

# Survey on the use of ICT in Physics in Moroccan Schools

Bouchra Gourja, Malika Tridane, Said Belaaouad

**Abstract**— Morocco, like all developing countries, has understood the importance using and integrating ICT in the education system. The ICT are tools and resources required by the National Education programs to support teachers in their courses while increasing student understanding. The Ministry of Education (MEN) has made significant efforts to equip schools with computers. The objective of this work is to show the level of employment of ICT to Moroccan schools and what can still impede its use. For this reason, we conducted a survey on high school teachers, to measure the degree of use of digital resources. The analysis of our survey showed that more than half of high school teachers use digital resources as a teaching aid for the lessons of physical sciences. However, some teachers who have not benefited from ICT training by the department do not use digital resources in their course or not enough. Despite the MEN having made some digital resources available, these teachers do not know how to exploit them. Some teachers who have many years of experience in teaching think wasting time using ICT.

**Index Terms**— ICT, digital resources, secondary education, Moroccan schools.

## I. INTRODUCTION

The information and communication technologies ICT are increasingly used in education. This is a recommended way to support the training of students, making it more efficient and easier to manage several school activities. International studies consider that ICT bring a clear advantage to student learning, offering a wide variety of media. In this regard, Morocco, like all developing countries, has understood the importance of using and integrating ICT in the education system. For this reason, the Moroccan government has adopted, since 2005, a program called "GENIE", with the aim of generalizing these technologies to better integrate them in the education system and training. The ICT are now integrated into the CRMEF (regional center of professions of education and training) in Morocco. In this work we will study the degree of use of ICT in teaching high school physical science by presenting an experiment conducted in schools in Morocco, for this we have prepared a questionnaire which measures to what extent which high school teachers are using digital resources in the classroom.

**Manuscript published on 30 August 2016.**

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## II. ISSUE

We intend to make a focus on the use of ICT by the physical sciences' teachers in high schools. The ICT are tools and resources required by the National Education programs to support teachers in their courses while increasing student's understanding. The Ministry of Education (MEN) has made significant efforts to equip schools with computers. The widespread access to these technologies is the subject of one of the main levers of the National Charter of Education and Training : "Considering that educational technology plays an important and growing role in the systems and teaching methods ..., education authorities and training will seek to integrate these technologies into the school's reality", lever 10 section 121 of the National Charter of education and training [1]. The uses of ICT in physical chemistry are classified into 3 categories: computer-assisted experiments CAEx, modeling and data processing. Our job is to investigate the use of ICT by teachers, during their exercise, if so what kind of digital resources? Are the ICT well integrated during the courses? Otherwise What are the barriers to it integration?

We make the following assumptions: The use of ICT tends to attract the interest and motivation of learners, and also to compensate the lack of material for experiences. However, some teachers do not use ICT during their courses, they declare wasting time using digital resources or perhaps they do not master these tools.

In high school the ICT are used in physics for:

- Make a working internet research (history of science,)
- Write a report, presentation or prepare a computer-assisted presentation of an experiment in class, or a research work done outside school hours.
- Conduct an experiment by automating measurements and recording.
- Exploiting the digital data of an experiment using a spreadsheet - grapher.
- Simulating experiments that can not be done in the class (in case of shortage of materials or because of the dangerous nature of the experiment): effect of a short circuit on a domestic power supply, changes in kinetic and potential energy during a fall,
- Exploit a video for the study of motions: a body falling, energy study relativity of motion.
- Understand some physical laws using software, simulating phenomena in real time representing the evolution of speed or other values. [2]

There are three ways to look at the impact of ICT in the classroom, according to an optimistic, a pessimistic view and depending on the more unbiased approach: academic research.

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Optimists regain perspective Papert (1980) which suggests that ICT will revolutionize the school and they will significantly improve student outcomes. Pessimists are with ICT students are too sedentary and too isolated from each other. They seemed suspicious of market enterprises technology for schools. According to Reynolds et al. (2003), empirical research is not clearly involved on the impact of ICT. However, many works still converge that it is essential to use ICT as a tool for teaching. [3]

### III. WORKING METHODOLOGIE

We conducted a survey to measure the level of employment of ICT and causes that prevent their use on secondary teachers. To do this, we developed a questionnaire for teachers of physical science in high schools across Morocco. This questionnaire is based on their years of work, training in ICT that they received and the use of digital resources in the classroom as well as the advantages and disadvantages of their use, the questionnaire was distributed to 240 teachers of qualifying schools.

### IV. ANALYSIS OF THE RESULTS

#### A. Distribution gender

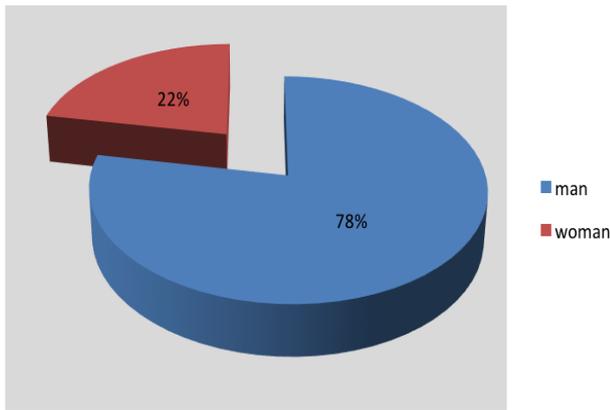


Fig.1 Distribution gender

Teachers who responded to our questionnaire are mostly men 78% and 22 % women.

#### B. Years of seniority teachers

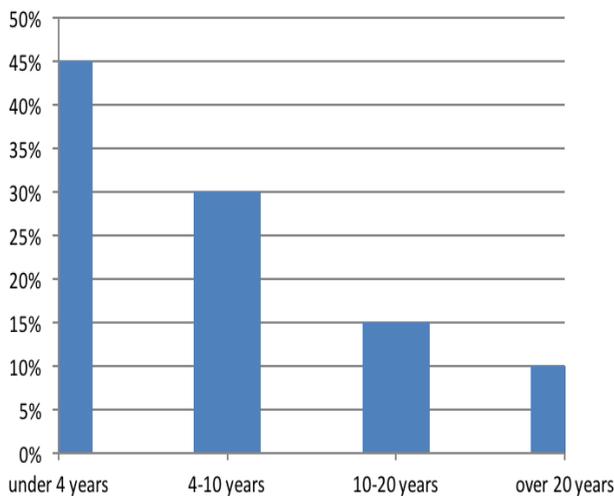


Fig.2 Years of seniority teachers

The majority of targeted teachers are under 4 years in education. This generation of young teachers is familiar with the use of digital resources and in addition they have received ICT training within CRMEF (ICTE CRMEF are part of the program since 2012).

#### C. University level teachers

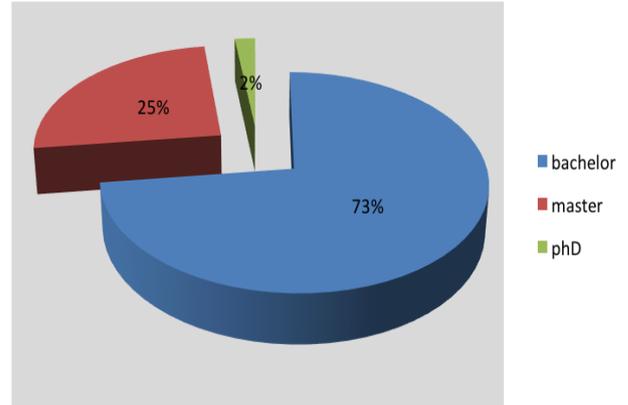


Fig.3 University level teachers

73% of teachers have a license and 30 % have a master .

#### D. Use ICT in classroom

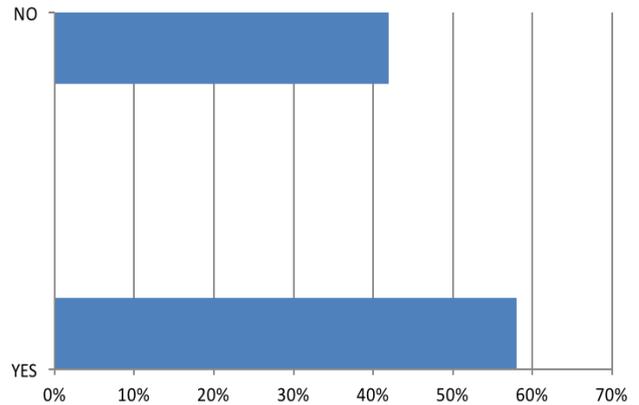


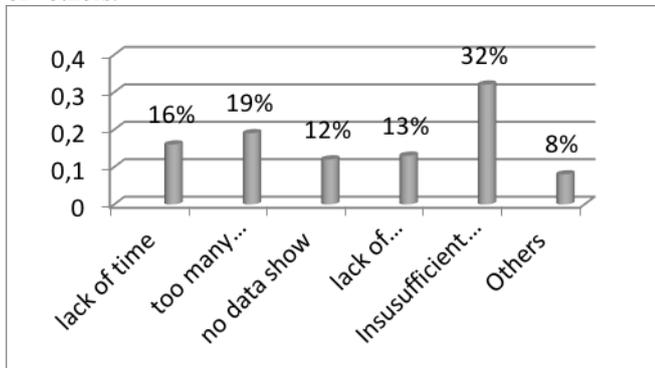
Fig.4 Use ICT in classroom

We note that 58% of teachers use ICT in the classroom. We can explain this result is that these digital resources are considered as a solution when there is a lack of experimental equipment at the laboratory (tube NEWTON, mining equipment ...). ICT motivate students, the later being a generation that often uses the computer. The ICT also save time when experiments are repetitive or when there is calculation to make. Indeed, the use of the experience of CAEx ph-metry in acid-base assays during the lesson in first year BA Mathematics helped to hold the attention of students and save time. However, an even larger share of teachers 42% do not use ICT in the classroom because of their inability to use of modern technology (or not received enough training). Some also think wasting time using the ICT, citing an overloaded program in secondary schools in Morocco.

We conclude that too many teachers do not use digital resources in the classroom in high school physical science.

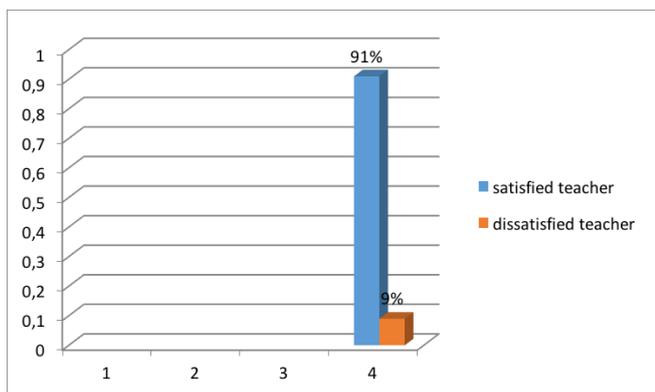
**E. Obstacles to the integration of ICT**

We asked an open question about the obstacles that prevent teachers to use ICT in progress . We received several responses with different percentages . The following figure shows the obstacles that have brought the highest percentages and we have gathered the answers that have a low percentage of "others."

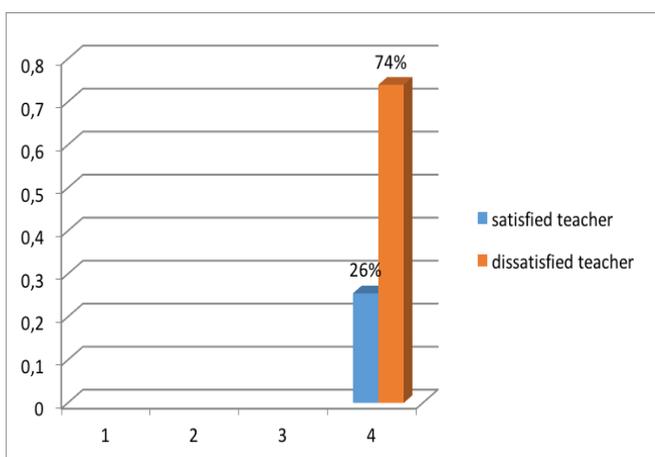


**Fig.5 Obstacles to the integration of ICT**

We looked at the major obstacle is the lack of training in ICT ; we searched the percentage of teachers who found insufficient training for both categories in our sample.



**Fig. 6 teachers opinions Percentage who received training in ICT at CRMEF**

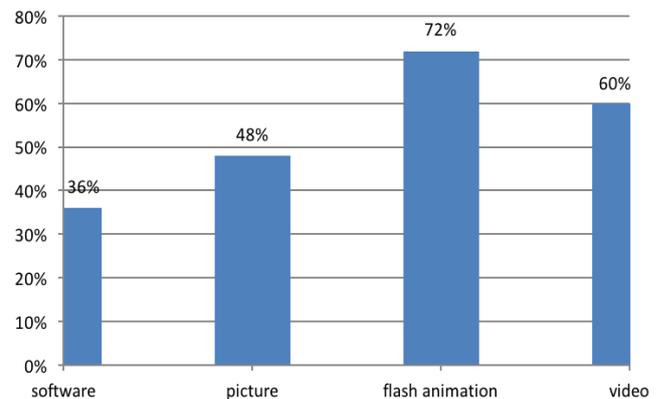


**Fig. 7 Percentage opinions of former teachers**

This diagrams (fig. 6 and 7) shows the lack of training in ICT for elders and efficiency of the training given to CRMEF. Indeed, it is spread over one semester and is based on classroom lectures followed by business applications on probation in public institutions, unlike that given to elders whose duration does not exceed a few days. We felt that the

improvement the use of ICT must go through a curriculum changes and the development of teaching materials and increased frequencies of continuing education for former teachers. Regarding other obstacles ( figure 5), we believe that this study confirms those that were previously done qualitatively ( Biaz and al, 2009) [4] and (Mastafi ,2013) [5] but there has been an evolution regarding the weight of each obstacle. I suggest to provide commissions which are responsible for treating each of the obstacles and propose an action plan tailored to promote the use of ICT by teachers.

**F. Type of digital resources used**



**Fig.6 Type of digital resources used**

We note that there is a disparity in the use of digital resources, we find that the animations are digital resources the most widely used with proportions of 72% because they replace the experiences that can not be performed in the laboratory and they simplify the phenomena we can not explain in class (the core level atomic model, radioactive decay second year bachelor and section movement of satellites and planets). Videos are used to 60% because they are easily downloadable and allow to see the experiences that have not been realized in the classroom by lack of equipment if it is expensive. Images are used with a percentage of 48%, and finally the simulation programs (36%). This low percentage of the use of simulation software returns to the fact that the Ministry of Education has trained teachers in the engineering program but this training seems to be better assimilated by the young teachers as older.

We conclude that the simulation software are not used enough by teachers in comparison with other digital resources. Among the difficulties hindering the use of simulation software, there is the lack of support for teachers in handling the software that are technically sophisticated.

**V. CONCLUSION**

The purpose of this study was to show the level of employment of ICT at school and what can still impede its use. Analysis of the questionnaire concluded that more than half of the teachers use digital resources as a teaching aid in the lessons of physical science. The most used digital resources are easily downloadable flash animations and videos. Simulation software are less used by teachers either those cited in textbooks or other ones since they require a certain level of control over their platform.



Notification of use of such software is not described in textbooks, it would be necessary to use tutorials.

However, some teachers who have not benefited from ICT training do not use digital resources in their course or not enough, despite the MEN has made available some digital resources, they do not know how to exploit these, other think waste time using ICT in the classroom.

Finally we can conclude that the digital educational resources can be a promising alternative educational materials for teaching and learning, of course these tools can not replace experience in physical sciences except for lack of equipment or experience with a danger of manipulation. ICTE undoubtedly improve teaching and learning when used in a specific educational purpose. However, to encourage teachers to use these digital resources, we should consider creating a computer lab to help physics teachers better understand these resources.

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