Mathematics teachers' participation in Innovative teacher's contest in Morocco

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ABSTRACT

Each year, some hundreds of teachers (all levels and all disciplines) propose their new digital products to the National Center for Educational Innovation and Experimentation to facilitate the learning of their discipline with their students. Mathematics teachers' regularly participate in this event.

In this article, we evaluated the mathematics teachers' participation in this contest during the first seven editions of the competition (2005-2011). We concluded then, that mathematics teachers are the most prized, especially those working in primary schools. We finished our article by the recommendation proposals for better success this experience in the future editions

Indexing terms/Keywords

Innovation, digital resources, evaluation, pedagogical scenario, meaning, ICT, Innovative teachers.

Academic Discipline And Sub-Disciplines

Education, Information Technology

SUBJECT CLASSIFICATION

Innovation in education

INTRODUCTION AND PROBLEM

Mathematics teaching quality should enable students to understand that mathematics is a living science, in relation to the real world and contributes to the resolution of their problems, away from the stereotypes attached to it in the common culture. This education must afford to live mathematical experience, and for that it must rely on technology and communication information (ICT).

According to Hoyles and Lagrange (2009), technology has undeniably enriched the possibilities for experimentation, visualization and simulation, they have to deal with more realistic problems.

New technologies provide the access to resources online , collaborative production and multiplication of resources and help the communities' emergences of teachers and researchers, and the remote exchange between students and teachers. Hoyles and Lagrange (2009) show that the new possibilities are opening to facilitate the access to the resources and training and promoting the dissemination of ideas and innovations.

Teaching mathematics needs production of quality resources for students and teachers to face this teaching-learning difficulty. Teachers are asked to design products that can help students overcome barriers to mathematical processes teaching and learning.

Gueudet and Trouche (2009) show rapid changes brought by technological evolution with the increasing number of available online resources, there are new opportunities for the design of resources. Indeed, for Gerard Kuntz "careful study, in recent years, the significant movement to create online math resources led many observers to believe that the renewal of the mathematics teaching and prepares emerges on the Internet "(Kuntz, 2007, p 104).

Moroccan mathematics teachers produce digital resources to facilitate teaching and learning, they regularly participate in the contest of innovative teachers organized annually by the Ministry of National Education (MNE). Several multimedia products were designed by innovative teachers of different disciplines.

In this article, we analyze the reference documents of the contest and awarded winning Innovative teachers' lists editions (2005-2011) and we are particularly interested in winning mathematics productions. Our goal is to answer the following questions.

- What mathematics teachers participation in this contest?
- Is that the forum has achieved these objectives with regard to the teaching of mathematics?

Our work is to verify the following assumptions:

- Mathematics teachers are more awarded than other teachers.
- Although the competition has achieved most of its objectives, it has reduced impact on the mathematics teaching and learning.

CONTEXTS PROJECT

General context

"Innovative", Forum of Innovative Education is part of the National Charter for Education and Training (NCET) which is in the lever 10 and 11:

- Optimize the use of educational technology resources and tare the most modern technologies.
- Investing ICT as a way forward to address as much as possible the difficulties of teaching and learning.
- Invest ICT as a way forward;
- Integrate these technologies into the school reality;
- Encourage excellence, innovation and scientific research.

Specific context

Contest of innovative teachers is the result of cooperation between Microsoft and the National Department of Education under the initiative Partners in Learning since 2004. The competition is open to teachers, educators of primary and secondary and to the associations working in partnership with a school.

Competition objectives

This national competition aims to:

- • Contribute to disseminate and promote educational innovation in educational institutions and general public;
- • Create a dynamic and competitive learning between educators from different grade levels;
- • Promote and develop innovative projects in educational activities and teaching;
- • Create a drive to enhance the pedagogical actors who innovate through the introduction of ICT in their teaching practices;
- • Increase active access to technology and improve its use in the process of teaching and learning.

Criteria evaluation

The selection of educational rewarded performers occurs in three steps. The first stage selection is done by committees made up of inspectors of each subject, taking into account criteria such as the content of the project, potential uses, educational innovation and the integration of ICT. The second phase of selection is made by a jury of professionals who evaluate the selected projects in the first phase to determine the most promising. The third phase of selection is lead by the same jury, joined by other evaluation of digital resources experts. During this step, the holders of shortlisted projects pass a focused interview mainly on the learning scenarios importance or the mastery of the ICT use.

The National Center of Educational Innovation and Experimentation (NCEIE) inform all Regional Academies of Education and Training (RAET) the launch of the competition with a ministerial note, this ministerial note is accompanied by a record that includes:

- Organizational texts
- The set of specifications
- The attachment including information on innovative teaching

The national competition is characterized by offering three types of awards:

- Prize of the best multimedia productions presented by classroom teachers working individually (MMI);
- Prize of the best multimedia productions presented in the framework of a working group consisting of 2 to 3 Educational performers (MMG);
- Prize for the best pedagogical scenarios using ICT (SPTIC).

CONCEPTUAL FRAMEWORK

Concept of digital resource

Robert Bibeau proposed a definition of digital resources for education:

"Digital resources for education and training are all editing software and communication (portals, search engines, directories, software tools, application training) as well as data, information and digital works (statistical and informational data, general references, literary, artistic or otherwise) useful in teaching or learning in a teaching or learning activity. "(Bibeau, 2004a). In his article "ICT at schools: proposed taxonomy and analysis of the barriers to their integration." Bibeau (2005) noted that:

"Digital resources for education related to all online services, software management, publishing and media (portals, software tools, training platforms, search engines, educational applications, portfolios) as well as data (statistical, geographical, sociological, demographic, etc..), information (newspaper articles, TV shows, audio clips, etc..) and digitized works (general reference documents, literary, artistic or education, etc.). useful to the teacher or the learner through a teaching or learning activities using ICT, activity or project can be presented as part of a lesson plan "(Bibeau , 2005)

Concept of pedagogical scenario

A pedagogical scenario is the result of the design process of a learning activity to guide student learning before, during and after the activity. "A pedagogical scenario presents an approach to achieving educational goals and the acquisition of general and specific skills related to one or more disciplines under the terms and specifications of the curriculum" (Bibeau, 2004b). The scenario gives rise to an innovative project which highlights trans-disciplinary approaches and whose implementation uses the resources of the Internet and printed materials, audiovisual or multimedia.

The concept of innovation

The concept of innovation is defined in different ways, overall it's a change that, in order to improve a situation, can carry on a practice, a method, a way to teach certain concepts, a procedure, a tool and so on.

Innovation identifies to a process much more than a product (Cros, 1996). It is "centered on the proposal to introduce a voluntary way to a new practice in a school with a view to greater efficiency in response to a perceived problem in the environment or in order to more efficient use of resources "(Garant, 1996). Le Guen says it's always "a deliberate action developed to deal with a problem"(Le Guen, 2002). However it also has a random character: "Innovation is a process with areas of uncertainty, it is delivered to the unpredictable" (Cros, 1997). This is a non-linear process, which includes periods of advanced stoppages, setbacks, trial and error, feed-back. Françoise Cros added that "innovation is a process that has the intention and action for change through the introduction of a component or system in an already structured context." (Cros, 2001: 119).

More: "Innovation is analyzing all the parameters of teaching and learning in a given situation and a place to question, identify problems and seek practical solutions to better effectiveness "(Boiron, 2005).

METHODOLOGY

To do this study, we analyzed the documents reference of competition and lists of participants in the contest and the prize list for edition. We chose to work on all productions awarded in mathematics from 2005 to 2011 to evaluate the participation of mathematics teachers' in this contest.

RESULTS AND DISCUSSION

The analysis of participants and winners lists in the contest innovative teachers shows that a large number of multimedia products is designed by innovative teachers from all disciplines engaged in primary, secondary schools and high schools. We also note the participation of sixteen regional academies in this contest and the participation of women teachers at all grade levels and in all disciplines

We also find that a lot of resources to deal with spatial and dynamic geometry, this shows that mathematics teachers are aware of the usefulness of geometry in mathematics and other scientific disciplines.

Table 1: Number of participants per year

Years	Number of participants	Academies
2005	227	14
2006	235	14
2007	159	16
2008	207	16
2009	197	16
2010	261	16
2011	202	16

An initial analysis of data in Table 1 shows that there is:

- A representation of all the academies;

- Low participation of teachers in the competition (between 159 and 261).

Number of Prizes per discipline

Table 2: Number of Prizes per discipline

| Discipline	Number of Prizes per discipline
Mathematics	12
Arabic	9
Physics / Chemistry	9
French	7
Technology	7
Life sciences and earth	7
Informatics	5
Bilingual (Arabic + French)	4
English	4
History and Geography	3
Amazigh	3
Engineering Sciences	2
Translation	2
Philosophy	2
Islamic Education	1
Mechanical Industry	1
Plastic arts	1
Music Education	1

The data analysis of this table shows that teachers of different disciplines have won this competition and that mathematics teachers are more winning than other teachers during the 2005-2011 period. Scientific disciplines (physics, computer science, life sciences and earth and Technology) are more winning than other disciplines.

In the following, we analyze only the 12 awards in mathematics.

Number of prizes per level

Table 3 : Total prize per level

Level	Number	Percentage
Primary school	07	58,33%
Secondary school	01	8,33%
High school	04	33,33%
Total	12	100,00%
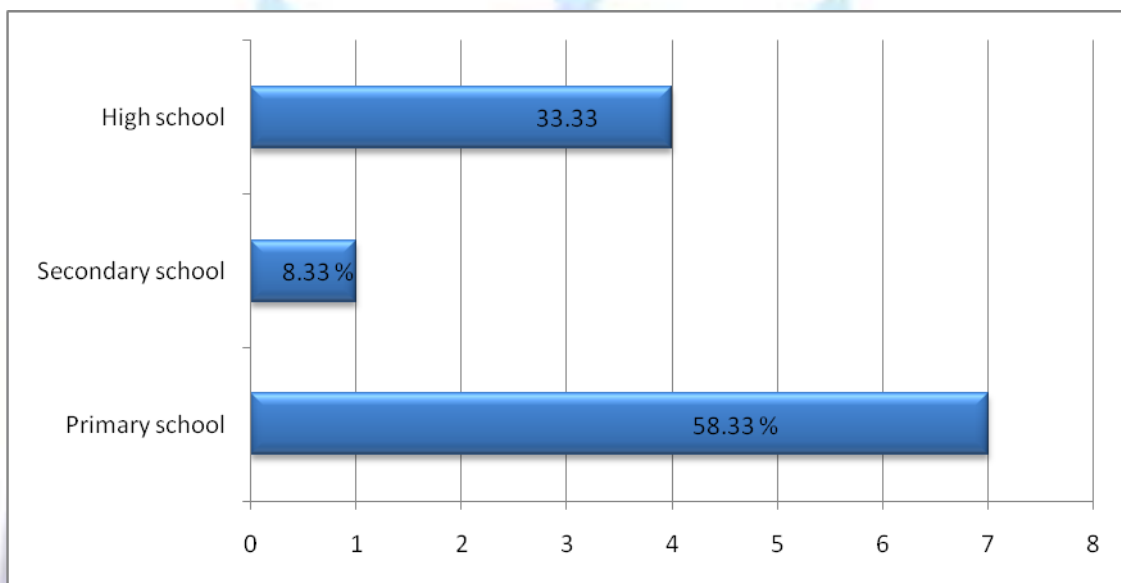
Fig 1: Number of prizes per level

These results show that a high percentage of primary teachers has innovated in mathematics and won the contest of innovative teachers.

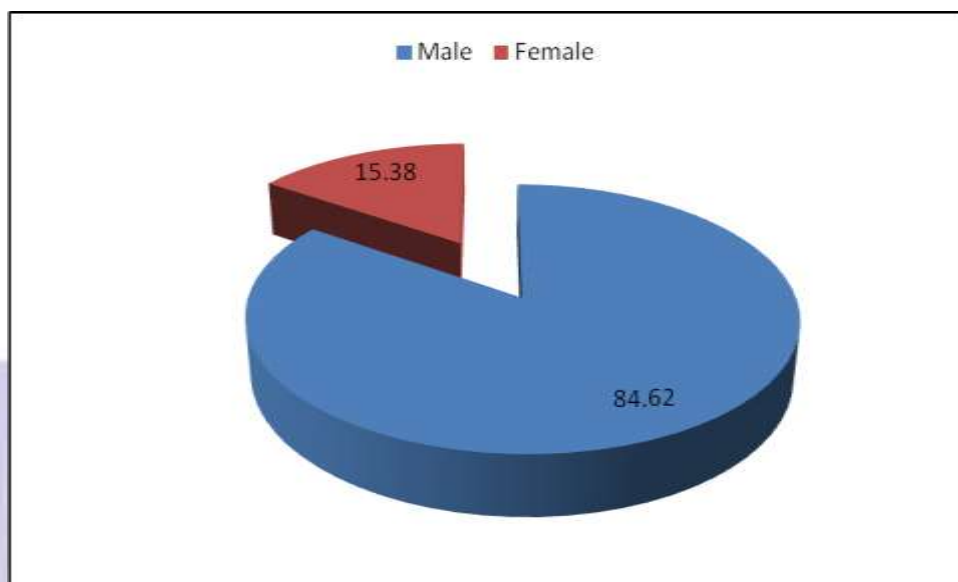### Table 4: Number of Prizes per level for each edition

Level \ Edition	2005	2006	2007	2008	2009	2010	2011	Number of Prizes per Level
Primary school	1	0	1	0	2	1	1	6
Secondary school	0	0	0	0	1	1	0	2
High school	1	0	0	0	1	1	1	4

This table shows that primary school teachers are the most awarded in mathematics during the first seven editions of the contest.

Number of prizes per genre

Table 5 : Number of Prizes per genre

Genre	Number	Percentage
Male	11	84,62%
Female	02	15,38%
Total	13	100%

Fig 2: Number of prizes per genre

According to Figure 2, we see clearly that the majority of innovative award-winning mathematics teachers are male.

**Table 6 : Number of Prizes per genre for each edition**

Edition / Genre	2005	2006	2007	2008	2009	2010	2011	Number of Prizes per genre
Male	2	0	1	0	4	2	2	11
Female	0	0	0	0	0	1	1	2

We also note that the number of women teachers winning increases since 2010.

Number of prizes per type

Table 7 : Number of prizes per type

Type of prized product	Number	Percentage
Individual multimedia production	08	66,67 %
pedagogical scenario	03	25,00 %
multimedia production group	01	8,33 %
Total	12	100 %
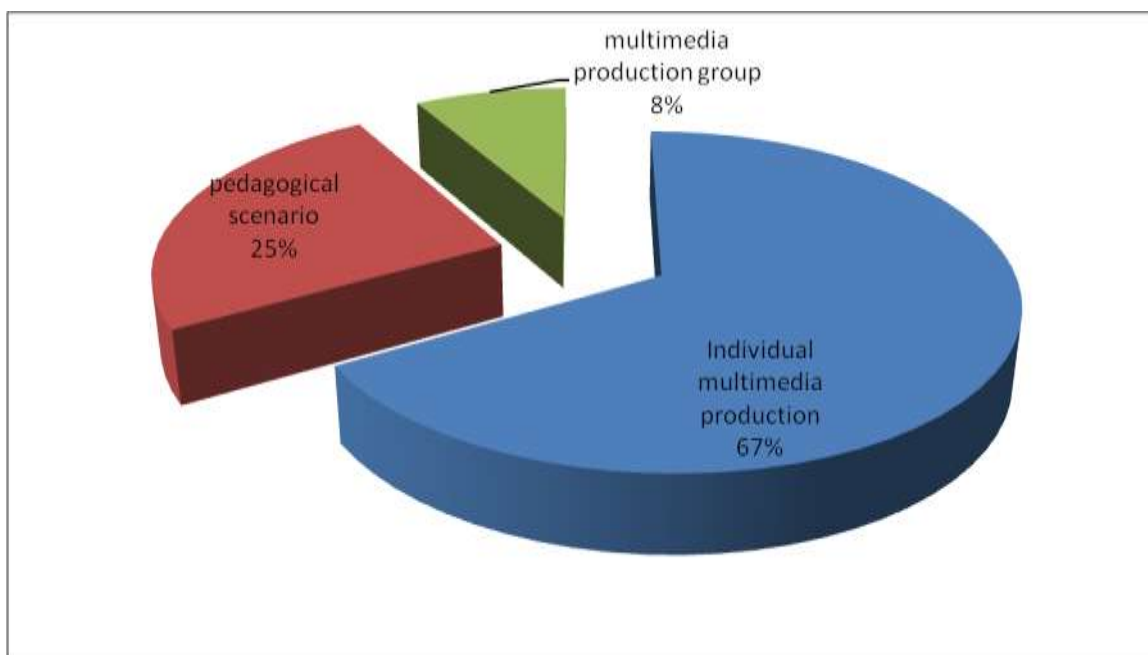
Fig 3: Number of prizes per type

We see one prized product is designed by a group of teachers, while 9 products have been designed individually. Group work is inadequate for the work individual. These results also show that three pedagogical scenarios were awarded (25%). We record a great interest in pedagogical scenarios.

Table 8: Number of prizes per type for each edition

Edition \ Product Type	2005	2006	2007	2008	2009	2010	2011	Number of prizes per type
Individual multimedia production	2	0	1	0	4	1	0	8
Multimedia production group	0	0	0	0	0	0	1	1
Pedagogical scenario	0	0	0	0	0	2	1	3

The results in Table 8 show that since 2010, the pedagogical scenario has an important place among the prized products in mathematics.

Number of prizes per region

Table 9: Number of prizes per region

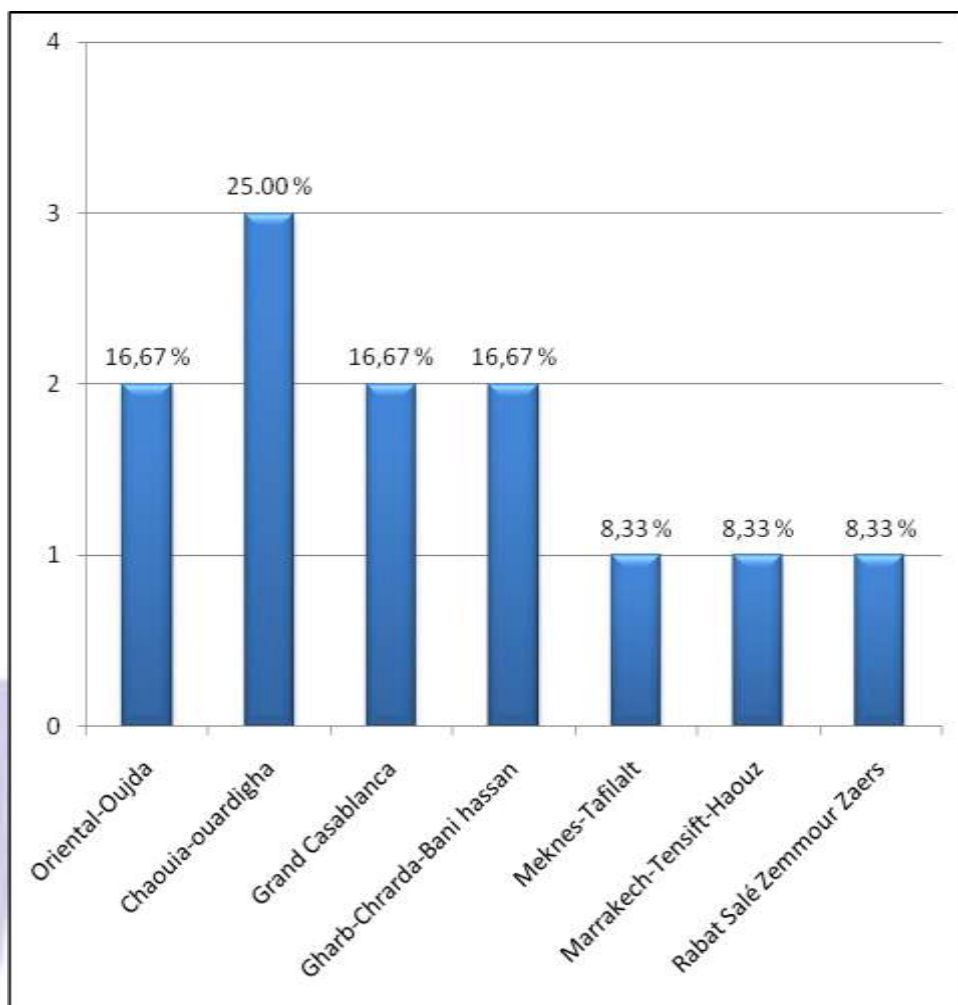| Regions	Number of Prizes in Mathematics	Percentage
Oriental-Oujda	02	16,67%
Chaouia-ouardigha	03	25,00%
Grand Casablanca	02	16,67%
Gharb-Chrarda-Bani hassan	02	16,67%
Meknes-Tafilalt	01	8,33%
Marrakech-Tensift-Haouz	01	8,33%
Rabat Salé Zemmour Zaers	01	8,33%
Total	12	100,00%

Fig 4: Number of prizes per region

Some Academies have an important share prizes in mathematics than others (Chaouia-ouardigha).

Number of prize per edition

Table 10: Total prize per edition

Edition	Total number of prizes	Number of Prizes in Mathematics	Percentage prizes in mathematics compared to the number of general prize
2005	10	02	20,00%
2006	10	00	0,00%
2007	10	01	10,00%
2008	10	00	0,00%
2009	13	04	30,77%
2010	18	03	16,67%
2011	09	02	22,22%
Total	80	12	15,00%

We record that the year 2009 saw a number of innovative mathematics teachers (4 prizes). Both 2006 and 2008 saw a lack of winning math products. In general mathematics teachers' are the most awarded in the contest (15% of prize).
Regarding the impact of competition on the education system, we recorded the following: The multimedia classrooms' providing by digital resources, participation of innovative teachers in several regional forums, their contributions in regional training of ICT generalization program and the establishment of a network of innovative teachers.

Although the competition has achieved most of its aims, it has a reduced impact on the teaching and learning of mathematics, indeed prized products are used by teachers. Guin and Trouche (2006) emphasize the need to use a digital resource:

"A resource does not exist so long as it has not been tested in classrooms and validated by a group of teachers to become a shared community instrument" (Guin and Trouche, 2006).

Resources are then living entities that change in the light of practice and teacher collaboration.

CONCLUSION

In this study, we showed that mathematics teachers are more winning than other teachers, and most of the winners work in primary schools. Group work is almost absent from media productions in mathematics. It regards the projects in mathematics; contributions of male teachers (84.62%) are higher than those of women teachers (15.38%). This contest realized most of its objectives, it is necessary to encourage mathematics' teachers to use, share and develop digital productions.

We also found that mathematics teachers have a desire to overcome the difficulties of teaching and learning of mathematics and give meaning to the concepts hence the need to enhance the innovative capacity of our teachers.

RECOMMENDATIONS

These findings contribute to the formulation of the following recommendations are intended to improve the experience of innovative teachers in Morocco and encourage mathematics teachers' to participate massively in the competition to reduce the failure rate in mathematics and give meaning to these concepts:

-Improve, diversify and certify the training of teachers in ICT.
-Encourage mathematics teachers' to use, share and develop digital productions.
-Encourage the production of pedagogical scenarios and multimedia products group.
-Encourage innovation resources that the treat concepts that are problematic in the teaching-learning process
-Organize regional and national meetings of mathematics teachers for the diffusion and exchange of the prized projects and to encourage educational innovation.
-To provide teachers a bank of prized digital resources.

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