientific progress. It is a medical specialty that dates back to 1912.

It should be remembered that the history of endocrinology began with sexual endocrinology after Van de Velde in 1904 demonstrated the

biphasic characteristics of the female genital temperature curve during the genital cycle, the explanation would not come until some thirty years later, with the discovery of a double hormonal secretion of the ovaries. However, learning endocrinology at university allows students to have a clearer vision of the functioning of different hormones governing human development, fertility, metabolism, and the maintenance of balance (fmed.ulaval.ca).

Given the importance of this subject and the complexity of this teaching unit, we have tried through this research to discover and explain the different causes that are at the root of the difficulties encountered by the students of ENS Tetouan in their learning of endocrinology. To this end, we met with them and discussed their difficulties in learning the module at school. Thus, as we have specified in the previous lines, the major concern of this study is to answer the following question: What are the major difficulties encountered by the students of ENS Tetouan in their learning of endocrinology?

To answer this question, we have set the following objectives: (1) To conduct a state-of-the-art review of the teaching and learning of endocrinology to establish an interview guide, (2) Collect and analyze the opinions of the students targeted in this study. These are the two objectives that we will try to pursue throughout this work.

METHODS

To carry out this survey, we used a sample composed of 19 students regularly enrolled in the SVT program at our host institution. Data collection was carried out through semi-directive interviews. To facilitate this task, we used a dictaphone to quickly record the interviewees' speeches, which were then transcribed in the form of verbatims. It should be noted that all the questions used in this exchange with our respondents were essentially related to the learning difficulties concerned. As for the analysis of the collected data, we used the method of "content analysis (concept mapping, counting of propositions, expressions...)" (Huberman and Miles, 2002), to discover the essential information contained in the words of our interlocutors.

RESULTS AND DISCUSSION

Problems encountered in learning endocrinology

The data collected at the end of our study show that the main difficulties experienced by the students in this module are: the complexity of the content of the module and the insufficient time allocated to learning endocrinology. Indeed, according to the majority of the respondents, there are a large number of hormones to study and memorize. A large proportion of these students raised problems related to the delicacy of the concepts of endocrinology (difficulties related to the part of regulation and cell signaling).

Furthermore, our results show that the biggest problem revealed by our students during these interviews is the lack of organization of practical work in the endocrinology course. Here are the verbatims of some students consulted on these points. For further clarification, it should be noted that in this section we have used a sample of 5 verbatims from 5 different students to present the testimonies collected from our students.

What are some of the problems you encounter when learning about endocrinology?

Students	verbatims
Student 1	"(...) Time, concepts, the complexity of the names of the hormones, example of the hormone PEP, the different glands".
Student 2	"Hormones are numerous and you must know in detail the role and place of production of about 27 hormones".
Student 3	"The number of hormones and their complicated names are difficult to remember".
Student 4	"There are a lot of hormones in the course and these are very similar and may have the same role".
Student 5	"A problem with a large number of hormones, the complexity of the names of the hormones, the similarity of the names of the hormones".

Some verbatims on the confirmation of the non-realization of the TP of endocrinology: Have you done any endocrinology lab work?

Students	verbatims
Student 1	"No".
Student 2	"No, I did a lab in the nervous system".
Student 3	"No, I did a lab in the nervous system as well as in geology".
Student 4	"No, I did a lab in the nervous system".
Student 5	"No, just in the nervous system".

The most difficult chapters in learning endocrinology according to students. According to the students, the most difficult chapters to assimilate in this module are respectively. Signaling and cellular communication (very difficult, 5); The different modes of signal transmission (difficult, 4); Hormonal regulation (moderately difficult, 3); Mechanism of hormonal action (not very difficult, 2); Endocrine glands (less difficult, 1).

Students' suggestions for improving the quality of their learning. To overcome all these problems, the students think that the regular organization of the TP and TD sessions, but also the recourse to the rational use of the Information and Communication Technologies (ICT), for example, the use of interactive graphic animations to simplify and facilitate the comprehension of different concepts of

endocrinology can be effective solutions to improve the quality of the teaching and the learning of this subject. They also suggested if possible that their teachers make use of active pedagogies in the teaching-learning of this subject. Here are some verbatims that illustrate the students' views on the different solutions to be used to improve the quality of their endocrinology course at ENS Tetouan:

Students	verbatims
Student 1	"Digital animations"
Student 2	"Explanatory videos (...) "
Student 3	"TDs, exercises"
Student 4	"Explanatory videos, animations, practical work, increase the number of TDs".
Student 5	"(...) videos on hormone secretion, increase the number of TDs, make visits to the lab to actually see how hormones work".

Our results show that there is a problem with the complexity of the content of the endocrinology module and the amount of learning time allocated to this subject. Logically, these students encounter difficulties in this discipline. After checking and analyzing the national program, we realize that this module is not taught at the college or high school level, and this, is due to the heaviness of the curriculum of this teaching unit. Hence the problem is justified.

Our results still show that the students suffer from a difficulty related to the understanding of the concept of this module, we think that this situation could be justified by the fact that their learning is based on non-active teaching methods. It could also be justified by the low level of knowledge that these students have in the fields related to endocrinology (animal biology, animal physiology, etc.). Moreover, for Legendre (1994), the goal of didactics is not only to make knowledge accessible to the learner but also to make it meaningful, usable, and transferable to other contexts than the one in which it is transmitted.

The results also show that there is a real absence of practical work. This state of affairs could be due to the lack of teaching time allocated to this subject, but also to the absence of material for this kind of practice in the laboratory. Therefore, the teachers, faced with this sad reality, are obliged to

multiply the number of lectures to quickly finish their time.

CONCLUSION

The results of our study show mainly that there is a really big problem of non-performance of practical work in endocrinology, and this problem really deserves to be treated with great seriousness by the concerned authorities to improve considerably the teaching and learning of this discipline in Morocco. We think that it is really time that the Ministry of Education invests totally in the resolution of this problem, by trying to clean up the learning environment of the students by offering them for example the necessary materials (equipping laboratories, etc..) able to help them to better learn their lessons. And above all, to regularly equip teachers with the organization of professional training focused on the use of ICT in teaching and active pedagogies.

In conclusion, this research is very important insofar as it emphasizes the importance of improving the quality of endocrinology teaching in Morocco, precisely at the ENS of Tetouan. For this purpose, ICT (interactive graphic animations, explanatory videos...) and the use of active pedagogies are the alternatives proposed by the students consulted to simplify, explain, and modeling concepts that remain to these days difficult to assimilate with these students.

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