Under the High Patronage of His Excellency
Mr Abdelaziz Bouteflika,
President of the Algerian Republic

CIEAEM 70 International Conference

Mathematics and living together

Social process & Didactic principle

15th-19th July 2018
Ibn Badis University
40th anniversary
MOSTAGANEM

Program

Mostaganem
ciæm
70

SUMMARY

Mostaganem
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70

International Programme Commitee

Younés Aberkane Président (France),
Gilles Aldon (France),
Peter Appelbaum (USA),
Françoise Cerquetti (France),
Benedetto Di Paola (Italy),
Joaquin Gimenez (Spain),
Michaela Kaslova (Czech Republic),
Pedro Palhares (Portugal),
Sixto Romero Sanchez (Spain),
Charoula Stathopoulou (Greece)

Local organisation Commitee

Nasser Eddine Mouhoub
Ferhat BALAMANE
Hamid Demmou
Mostefa Belhakem
Benmekki Houari
Tewfiq Lamraoui
Hadj Adda Bentounes.
Mustapha Moulay Idriss Bentounes

General planning

	Sunday, July 15th	Monday, July 16th	Tuesday July 17th	Wednesday, July 18th	Thursday, July 19th
9.00 - 9.30	REGISTRATION	Plenary 2 Pr Arzarello	Plenary 3 Pr Sokhna	Plenary 4 Pr Stathopoulou and Pr Appelbaum	
9.30 – 10.00					Reports of working groups
10.00 – 10.30		Coffee break	Coffee break	Coffee break	
10.30 - 11.00	Opening	Meeting with the plenarists Plenaries 1 and 2	Working groups session 3	Working groups session 4	
11.00 - 11.30					Coffee break
11.30 - 12.00		Working groups session 2			Panel CIEAEM Feedback
12.00 - 12.30	Presentation session Algeria Pr Benzaghou and Pr Bebbouchi				
12.30 - 13.00					Closing ceremony
13.00 - 14.30	Lunch	Lunch	Lunch	Lunch	Lunch
14.30 - 15.00		Workshops	Excursion haras	Meeting with the plenarists Plenaries 3 and 4	
15.00 - 15.30					
15.30 - 16.00	Plenary 1 Pr Aïssani			Coffee break	
16.00 - 16.30		Coffee break		Forum of ideas	
16.30 - 17.00	Coffee break	Special session			
17.00 - 17.30	Working groups session 1				
17.30 -18.00					
18.00 -18.30					
18.30 -19.00					
19.00 - 19.30					
19.30 - 20.00					
20.00 - 21.00	Dinner	Dinner	Dinner	CIEAEM 70 Dinner and musical evening Djanatu Al Arif	
21.00 - 23.00					

ORGANIZERS

International Commission for the study and improvement of mathematics teaching

The CIEAEM was created in 1950 just after the Second World War by mathematicians, psychologists, teachers from many devastated and war-ravaged countries in Europe, all faced with major difficulties in the teaching of mathematics, reconstruction of society and even entire countries: lack of teachers, materials, and many refugees, displaced persons and orphans.

Leading figures such as Piaget, Choquet, Gategno, Dieudonné, and later Krygowska, Freudenthal and Castelnuovo, gathered to reconsider the teaching of mathematics in the light of these events.

From the beginning the founders of CIEAEM tried to restore the « Living together » by working with German teachers and mathematicians and in 1953 the meeting of the Commission took place in Germany in Calw.

The current situation in the world has several points in common with that of the post-war period, and Europe is confronted with problems quite similar to those at the time of the creation of CIEAEM. Living together has become a necessity. It is a challenge for education in general and the teaching of mathematics in particular.

Djanatu al Arif

Djanatu al-Arif (The Paradise of the Knower) is a Foundation of Algerian law that intends to participate in the construction of Man with dignity, beauty and wisdom. It works for more concitoyenneté and «convivence» between all, contributing to maintain a dynamic generating synergies and exchanges by supporting:

- Through networking, development initiatives carried out by actors and actresses: also during meetings, training and partnerships.
- Transdisciplinary fundamental and applied research on the vital issues of our time.
- Biodiversity preservation, environmental awareness education and general public awareness.
- Rehabilitation of the artistic, cultural, artisanal and architectural heritage.
- Knowledge, preservation and dissemination of tangible and intangible heritage.

AISA ONG Internationale

AISA International NGO's main purpose is to promote the Culture of Peace. It contributes to the emergence of a society of the Good Living Together by relying on a spiritual heritage and working in the field of human dignity, the rapprochement between peoples and the world fraternity.

AISA ONG Internationale is an officially accredited partner to the UN and its Economic and Social Council (ECOSOC) for its expertise in the following areas: Culture of Peace, Gender Equality, Social Development, Environment, Global Governance, Ethics and Spirituality. AISA International NGO is the bearer of the project «International Day of Living Together in Peace (JIVEP)» with the UN.

The JIVEP is a strong commitment to the human family, combining notions of citizenship, pluralism, humanism and spirituality. It proposes a dynamic of Peace and launches its message to the citizens of the world in order to build a society based on the respect of living things: Living together is doing together. The day presented by Algeria was adopted by consensus on December 8, 2017 at the UN and will now be celebrated on May 16 in 172 countries around the world.

UNIVERSITE Abdelhamid Ibn Badis MOSTAGANEM

Created in 1978, the University of Mostaganem Abdelhamid Benbadis (UMAB) relies on strong links between research and training, it contributes to the construction of a society that values reflection, openness and interdisciplinarity. Multidisciplinary establishment, the UMAB offers a hundred courses (103 licenses and 123 master) and has 41 research laboratories, spread over 7 campuses.

It has a strong territorial base, particularly its links with the socio-economic world of the region, to provide its training and research activities to the expectations of economic and institutional partners.

It seeks to transmit by putting nearly 1,500 teaching, administrative and technical staff at the service of more than 20,000 students. It is part of the five major Algerian universities, which makes the University of Mostaganem a place of knowledge, life, exchange, adaptation, animation, integration and commitment.

This year UMAB celebrates its 40th anniversary.

SUNDAY 15TH OF JULY 2018

AMPHITEATER

9h00 -10h30	**REGISTRATION**
10h30 - 12h00	**OPENING CEREMONY (Abdelhamid Ibn Badis University, Kharuba)** **Mr Mustapha Belhakem,** Rector of the University of Mostaganem **Mr Rabhi Abdenour,** Wali wilaya of Mostaganem **Dr Younes Aberkane,** President of the International Program Committee of Cieaem 70 **Sheikh Khaled Bentounes,** Spiritual Guide of the Sufi Order Alâwî, and founding President of the Djanatu al-Arif **Pr Tahar Hadjar** Minister of Higher Education and Scientific Research
12h00 - 12h30	**Revisiting the Algerian experience in setting up an University** **Pr Benali Benzaghou** Houari Boumédienne University Algiers (Algeria) The subject of this conference, especially of the subtheme 3 offers the opportunity to revisit Algerian's experience history. Algerian university's construct started with the high education's reform (RES) in seventies, and has been directed by three major concepts: science and technology, democratization and "algerisation". As pedagogical approach, the modular system has been chosen. Each university curriculum then included several modules which could be flexibly mixed by the student. Algiers Sciences and Technology's University, opened on 1974, can be considered as an example of this approach. Mathematic's teachers were faced with interdisciplinarity's problem. This experience has lasted ten years and has faced two challenges: massification and pedagogical management's complexity. Scientific research faced similar problems. We could ask ourselves if that wasn't a historical evolution of science (and knowledge) to specialisation. The parry is probably local and international collaboration.
12h30 - 13h00	**What does the Algerian Society want from Mathematics ?** Pr Rachid Bebbouchi, President of the Société mathématique d'Algérie

SUNDAY 15TH OF JULY 2018

AMPHITEATER

13h00 - 14h30	LUNCH
15h30 -16h30	**PLENARY 1** **Maghrebian Mathematics in the Middle Ages** **Pr Djamil Aïssani (Algeria)** The presentation will concern Maghrebian Mathematics in the medieval period (in the time of Leonardo Fibonacci, Ibn al-Banna, Raymond Lulle, Ibn Khaldun, Piri Reis ...) : intellectual centers, institutions, scientific tradition, cities - relations, process of transmission and their relations with the Christian West. It is the same in the nineteenth century : knowledge available among local scholars (Ash Shellati, Lmuhub Ulahbib, ...) and activities in the Maghreb of Western mathematicians (François Arago, Eugene Dewulf, Albert Ribaucour, ...).
16h30 - 17h00	COFFEE BREAK

ROOM 1, 2, 3 and 4

17h00 - 18h30	**WORKING GROUPS (SESSION 1)** • **Group A :** **Mathematics and Living Together** Animators : **Cristina Sabena, Philippe Vaz** • **Group B :** **Mathematics and sustainable development** Animators : **Ana Serrado Bayès, Monica Panero** • **Group C :** **Cross-border Mathematics. Rethinking history of Mathematics** Animators : **Peter Appelbaum, Giulia Bini** • **Group D :** **Mathematics and Dialogue with other Disciplines and Between Teachers and Researchers** Animators : **Joaquin Gimenez, Andreas Moutsios Rentzos**

Group A

Mathematics and Living Together

Animators :

Cristina Sabena, Philippe Vaz

To search, to model, to represent, to reason, to calculate and to communicate, six mathematical skills for living together.

Philippe Vaz (France)

Six panels to build in class the sense of six skills «To search, to model, to represent, to reason, to calculate, to communicate» and sow the seeds of a better « Living together » for the students' life project, active citizenship and culture of peace.

Group B

Mathematics and sustainable development

Animators :

Ana Serrado Bayès, Monica Panero

Argumentation in mathematics for learning to live together.

Monica Panero,
Anna Maria Brunero (Italy)

Through argumentation in mathematics, students can learn to live together. If students are constantly stimulated to verbalise what they did, to explain how they reasoned and why, mathematics can largely contribute to develop the capability to communicate and discuss, to argue in a correct way, to understand other people's points of view and arguments. This paper presents a didactic method based on formative assessment strategies and feedback provided at different evolving levels to foster argumentation. A sequence of interventions has been planned and implemented all along the current school year in eleven grade 5 classrooms in Turin (Italy). The study is part of a wider project aimed at designing and experimenting formative uses of INVALSI standardized tests in mathematics. Our preliminary results show effects on the evolution of students' argumentations and on students' meta-cognitive skills, developed through peer assessment and

Group B

interactive constitution of what counts as an acceptable argumentation.

Group C

CROSS-BORDER MATHEMATICS. RETHINKING HISTORY OF MATHEMATICS.

Animators :

Peter Appelbaum, Giulia Bini

Promoting Language Awareness and Integrating Intercultural Learning into Mathematics Teacher Education : Concept of a Joint Seminar for Teacher Students and Refugee Teacher.

Claudia-Susanne Günther, Karen Reitz Koncebovski (Germany)

Increasing diversity in linguistic and cultural backgrounds of German school students requires teachers to integrate language and intercultural learning into their teaching. In contrast to common beliefs, students' language skills play a major role in learning mathematics as they affect the ability to communicate and comprehend mathematical ideas. Teacher training often focuses on theoretical knowledge and teacher students don't feel qualified enough to apply their knowledge in praxis. Furthermore, teacher training seems to be lacking opportunities

Group C

for gaining intercultural experiences, though unarguably important for future teachers. Tackling both problems, a multi-stage seminar was designed that gives math teacher students the chance to apply integrated language learning by designing and conducting a seminar for refugee teachers. The latter benefit from the seminar by improving their language skills and vocabulary regarding school mathematics. Through their encounter both groups of participants gain intercultural knowledge, which prepares and equips them for their future teaching.

WORKING GROUPS (SESSION 1) — JULY 15, 2018

Group D

Mathematics and Dialogue with other Disciplines and Between Teachers and Researchers

Animators :
Joaquin Gimenez, Andreas Moutsios Rentzos

Power-relations in participatory action research projects in mathematics education.

Lisa Björklund Boistrup, Joakim Samuelsson (Sweden)

In this paper we describe a study on how mathematics teachers and researchers in action research projects experienced power relations. The power relations were produced between different actors within the projects, but also between the project participants and elements in different decision levels, in the broader context. We present a model for participatory action research, and we give voice to experiences of teachers and researchers in relation to this model.

Group D

Salinity study in the river Lima estuary : an interdisciplinary project at secondary level .

Teresa Pimentel (Portugal)

In this paper we will point out an interdisciplinary project with two classes of 10th graders while they research possible relations among salinity of the river water and three different variables : depth, distance to mouth and temperature. We will present excerpts of three written reports made by one group of each theme showing the ways chosen by the students to accomplish the task while using sensors, Google maps and graphing calculators. Procedures used, results and conclusions were also orally presented by four groups of students in a Mathematical Congress usually held in the school they attend. We draw some conclusions about this type of work and present future perspectives.

MONDAY 16TH JULY 2018

AMPHITEATER	9h00 -10h00	**PLENARY 2** **Learning and teaching mathematics in the age of globalization : problems from the south and from the north of the world** **Pr Ferdinando Arzarello** Torino University. (Italy) In recent years, the globalization of the economy, the universality of technological change and the related needs for the skills of the workforce play the role of strong historical motivations for a reform that should bring unified standards for mathematics at school. I will propose a multiple cultural perspective that takes into account the existence of different epistemological and cultural positions concerning mathematics and the possible distance of the curricular reforms from the mathematical culture of a country.
	10h00 - 10h30	COFFEE BREAK
	10h30 - 11h30	**MEETING WITH PLENARY SPEAKERS 1 AND 2** **Pr Djamil Assani, Pr Ferdinando Arzarello**
ROOM 1, 2, 3 and 4	11h30 - 13h00	**WORKING GROUPS (SESSION 2)** • **Group A : Mathematics and Living Together** Animators : **Cristina Sabena, Philippe Vaz** • **Group B : Mathematics and sustainable development** Animators : **Ana Serrado Bayès, Monica Panero** • **Group C : Cross-border Mathematics. Rethinking history of Mathematics** Animators : **Peter Appelbaum, Giulia Bini** • **Group D : Mathematics and Dialogue with other Disciplines and Between Teachers and Researchers** Animators : **Joaquin Gimenez, Andreas Moutsios Rentzos**
	13h00 - 14h30	LUNCH

Group A

Mathematics and Living Together

Animators :
Cristina Sabena, Philippe Vaz

Exploring children's ideas of discrete variables using graphs, tables and isolated cases.

Ema Mamede,
Liliane Carvalho (Portugal)

This paper focuses on the effect of different representations of information on Portuguese children's mathematical reasoning, when discrete variables are involved.

Inquiring game activities fostering critical thinking in primary school within dynamic geometry environment.

Cristina Sabena, Carlotta Soldano (Italy)
In this communication, we will present inquiring activities in geometry triggered by a game played in a Dynamic Geometry Environment (DGE). The didactical goal of the inquiring game-activities is to exploit investigations and games dynamic to foster students' logical thinking, along with geometrical knowledge, and their argumentation processes. The design of the games is inspired by J. Hintikka's semantical games (1998) used in the field of logic to establish the truth conditions of statements.

Group B

Mathematics and sustainable development

Animators :
Ana Serrado Bayès, Monica Panero

The Effect of Exploring Applications on Pure Mathematics Material on Mathematics Students.

Khalida Nazzal,
Mays Sodqi (Palestine)

To study the effects of assigning research projects on applications of pure mathematics courses on students in terms of their attitudes towards pure mathematics, their understanding of the pure concepts and theorems, their performance in the respective courses, the knowledge and skills they acquired, and on their self-confidence and self-esteem.

Group C

CROSS-BORDER MATHEMATICS. RETHINKING HISTORY OF MATHEMATICS.

Animators :
Peter Appelbaum, Giulia Bini

Translanguaging in Malta : Teaching mathematical concepts in Maltese and English

Angel Mizzi (Malta)

Group C

This paper focuses on the use of two languages for teaching mathematical concepts in multilingual classrooms in Malta. The main aim of the present study is to investigate when teachers use Maltese or English for which purpose when introducing mathematical concepts. The interlacing of Maltese and English in the context of translanguaging in teaching is illustrated by a case study methodology, whereby this paper focuses only on one case to illustrate how a fourth-grade teacher introduces the concept of weight. First results show that both languages fulfill different functions during mathematical instruction, all of which are necessary for efficient mathematical learning under consideration of the teacher' and students' multilingual background.

"The guided reinvention" in the teaching of mathematics at the tertiary level

Ildar Safuanov (Russia)

The method of "the guided reinvention" (a kind of the genetic method) in the teaching of the advanced sections of abstract algebra including congruence relations in algebras (algebraic structures), quotient algebras modulo congruence relations, and homomorphic image theorems for algebras is considered.

Group D

Mathematics and Dialogue with other Disciplines and Between Teachers and Researchers

Animators :
Joaquin Gimenez, Andreas Moutsios Rentzos

Does New Educational Technology Compensate My Ignorance ?

Abdul-Sahib Hassani Nezhad (Iran),

Technology as seen by casual folks is a miracle that compensates any human's weaknesses and they even imagine of replacing teacher by machine ! This view would be true if it does not intervene with teaching field and if the word 'any' is replaced by 'some': physical weakness can be compensated for, or at least balanced by technology but ignorance would be piled up by mythical believe in technology. Examples that investigated here show the insufficiency that when conveyed by ignorance leads to implausible answers and results.

Group D

Co-constructing teaching and learning spaces in and between mathematics and physics at school

Andreas Moutsios-Rentzos,
Georgios Kritikos ,
Fragkiskos Kalavasis ,(Greece),

In this paper, we view the school unit as an open learning organisation and we focus on the appearances of mathematical signs common in both school mathematics and physics, in order to investigate the variety of the associated implicit meanings with respect to mathematics and physics, both as school courses and as scientific disciplines. Through an interdisciplinary approach to the reflections of the school unit protagonists (in this paper, teachers) upon signs that appear in both mathematics and physics school textbooks, we attempt to reveal the diverse co-existing, often diverging, cognitive processes, intentionalities and conventions, implicit for both the learners and for the teachers of the different courses. This approach allows for the identification of novel, invisible, interdisciplinary obstacles to the understanding of each discipline. Within this emergent interdisciplinary teaching-learning complex space, it is possible to make the distinctions, the linkings and the constructions of uni-/inter-disciplinary meanings.

MONDAY 16TH JULY 2018

ROOM 1, 2, 3 and 4

14h30 -16h00 **WORKSHOPS**

Workshop A : Magic squares

Pedro Palhares (Portugal)

Magic squares are an important part of recreational mathematics. And they can be used in teaching mathematics, through problem solving, explorations, surveys, even with algorithmic procedures. On the other hand, the magic squares were not invented by Western mathematics, they were known in China and have certainly been transmitted from Africa to Europe.

In this workshop, we will explain what a magic square is, what types exist, give some examples of methods to build them, and suggestions to their historical roots. Then we will solve some problems based on magic squares and discuss possibilities for mathematical education.

Workshop B : Exploring Algebraic Thought in Everyday Practices

Peter Appelbaum (USA), Charoula Stathopoulou (Greece)

Important for living together is the mathematics of everyday artifacts. They may appear trivial; they are also resources for developing mathematics knowledge. This workshop uses artifacts in the conference room, and outside of the building, as a means to collect ideas for algebraic thinking parallel to traditional school curriculum. We then discuss ways to connect the everyday and school algebraic thinking.

Workshop C : Mathematics and magic tricks

Gilles Aldon (France), Françoise Cerquetti (France)

This workshop is dedicated to mathematics and magic tricks. During this workshop we'll present magic tricks leaning on mathematical properties. We will discuss of their interest in term of teaching and learning mathematics.

MONDAY 16TH JULY 2018

ROOM 4	14h30 -16h00	**WORKSHOPS**
		Workshop D : Inquiring game activities within dynamic geometry environments. **Carlotta Soldano (Italy), Cristina Sabena (Italy), Ferdinando Arzarello (Italy)** In this workshop, we will present inquiring game activities that are based on geometric theorems meant for secondary school students. The didactical goal of the inquiring game-activities is to exploit investigations and games dynamic to foster students' logical thinking, along with geometrical knowledge, and their argumentation processes. In the workshop, participants will be engaged in experiencing inquiry games and in reflecting on how these games can be exploited within didactical designs. In the second part of the workshop, we will focus on task design : participants will be involved in designing inquiry games and tasks following the presented model and basing on different theorems.
	16h00 -16h30	COFFEE BREAK
	16h30 -17h30	**SPECIAL SESSION** **Mathematics and living together.** **Dr Idriss Aberkane**

TUESDAY 17Th JULY 2018

AMPHITEATER	9h00 -10h00	**PLENARY 3** **What teaching of mathematics for the construction of the civilization of the Universal ?** **Pr Moustapha SOKHNA (Sénégal)** At the heart of the tumults of today's world, the differences in perceptions of civilizations and cultures are increasing. Now, if we know that mathematics, through the proofs and the coordination of the registers of representation, favor a questioning of the conceptions, we can suppose that the essence of the dialogue between the cultures is consubstantial with the mathematical activity. The challenge is then to make mathematics that makes sense, so rooted in civilizations and that develop towards the Universal. This theorem accepted, what weight is given to Algebra, Analysis, Probability, Statistics, etc... in a mathematical education ?
	10h00 - 10h30	COFFEE BREAK
ROOM 1, 2, 3 and 4	10h30 - 13h00	**WORKING GROUPS (SESSION 3)** • **Group A : Mathematics and Living Together** Animators : **Cristina Sabena, Philippe Vaz** • **Group B : Mathematics and sustainable development** Animators : **Ana Serrado Bayès, Monica Panero** • **Group C : Cross-border Mathematics. Rethinking history of Mathematics** Animators : **Peter Appelbaum, Giulia Bini** • **Group D : Mathematics and Dialogue with other Disciplines and Between Teachers and Researchers** Animators : **Joaquin Gimenez, Andreas Moutsios Rentzos**
	13h00 - 14h30	LUNCH
	14h30 - 19h30	**EXCURSION**

Group A

Mathematics and Living Together

Animators :
Cristina Sabena, Philippe Vaz

From the pyramid to the circle in High school - the contributions of a cooperative education.

Claire Chevrier (France)

Our contribution aims to propose some experiments and a reflection on practical co-operatives lived in mathematics classes in high school. This reflection comes from the concern to adapt daily teaching to students forged by the current society. I will first of all note the recurring inadequacy of a classical education in various situations, and the solutions provided in the framework of a pyramidal type of education, with what they entail of tensions and conflicts. I will then present several experiences of cooperative work in different non-pyramidal forms and up to the teaching in a circle, analyze what they have brought back into relations and learning, as well as their possible limits. I will refer to the underlying motivations as well as the sources that can be drawn for these practices. In conclusion, some reflections linking these practices with other themes of the congress

Group A

The persistence of calculus-oriented mathematics education : Research results and possible explanations

David Kollosche (Germany)

Many scholars have actively supported teaching paradigms that seek to overcome an educational philosophy that rests on teacher explanations and solitude practice on calculus-oriented problems. Nevertheless, at least in Germany, calculus-orientation remains the dominant organisation of learning mathematics by far. Here, I will first discuss some research results from Germany which shed light on this phenomenon. Afterwards, I will discuss possible reasons for this situation. Thereby, I argue that calculus-orientation might not only be a latently agreed-upon way to limit the intellectuality of the subject in the classroom by both teachers and learners. I also argue that calculus-orientation constitutes a reproduction of the bureaucratic organisation of school in the realm of mathematics.

Group B

Mathematics and sustainable development

Animators :
Ana Serrado Bayès, Monica Panero

Mathematics outside the classroom : examples with preservice teachers

Isabel Vale, Ana Barbosa, Isabel Cabrita (Portugal)

The classroom is only one of the «homes» where education takes place. The use of non-formal teaching contexts, such as the surrounding environment, constitutes an educational context that can promote positive attitudes among students and an additional motivation for the study of mathematics. Teaching should be enriched with challenging tasks, aimed at developing cognitive abilities, such as problem posing and solving, and also encourage creative thinking. Thus, arise the trails, which consist of a sequence of tasks that the students have to solve, along a preplanned route. In this process, teacher education has a fundamental role, providing (future) teachers with the same experiences they are expected to offer to their own students. The trails have great potential for all the students who experience them. Thus, we will discuss some of that potential developed in the context of initial teacher training.

Group B

« Gallery walk » a collaborative strategy to discuss problem solving

Isabel Vale, Ana Barbosa (Portugal)

Mathematics should provide an environment that allows students to conjecture, to prove, to generalize, to question, to discuss, to collaborate, to explain and to communicate their way of thinking by engaging and creating a sense of community. So, tasks can have a great influence on students' learning, in particular those that elicit visual resolutions, as well as the way they are explored by the teacher. Moreover, today we have children sitting for a long time in the classroom and the gallery walk is a strategy that requires students to move around the room, aspect that can be especially attractive for younger students, encouraging them to challenge and share ideas. In this context, a study is being carried out with elementary preservice teachers where we analyze the work developed by these students, future teachers, in a teaching-learning environment based on a gallery walk when they solve some problems with multiple resolutions.

Group C

CROSS-BORDER MATHEMATICS. RETHINKING HISTORY OF MATHEMATICS.

Animators :

Peter Appelbaum, Giulia Bini

Digital black holes : π and e in permanent dialogue with reality in the history of mathematics

Sixto Romero (Spain)

As a black hole is a body with a gravity so strong that nothing can escape, not even the light, there are also numbers that attract others during certain operations.

There are numbers that, throughout history, have become very famous for a variety of reasons. In some cases, its fame is simply due to historical coincidences ; sometimes it appears at the center of some very relevant scientific discoveries.

The numbers **π** and **e** have intervened differently throughout the history of humanity in the problems of geometrical reality and also in the resolution of the problems of real life.

This article aims to reveal the omnipresence of the numbers **π** and **e**, and to try to answer the question : is the ubiquity of these numbers a property of the phenomena in which they appear or refers only to language used for its description ?

Group C

Some diophantine problems in the mathematical tradition of the Muslim West (12th - 14th centuries)

Anissa Harbili (Algeria)

The discovery of new Arab mathematical manuscripts during the last decades of the last century has helped, in a considerable way, to better understand certain aspects of the contribution of Arab mathematicians in both fields : Algebra and Number theory. The analysis of documents, exhumed so far, has made it possible to describe the processes, which were developed in the Arab mathematical tradition, to solve some well-known problems. The one that interests us, in this communication, is relative to the numerical right-rectangles or pythagorian triplets, with reference to Pythagoras (IV century BC), that can be expressed, today, as a quadratic equation to three variables : $x^2+y^2=z^2$. The purpose of this paper will be to expose the work done by two Western Muslim mathematicians to solve this problem. And to give some results of the comparative analysis between the texts that we were able to gather for this study. These texts are extracted from works of algebra or calculus, which were written between the tenth and fourteenth centuries in the two regions of the country of Islam : the East and West Muslims. The study, which we propose, also presents some indications on the resolution of the problem in the mathematical traditions anterior to the Arab mathematical tradition.

Group D

Mathematics and Dialogue with other Disciplines and Between Teachers and Researchers

Animators :

Joaquin Gimenez, Andreas Moutsios Rentzos

A theoretical framework to model the relationships between teachers and researchers in collaborative research.

Gilles Aldon (France),
Monica Panero (Italy),

The collaborative work between researchers and teachers has been modeled by the Meta-Didactical Transposition (Arzarello et al. 2014). In this model, the relationships between the different communities lean on an internalization of external elements in the actors' praxeologies. At a deeper level of granularity, it is essential to consider the objects which are at stake in the common work of the two communities as well as the actions and activities that the two communities can perform on and with these objects. Starting from the concept of boundary objects, we present a framework allowing to analyze the relationship between actors of a collaborative research.

Group D

Designing Interdisciplinary Learning Units Drawing on a Research Project Aimed in Assessing Mathematics Teachers' key Competencies

Joaquim Giménez, Yuly Vanegas and Javier Díez-Palomar (Spain)

The aim of this paper is to introduce and discuss some indicators to evaluate mathematics teachers' competences drawing on the discussion of the design of an interdisciplinary learning unit (LU) embedded in the Professional Training for Pre-K and Primary pre-service teachers program, in a HE (High Education) program for mathematics teachers, drawing on a design research approach. We conclude that this experience provided insight for pre-service teachers to develop some crucial competencies in terms of teacher training abilities.

WEDNESDAY 18TH JULY 2018

AMPHITEATER	9h00 -10h00	**PLENARY 4** **Mathematics education and ethnomathematics living together** **Pr Charoula Stathopoulou (Greece),** **Pr Peter Appelbaum (USA)** We are going to discuss the contribution of ethnomathematics to mathematics education, particulary its frameworks and its potential to create conditions to live and do together. Developping the dialogue with alterglobalization ideas and integration of South-South ideas as epistemological perspective (Santos 2015, for example the African idea of Ubuntu, we re-consider ethnomathematics itself offering alternative founding principles based on post-colonial notions of dignity, acknowledgment and reconciliation.
	10h00 - 10h30	COFFEE BREAK
ROOM 1, 2, 3 and 4	10h30 - 13h00	**Working Groups (SESSION 4)** • Group A : **Mathematics and Living Together** Animators : **Cristina Sabena, Philippe Vaz** • Group B : **Mathematics and sustainable development** Animators : **Ana Serrado Bayès, Monica Panero** • Group C : **Cross-border Mathematics. Rethinking history of Mathematics** Animators : **Peter Appelbaum, Giulia Bini** • Group D : **Mathematics and Dialogue with other Disciplines and Between Teachers and Researchers** Animators : **Joaquin Gimenez, Andreas Moutsios Rentzos**
	13h00 - 14h30	LUNCH

Group A

Mathematics and Living Together

Animators :
Cristina Sabena, Philippe Vaz

Exploring parallel lines intersected by a transversal line with GeoGebra on smartphones

Marcelo Bairral,
Marcos Paulo Henrique (Brazil)

We present contributions from a research on learning parallel lines intersected by a transversal line with GeoGebra App. We are showing the development of two tasks in which 8th grade primary school pupils interacted, kept various records and reported their discoveries. Data were produced through audio and video recordings, screen capture, learners' written notes and the researcher's diary. We noticed that the students had a wider articulated vision of geometric properties. The use of smartphones proved stimulating, as it allowed students to watch a set of elements (angles, line position, etc.) articulated with the manipulation of the drawn straight lines. Results also claim for less focus on memorizing names in favor of a deeper understanding on angle properties and relations among them. Since there are many geometric properties and references to take into account, we point out the difficulty to visualize some properties on a small screen.

Group B

Mathematics and sustainable development

Animators :
Ana Serrado Bayès, Monica Panero

Mathematizing the consequences of climate change : beliefs, metacognition and decision-making

Ana Serrado-Bayés, Victoria Romero Marquez, Juan Antonio, Prieto-Sanchez (Spain)

Transforming mathematic curriculum into a mathematic sustainable one is one of the current challenges of education. This transformative approach aims to question what activities should be put in place to enable the teaching of mathematics to be a sustainable teaching. In this regard, this oral communication presents an "authentic" task that aims to enhance forty-eight Spanish Secondary School students in mathematizing the consequences of climate change. The task is composed by seven ill-defined complex problems connected by open-ended self-reflective metacognitive questions. We have analysed the declarative, procedural and conditional self-reflective metacognitive knowledge that students had used to justify beliefs, thoughts and decisions when answering these questions. Moreover, we have analysed if involving students in answering these kind

Group B

of questions helps to transform the seven ill-defined complex problems into an authentic task for sustainable mathematics education.

Group C

CROSS-BORDER MATHEMATICS. RETHINKING HISTORY OF MATHEMATICS.

Animators :
Peter Appelbaum, Giulia Bini

Piaget's Legacy : What is Reflecting Abstraction ?

Felix Lensing (Germany)

In its classical Lockean sense, the concept of abstraction refers to a two-sided process, in which something is retained, while at the same time something else is left out. Therefore, every abstraction presupposes a certain kind of material or substance upon which it is carried out. Depending on the material upon which an abstraction is exercised, Piaget distinguishes between empirical and reflecting abstractions. In this paper, the notion of reflecting abstraction is reconstructed in three steps: firstly, the shortcomings of the classical theory of abstraction in generally explaining the formation of concepts are developed; secondly, it is shown in how far these shortcomings can be overcome by modeling certain processes of concept formation as reflecting abstractions; thirdly, the explanatory power of the notion for the formation of mathematical concepts is exemplified in the case of what Freudenthal has called « counting number ».

Group C

The indivisibles : a travel in time and space from Archimedes to Cavalieri

Giulia Bini (Italy)

This paper presents a teaching experiment in three-dimensional Euclidean geometry, with the use of artifacts and physical experiences, involving a class group of 24 high school students (12th grade), who became time traveller historians and mathematicians investigating analogies and differences between Archimedes' and Cavalieri's approach to equivalence. The project had a double goal : from a research point of view, I pointed at evaluating the effectiveness of an historical inspired activity to update students' common culture about mathematics, while from a didactical point of view, the aim of this experience was exploiting the feeling of personal discovery that epitomizes hands-on activities as a pivot to promote a critical attitude towards Euclidean geometry as well as to endorse a historical approach to calculus.

Group D

Mathematics and Dialogue with other Disciplines and Between Teachers and Researchers

Animators :
Joaquin Gimenez, Andreas Moutsios Rentzos

"The mathematician is present". Report from a scientific Mini-Residency at Bode-Museum Berlin

Jana Göpper (Germany),

This paper is about detecting mathematizations in an art museum in a workshop that provides a meeting space between art and science. The workshop is the result of and science-residency at Bode-Museum and based on theoretical ideas stemming from critical mathematics education. It starts with Ole Skovsmose's distinction between different subject positions in the context of "mathematical modelling": constructors, operators and consumers. Because in the classroom, the focus is on operating and consuming mathematics, this project takes the out-of-school experience for teachers and students as a starting point to look at the activities of the constructors, in this case the people involved in the work of the museum. In effect this amounts to engaging in a form of "mathematical archeology". As the project is only in its initial stages, I would like to present some ideas at this conference in order to engage in a discussion and share the experiences of addressing the process of categorisation and classification as a

Group D

mathematical activity in this “dialogue with other disciplines”.

Through Islamic lenses : materials for a history of visual aids at the service of mathematics education

Farid Benfeghoul (Germany)

Arab texts still very little known, and which have not yet been exploited for a universal history of visual aids, testify to the knowledge of magnifying lenses for reading, in the Islamic civilization, from the tenth century. The prehistory of optical aids, especially glasses, which appeared around the end of the 13th century, would thus be buried in Arabic sources until now. Another unexpected result : the study of optics resulted in the construction, by an Ottoman scholar of the late sixteenth century, of an instrument functioning as a telescope. This work, which is part of the history of science, could be used in the context of an interdisciplinary teaching linking at the same time Mathematics, Physics and History of Sciences where it would be an important factor of motivation of the pupils in difficulty or lacking motivation in mathematics class, giving meaning to their teaching. The history of science contains a multitude of pedagogical applications and the history of visual aids, being related to everyday life, would be a convincing example. This work, which constitutes a new deal in the history of science, namely the opening of a new field of knowledge and investigation, also has an

Group D

innovative potential through its application to the didactics of mathematics.

WEDNESDAY 18TH JULY 2018

ROOM 1and 2

14h30 - 15h30	**MEETING WITH PLENARY SPEAKERS 3 ET 4** **Pr Mustapha SOKHNA, Pr Charoula STATHOPOULOU, Pr Peter APPELBAUM**
15h30 - 16h00	COFFEE BREAK
16h00 - 17h30	**FORUM OF IDEAS, POSTERS**

Mathematical tasks for living together: using difference as a starting point

Alexandra Gomes (Portugal)

One of today’s great challenges in education is to create conditions for everyone to live together, to recognize differences, to accept them, and to learn from them. Mathematics can and should contribute to the recognition and acceptance of differences, promoting the coexistence of all.

The need to promote an inclusive mathematics that allows for the learning of all leads one to think about the kind of tasks that should be offered to the students. The proposal we make in this work is to consider the difference as a starting point for mathematical activities in the classroom.

Connecting mathematics and culture using ICT in non-formal settings associated with tourism

Pedro Palhares (Portugal)

In this Poster, we will present the basics of a project connecting mathematics and culture. This project pretends also to bring information and communication technologies to help dissemination on non-formal setting associated with tourism.

WEDNESDAY 18TH JULY 2018

History of school mathematical education and preparing mathematics teachers in Moscow during social and economic changes
Ildar Safuanov, Sergey Anastasyan (Russian Federation)

Transformations in social and economic life in Russian Federation in the last decades had remarkable impact on mathematics education and mathematics teacher training. The history of new approaches to mathematics education and preparing mathematics teachers is described.

To search, to model, to represent, to reason, to calculate and to communicate, six mathematical skills for living together
Philippe Vaz (France)

Six panels to build in class the sense of six skills «To search, to model, to represent, to reason, to calculate, to communicate» and sow the seeds of a better Living together all in the service of the students' life project, active citizenship and culture of peace.

20h00 - 23h00	**CIEAEM 70 DINNER, MUSICAL EVENING DJANATU AL ARIF**

THURSDAY 19TH JULY 2018

9h30 -10h30	**WORKING GROUP REPORTS**
10h30 -11h00	COFFEE BREAK
11h00 -12h00	**PANEL : CIEAEM 70 FEEDBACK**
12h00 - 13h00	**CLOSING CEREMONY**
13h00	LUNCH

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