

The use of ICT by secondary school teachers of Life and Earth Sciences in teaching immunology

Aicha Tarichen¹, Rajae Zerhane¹, Rachid Janati-Idrissi¹.

¹ Laboratoire Interdisciplinaire de Recherche en Ingénierie pédagogique, Ecole Normale Supérieure de Tétouan, Abdelmalek Essaadi University, Tetouan, Morocco, aicha.tarichen@gmail.com

Abstract— During the past decade there has been an exponential growth in the use of information and communication technology (ICT) which has become one of the basic building blocks of modern society. ICT have been increasingly embedded in education reforms that aimed to develop students' skills such as, reinforcing self-training, promoting the construction of scientific concepts, to enrich students' knowledge and overcome some learning obstacles.

In this research, a quantitative approach using a questionnaire survey was carried out anonymously among teachers of life and earth sciences in secondary schools, which are sampled from 11 Regional Academies of Education and Training of Morocco, in order to explore the use of ICTs by these teachers to overcome students' obstacles and difficulties on some immunological concepts.

The analysis of the survey's results found that ICTs and educational digital resources are used by teachers of life and earth sciences to support student learning. ICTs have a positive impact on solving problems encountered in the process of learning immunological concepts. On the other hand, the educational digital resources available are insufficient and inadequate for level of the learners.

Index Terms— Perception, Obstacles, Immunology, ICTs.

1 INTRODUCTION AND PROBLEMATIC

During the past decade there has been an exponential growth in the use of information and communication technology (ICT) which has become one of the basic building blocks of modern society and have been increasingly embedded in education reforms. In this regard, the Higher Council of Education, Training and Scientific Research has emphasized the need for renovating the pedagogical practices through a judicious integration of ICT and promoting widespread access to ICT programs for both students and teachers [1].

The use of ICT in education can increase access to learning opportunities. It can help to enhance the quality of education with advanced teaching methods, improve learning outcomes and enable reform or better management of education systems [2].

ICT is part of teaching material supporting the teaching of Life and Earth Sciences (LES). The integration of ICT in teaching (LES) aims to achieve a set of objectives, including: Reinforce self-training, promote the construction of scientific concepts, enrich Students' Knowledge and overcome some learning obstacles [3].

In every field of knowledge, students have erroneous perception. Students' perceptions are intellectual tools that students think with, and this explains why they persist and resist changing [4].

Misconceptions have been observed, by teachers of LES, among learners after they learn immunological concepts, such as: microbes, antigen, self and non-self, innate immunity, acquired Immunity, lymphoid organs, Immune cells, immune cells' collaboration [5].

The perceptions of the students on the concepts of vaccination, vaccine and antibodies are still influenced by their common social knowledge, even after following a supposed course

help them build a scientific knowledge. The analysis of student responses allowed us to highlight some persistent misperceptions, with the properties of resistance and continuity, which may impede the assimilation of some concepts of Immunology during higher education [6] [7].

These resistant misperceptions in immunology are serious obstacles that hinder the acquisition of immunological concepts. Classical education does not permit students overcoming these obstacles. Hence the need to search for other remediation practices integrating ICTs.

Research question: In order to approach the use of ICT by teachers of LES and to study the impact of ICT on overcoming immunological obstacles, we ask the following two research questions: First, Do teachers of LES use ICT in teaching immunology? Second, could ICTs be an alternative means to remedying learning obstacles?

2 THEORETICAL FRAME

2.1 ICT

Information and communication technology, or ICT, is defined as the combination of informatics technology with other, related technologies, specifically communication technology [8].

ICTs are used to reinforce self-training, promote the construction of scientific concepts, enrich knowledge and motivate students [3].

The use of ICT has a positive effect on many areas of attainment in science. Through the use of ICT, pupils have improved their understanding of scientific concepts, developed problem-solving skills, been helped to hypothesise

scientific relationships and processes, and improved their scientific reasoning and scientific explanations [9].

2.2 Misconceptions: a learning obstacle

Misconceptions arise from students' prior learning, either in the classroom or from their interaction with the physical and social world. They can be stable and widespread among students and can be strongly held and resistant to change, interfere with learning expert concepts. There are differences between student ideas and corresponding expert concepts created. Rather than being momentary conjectures that are quickly discarded, misconceptions consistently appear before and after instruction in substantial numbers of students in a wide variety of subject-matter domains and are often actively defended. Because misconceptions are so prevalent, learning science must involve a shift away from misconceptions to expert concepts. This shift is often characterized as replacement: More adequate expert ideas must be developed and replace existing misconceptions [10].

3 OBJECTIVE AND HYPOTHESES

The overall objective of this study is to determine the level of ICTs use by teachers of LES in teaching immunology and the impact of ICT on overcoming immunological obstacles.

Our study will try to verify two working hypotheses:

- Teachers of LES use ICTs in the teaching process of immunology,
- Teachers think that ICTs have a positive effect in overcoming learning obstacles.

4 METHODOLOGY

In this research, a quantitative approach using a questionnaire survey was carried out anonymously among 104 teachers of LES in secondary schools: 64 college teachers and 40 qualifying teachers, which are sampled from 11 Regional Academies of Education and Training of Morocco, in order to explore the use of ICTs by these teachers to overcome students' obstacles and difficulties on some immunological concepts.

Rather the questions were designed to provide information on the level of ICT use by teachers of LES in teaching immunology. The questionnaire consisted of 11 items: general questions and questions related to the use of ICTs in teaching immunology, the impact of the impact of ICT on overcoming immunological obstacles, educational digital resources used by teachers and their adequacy with school curriculum.

5 RESULT

5.1 The use of ICTs by teachers of Life and Earth Sciences

More than half (54.5%) of teachers said they were adopting ICT and educational digital resources as a solution to overcome the obstacles encountered by students.

5.2 Effectiveness of ICT

According to these teachers, ICT has enabled the overcoming obstacles to assimilation immunological concepts. These educa-

tional digital tools had a positive effect in resolving problems encountered during the teaching / learning process.

5.3 Effectiveness of ICT

Educational digital resources most used by these teachers were: flash animations, educational digital videos, 3D modeling of immunological phenomena, PowerPoint presentations and images related to the discipline.

These resources were scarcely realized by the teachers themselves, but rather downloaded from various scientific websites such as Edumedia, or even the YouTube site when it came to scientific videos.

5.4 Adequacy of educational digital resources

However, these educational digital resources were considered insufficient by 63.6% of teachers and inadequate by 54%, both in terms of language and achievement of the objectives set out in the school curricula.

7 CONCLUSION AND PERSPECTIVES

7.1 Appendices

This study shows that ICTs and educational digital resources have been used by teachers of LES. The use of ICT had a positive effect in resolving problems encountered during the teaching / learning process of immunology. On the other hand, the available resources remain insufficient and inadequate to the learners' level. Hence the need for a project to produce educational digital resources adapted to the needs of Moroccan learners.

As perspective of this research, an e-learning module in immunology will be designed and implemented in order to:

- Evaluate the impact of an e-learning course in immunology on the assimilation of immunological concepts by students and, thus, its effect on the remediation of obstacles and difficulties encountered during immunology learning.
- And also, to study the level of motivation of these students in this new way of learning.

REFERENCES

- [1] Oulmaati, K., Ezzahri, S., & Samadi, K. (2017, 2). The Use of ICT in the learning process among the students of History and Civilization at Abdelmalek Essaadi University, Morocco. *International Journal of Scientific & Engineering Research*, 8(2), 972-979.
- [2] UNESCO-UIS;. (2009). Guide to measuring information and communication technologies (ICT) in education.
- [3] Ministère de l'Education nationale. Maroc : Laboratoire National des Ressources numériques. (2013). Guide de l'intégration des TIC dans l'enseignement des Sciences de la Vie et de la Terre.
- [4] Astolfi, J.-P., & Peterfaivi, B. (1993). Obstacles et construction de situations didactiques en sciences expérimentales. *Aster*(16), 103-141.
- [5] Tarichen, A., Aidoun, A., Zerhane, R., Madrane, M., Janati-Idrissi, R., & Laafou, M. (2015, 3). Implications didactiques des TIC dans l'enseignement de l'immunologie. Centre de recherche et de développement en éducation (crde), 26-28

- [6] Aidoun, A., Zerhane, R., Dardri, M., Madrane, M., Janati-Idrissi, R., & Laafou, M. (2014, 1). Diagnostic des conceptions des apprenants marocains relatives à certains concepts d'immunologie. Centre de recherche et de développement en éducation(17), 13-14.
- [7] Aidoun, A., Mahdi, K., Tarichen, A., Zerhane, R., Madrane, M., Janati-Idrissi, R., et al. (2016, 6). Students' perceptions on some immunological concepts. .Vol.16 No. 3. International Journal of Innovation and Applied Studie, 16(3), 503-512.
- [8] UNESCO. (2002). Information and communication technologies in education: A curriculum for schools and programme of teacher development.
- [9] Cox, M., Abbott, C., Webb, M., & Blake, B. (2003). ICT and attainment. A review of the research literature. Coventry: Becta (ICT in Schools Research and Evaluation Series).
- [10] Smith III, J., diSessa, A., & Roschelle, J. (1993 - 1994). Misconceptions Reconceived: A Constructivist Analysis of Knowledge in Transition. The Journal of the Learning Sciences, 3(2), 115-163.

IJSER