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# Digitization in teaching and learning physical sciences

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*Abstract :* In order for this research to highlight the effectiveness and suitability of teaching physical sciences based on digitization, an electronic form was used to collect 73 contributions from physics and chemistry teachers who expressed their opinions. Among their opinions was that there is no escape from conducting experiments in front of the learners' eyes and ears so that physics and chemistry maintain their experimental character that expresses reality.

***IndexTerms*** **- Digitization, Physical Sciences, Teaching.**

## I. GENERAL INTRODUCTION

Paying attention to the issue of learning has become an imperative necessity due to its great importance in our daily lives and In a world where technology is spreading at an incredible speed and digital systems are increasingly integrated into multiple fields, important questions are being raised about the role of experimental activities in teaching physics and chemistry. Experimental education is an essential part of teaching science subjects, as it contributes effectively to enhancing students' understanding and developing their research skills..

Teaching with technology and digital experiments is an integral part of the future. This raises important questions about the role of experimental activities in teaching physics and chemistry in secondary schools..

Through this research, we will address the importance of experimental activities in teaching this scientific subject. We will seek to answer questions about the effectiveness of digital experiments in facilitating students' understanding of physical phenomena, and whether these experiments can replace real experiments. On the theoretical side, we will know some basic concepts related to the experimental method, some types of experiments adopted in teaching physics and chemistry, as well as the concept of experimentation.

As for the practical side, we will analyze the results of an electronic questionnaire directed at physics and chemistry teachers in secondary school, through which we will seek to understand the importance of real experiments for them, and the extent of their readiness to use information and communication technology to provide digital experiments to students. We will also conduct a field study to highlight the difference between using experiments

Reality and digital experiences and their effects on students' understanding of some scientific topics.

**Research objectives:**

Through this research, we will seek to achieve the following objectives:- Highlighting the role of both real and digital experiments in teaching physics and chemistry. - Highlighting the advantages and disadvantages of each.

- Conducting a field comparison between the effectiveness of real experimental activities that include the use of actual materials and tools and digital experimental activities that are implemented using a computer, and the extent of their impact on developing the scientific sense among learners.

**Research problem:**

Teaching physical science is a challenge for teachers because it is a tangible and realistic subject that deals with and studies phenomena that the learner observes in his environment. This makes experimental activities necessary for the learners to understand and comprehend the content. However, teachers of the subject often face several obstacles, either due to the lack or absence of laboratory equipment, lack of time, or the danger of the experimental activities themselves to the learners, which prevents the completion of the experimental activities, which negatively affects the learners' comprehension and understanding of the subject in a better way. In light of these obstacles, some teachers rely on digital experiments as an alternative to real experiments, as virtual reality technologies and interactive software can be used to simulate experiments..6Which leads us to ask a major question about the extent to which replacing real experiences with digital experiences affects learners' understanding and comprehension..

**Importance of research:**

The importance of this study is highlighted by:

- Contributing to the development of the teaching process of physics and chemistry in secondary education, which positively reflects on the performance and achievement of learners.

- Highlighting the importance of experimental activities in the context of teaching physics and chemistry at the secondary level. - Enriching the discussion on the effectiveness of digital experimental activities and to what extent they can replace real experiments in order to achieve learning objectives.

**Reasons for choosing the topic:**

- The lack of real experiments carried out by physics teachers, and their description to learners is limited to using documentary activities that describe the experimental protocol carried out, with the presentation of the results obtained, or reliance on digital experiments presented to learners via the computer.

- Weak academic achievement and insufficient or limited understanding of scientific and physical concepts by learners.

In this section, we will present the results we reached during the field experiment, in addition to analyzing the data of the electronic questionnaire that was directed to practicing physics and chemistry teachers in the preparatory and qualifying secondary levels. These results will be used to verify the validity of the hypotheses that were set at the beginning of the research.

## II. RESEARCH METHODOLOGY:

After preparing a research questionnaire, we shared it with a group of practicing physics and chemistry teachers in secondary education, whose objective was to understand and evaluate the different experiences and interactions of teachers with experiments, both real and digital, to what extent they involve learners. By completing it and studying the impact of this on students' performance and their interaction with the lesson, we reached 73 forms containing teachers' responses on this topic.

## III. RESULTS AND ANALYSIS:

Most of the professors participating in filling out this form are females, as their percentage reached 58.9%, while the percentage of male professors reached 41%.

The sample studied consists mainly of secondary school teachers, as this category constitutes about 63% of the total sample, while secondary school teachers represent about 37% of the total sample studied.

By examining the above data, it becomes clear that the research sample is diverse in terms of the professors' experience and length of work, as the percentage of professors with less than 5 years of experience represents the largest percentage, followed by the percentage of professors with experience between 5 and 20 years, then the percentage of those with experience of more than 20 years.

From the above data, it is clear that the sample is diverse, as it consists of 9.6% of teachers working in rural areas, 63% of teachers working in urban areas, while 27.4% work in semi-urban areas. It is noticeable that the largest percentage of participants in this questionnaire they work in urban areas.

Teachers sometimes rely, at a rate of approximately 47.9%, on experimental activities to complete the lesson, while about 35.6% of them always rely on these activities. It is noted that there is a small percentage of teachers who do not rely on experimental activities to complete the lesson.

33.8% of professors rely on digital experiments to a greater extent than real experiments, followed by 28.2% of professors who are satisfied with digital experiments only.While we find 25.4% of professors who resort to both types of experiments, but with the adoption of experiments.

12.7% of teachers who are satisfied with completing real experiments only.

Most professors resort to digital experiments to a large extent due to the lack of laboratory equipment, which is consistent with the significant proportion of unequipped or unequipped educational institution laboratories. Enough. This is followed by 40.6% of teachers who are satisfied with digital experiences due to lack of time, then rate 21.7% due to not receiving training in the practical aspect of the subject, and finally 11.6% of the professors who rely on this type of experiments only because of its ease.

## IV. DISCUSSIONS:

During our research, we found that real-world experiential activities clearly and positively contribute to improving learners' performance and increasing their understanding of the material compared to digital activities. While it is important to be open to digital experiences in tune with the digital age, true experiential activities cannot be removed, but rather should be seen as the foundation, with digital experiences used only as a means complementary.

Finally, it becomes clear to us the importance of maintaining a balance between real and digital experimental activities, considering real experimental activities as the basis of the educational process to obtain better results.

It should also be noted that the results of this study are limited in scope, as they were conducted for a section of a specific academic level (scientific common core, French option).

## V. CONCLUSION:

Virtual experiments in physics and chemistry are tools that help learners better understand physics concepts, as they allow them to conduct practical experiments without the need to have actual physics laboratories. The spread of modern technologies has led to the emergence of a large number of these websites, which provide exciting and useful physics experiments for students. They are valuable tools for learning physics and chemistry and motivate learners to interact with study materials in a fun and interactive way.

## REFERENCES:

-Al-Hazmi, D. The effectiveness of using the virtual laboratory in teaching a unit of the physics course for female students in the second year of secondary school on academic achievement. Journal of the Faculty of Education, Al-Azhar University. Mug. ,35 p. 168 Part One. (2016).

-Kabeer, A. And Abdel Moneim, M. The trend towards using virtual laboratory technology in teaching among science teachers at the secondary level in Gedaref State, Al-Butana University, Deanship of Research Scientific, publishing and translation. Mug. ,5 p. ,1 p. p. 159-188 (2017).

-Abdel, E. The effect of using the virtual laboratory on the academic achievement of physics for first-year intermediate school female students. Journal of the College of Basic Education. Volume 25, Issue 103. (2019)

-Al-Hafiz, M. Wajhar, A. The virtual laboratory for physics and chemistry experiments and its impact on developing the powers of observation for middle school students and their cognitive achievement. International specialized educational journal. Mug. ,1 p. 8, pp. 31-7. (2012).