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Conference theme

Mathematics and living together
Social process & Didactic principle

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"We are parachuted on this planet and we have to live together. That is why the Charter of the United Nations imposes the imperative on all human beings to practice tolerance and live together in peace with each other as good neighbors. So my mind is the simplest of definitions of peaceful coexistence "
U. Thant, Secretary General of the United Nations, January 7, 1964

"The world is dangerous to live, not so much because of those who do evil, but because of those who watch and let it go. "
Albert Einstein, mathematician

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Introduction. "Mathematics and Living Together": Why, How, What ?

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 Castelnovo, 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.

What is living together ?

An adapted definition of Françoise Lorcerie, for the International School of Peace - CIFEDHOP
<http://www.eip-cifedhop.org/publications/thematique7/Lorcerie.html>:

"Learn to enter into cooperative practices with all others with whom we share our present - and to develop feelings of sympathy for them, (...) learn to engage with them."

Also :

"It is acting in synergy through concrete and positive actions for the fulfillment of each one in the mutual respect of the differences on the intellectual, social, cultural and spiritual levels. It is building and acting together to build a common future. "(K. Bentounes)

Problematic :

To live together is to do together: how can we rethink mathematical education for a "better living together"? Can mathematics courses not be an opportunity to confront mathematical thinking and / or to learn by exchanging between pupils, pupils and professors, between teachers, both mathematics and also the art of living together? to evolve together through speech and reasoning?

On the other hand, what positive impact for living together can mathematics have in human society and not just in the classroom? This can be achieved by the students, actors of today and citizens of tomorrow, by the influence they can have on their family by modifying their behavior, by mathematical actions outside the walls of schools and universities.

From its history, CIEAEM is a european creation. However, the particular scheme of CIEAEM has increasingly attracted participants from other parts of the world. Their views and concerns occupy an ever-growing part of CIEAEM activities and open up exciting – and also worrying – perspectives on mathematics education as a global enterprise. CIEAEM faces the challenge of exchanging and sharing views, of offering aid and of co-operating in solutions without imposing Euro-centric views, and without fostering cultural alienation. The experience of CIEAEM is that mutual understanding, human and professional esteem, and an honest and attentive discourse can overcome these risks. The seriousness of the work, the "family"-character of the meetings, and the continuity of contacts have all proved to be assets of CIEAEM. (CIEAEM Manifesto¹)

Apart from changing labour market demands for new, extended or upgraded qualifications, education institutions are scrutinised more often than in previous decades in terms of their contribution to local, regional, national and even global social and economic needs. Public service, technology transfer, wealth distribution,

¹ <http://www.cieaem.org/?q=system/files/cieaem-manifest2000-e.pdf>

solutions to various problems, the production of a highly qualified workforce, reduction of inequality ... to name but a few of the multitude of expectations and demands. (CIEAEM Manifesto)

Today: The 17 United Nations Sustainable Development Goals² are part of the curricula of many countries. Of these, the following five objectives are more particularly related to education.

- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
- Goal 5. Achieve gender equality and empower all women and girls.
- Goal 10. Reduce inequality within and among countries.
- Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
- Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development.

To live together is to do together. What could be the contribution of mathematics?

Some questions about Mathematics and Living Together from the CIEAEM Manifesto

- How to create appropriate social conditions to establish a teaching and learning practice guided by principles of social justice and equity ?
- Who benefits from and whose interests are served by mathematics education today - is there a major change compared to 50 years ago ?
- How to make the society aware that mathematics education could promote accountability and give full scope to a democratic vision to establish new forms of social contracts, communications, and discourse ?
- Given that mathematics education is a powerful tool in basic democratic virtues: How to empower people to think critically and to adopt critical attitudes ?
- How could mathematics education emphasise more the development of judgement and wisdom than of particular skills ?
- Given the ubiquity of poverty and violence in a major part of the world, can co-operation in the field of mathematics education contribute anything to alleviate this situation ?
- How can communities with different political, cultural, and social conditions find ways to learn from each other more productively ?

² www.un.org/sustainabledevelopment/en/sustainable-development-objectives/

Subtheme 1: Mathematics and Sustainable Education

Mathematics and Sustainable Development Goals of the United Nations. Mathematics and gender. Mathematics and Cooperative Pedagogies.

This sub-theme will focus on the United Nations Sustainable Development Goals, as set out in the introduction, which includes in particular gender issues in mathematics education and also collaboration issues within a class or between classes. The use of cooperative games in mathematics can be a tool for socialization and living together.

Mathematics and Sustainable Development Goals [SDGs]of the United Nations.

Mathematics and sustainable development can be understood in two different ways. First, it means using sustainable development concepts to solve problems such as carbon equilibrium using mathematics, as the example is explained in the Sesamath review [Revue Sésamath] (Hache, 2011). It is also to use in mathematics classes examples that make people aware of specific problems related to the ecological management of the world.

A second way to understand this concept is for educators to consider mathematics so that their teaching belongs to the field of sustainable education and is part of the basic culture necessary for the future of humanity with the goal of promoting sustainable development. This is an objective in relation to the United Nations SDGs.

"Sustainable Mathematical Education is the project of reorienting mathematical education towards conscious environmental thinking and sustainable practices" (our translation, Renert, 2011).

In Europe, sustainable development is part of the curricula (Baudrit, 2005, Pêtre, 2010, Adomssent & al., 2014, O'Byrne & al., 2015) and mathematics can play an important role in this teaching and can be used as a subject of study for problems related to sustainable development (Ruhmann, Mathey, 2010). This is also the case in many other parts of the world.

Mathematics and Gender.

The research concerning "mathematics and gender" is plentiful, and relies on theoretical frameworks and methodologies which are well synthesized in the article by Leyva (2017):

"The purpose of this journal is to present a critical analysis highlighting the contributions and limitations of the methodological approaches of different studies for future research on gender in mathematical education" (p. 398).

Even if the principles of equality and cooperation are put forward and promoted in institutions, the inequalities persist and challenge educators and more generally the ways of to apprehending mathematics education. Several studies on gender stereotypes in textbooks have been done (Cromer, & Hassani-Idrissi, 2011).

Although the principle of gender equality has been consolidated in Europe over the centuries, based on international texts and the *acquis communautaire*, gender inequalities persist, including in education systems where schooling girls and boys are parity" (see in particular Baudino, 2007, Jarlegan, A Tazouti, Y (2010), Eurydice network 2010). A dual finding is unanimously established in OECD countries (Organization for Economic Co-operation and Development) :

"A supremacy of girls doubled everywhere a more favorable orientation of boys who reach the best levels" (Baudelot, Establet, 2007, p. 91).

How to explain the paradoxical success of boys, monopolizing prestige studies and being offered more opportunities while experiencing more academic difficulties, and the paradoxical failure of girls, doing their job better but having restricted choice of orientation? The significative stereotypes of sex through practices, speeches, representations, which are also relayed by the school, constitute a partial answer (Brugeilles & Cromer, 2011).

Mathematics and Cooperative Pedagogies

Cooperative pedagogies are part of this movement of living together. In particular, cooperative mathematical games, set up in kindergarten, modify human relations within the classroom. Without going into the diversity of definitions of cooperation and collaboration, the work highlights the social importance and beneficial educational consequences of such an approach :

"To make pedagogy of co-operation a basic principle of the social and educational life of its class is to adhere to a conception of man and society, of values, of a relationship between people and to a movement of ideas that go beyond the school" (Legall, 1999).

"Cooperative pedagogy is an interactive approach to work organization (...) where students of different abilities and strengths (...) each have a specific task and work together to achieve a common goal" (Howden & Martin, 1997, p. 7) cited by (Lavoie, Drouin, & Héroux, 2012).

Whether it is cooperative pedagogies such as reciprocal teaching, help, mutual aid, tutoring or others (Barkley, Cross, & Major, 2005), this type of pedagogy facilitates learning and seems to be particularly useful in the case of tutoring to "guardian"(Slavin, 1996). In addition, problem solving becomes more effective (Vidakovic & Martin, 2004) through the use of such an approach. In mathematics, the collaborative resolution of problems initiated by researchers (Gowers & Nielsen, 2009) in the Polymath project, for example, are parallel to collaborative research projects between students (ResCo, 2014, Aldon & Garreau, 2017).

Some questions

- What activities should be put in place to enable the teaching of mathematics to be sustainable teaching ?
- What elements of sustainable development can be used as a starting point for teaching mathematics ? Can multicultural classes be an asset for this ?
- Concepts such as "mathematical skill" or "gifted student" are part of the collective ideology, and are based on convictions and prejudices. In addition, the "math gift" a priori is easily associated with other hereditary characteristics, such as gender or ethnicity: how can we react against this ? (CIEAEM Manifesto)

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Subtheme 2 : Cross-border Mathematics

Globalization and the Internet: information technology, EAD, MOOC, cooperation of classes and schools across borders. Teaching in multicultural classes. Training of teachers to teach in a multicultural environment.

By cross-border mathematics we mean all the devices, tools, ways of thinking that transcend boundaries, including geographic, political, professional or cultural in the digital age. Thus, new forms of emerging teaching and learning (EAD, MOOC) are part of this theme, as is the work on multicultural classes but also on collaborative research and the necessary interactions between different communities.

Globalization and the Internet: information technology, EAD, MOOC, cooperation of classes and schools across borders.

Several universities have set up cross-border cooperation, such as the University of Pau (France) and the University of Zaragoza (Spain). This cross-border cooperation in mathematics proposes bilateral cooperation actions in mathematics between the two universities since the end of the 1980s. They concern either teaching and training activities, or research collaborations concretized, if necessary, by publications in international journals and participations in thesis juries.

(See <http://lma-umr5142.univ-pau.fr/fr/collaborations/cooperations-transfrontalieres.html>)

The UniGR "University of the Grande Région" which brings together the six founding universities : the University of Kaiserslautern, the University of Liège, the University of Lorraine, the University of Luxembourg, the University of Saarland, and the University of Trier was created in 2008. It works towards training and research "without borders", improving and facilitating the conditions of mobility of students, PhD students, teachers and researchers from partner universities; supporting cross-border collaborations through the network and expertise developed, and supporting the visibility of cross-border initiatives in institutions. Thanks to the impulses of the organs and numerous networks of the group, a "cross-border culture" must emerge within the partner universities. The UniGR must thus exceed its status as a recognized player in the Greater Region to become an engine of its development. The priorities set for excellence in research and teaching within the grouping are as much oriented towards visibility, and therefore international competitiveness, as towards the development strategy of the large regional area. The group also promotes multilingualism in the cross-border region and prepares students and PhD students for the Greater Region's labor market."

"Cross-border and intercultural research in partnership is an ongoing process, which aims to create solid knowledge, while generating mutual trust and learning and a shared sense of ownership." Excerpt from "a guide for cross-border research partnerships' 11 principles 7 questions Swiss Commission for Science Partnership with Developing Countries (KFPE) 2011 (See https://sciencesnaturelles.ch/uuid/e70572c4-64ca-58d8-86a9-2b7af19fd2ef?r=20170706115333_1499301166_adeb9728-2ce0-54b4-aec1-4cbbb3bf4ef3)

The African Virtual University and its resource model, the conditions for the viability of distance learning programs for mathematics teachers, is also an example of collaboration between teachers and researchers from a training perspective (Sokhna & Sarr, 2009).

These examples show cooperation at the university level, but also with educational institutions, and presuppose the reorganization of teaching at the international level. The MOOCs, moreover, were born at the beginning of the 2000s initiated by prestigious American universities (MIT, Harvard, Stanford, Duke University, ...) seeking to attract students from all over the world. It should be noted that what is the specificity of MOOCs as compared to a distance course is their massive side: with 10 000 participants, it is impossible for a trainer to follow each student. It is therefore necessary to develop peer-to-peer exchanges in the whole process of learning. A new form of collaboration between learners emerges from the very context of teaching in the development of communities of practice (Wenger, 1998, Shah, 2015, Panero & al., 2016).

"International school correspondence makes it possible to work on education for sustainable development, the social and solidarity economy, and cooperation. Martine Trinel (Millac school) and Patrick Galland (Moussac)

report on a partnership experience with Ricotte in Senegal, which led to the electrification of a school and a village. (ICEM 2009)

The resources provided by the Internet could be more:

- Allow work teams to contact experts from the same region. (teamwork)
- Allow teachers and students around the world 24 hours a day to find where and how to get in touch with a work group.
- Facilitate the creation of an effective transnational work system.

This can only be done if teachers and researchers are trained in the use of these new technologies (Niess, 2005) and if we take into account the students in this training (Druin, 2002).

Teaching in Multicultural Classes, Teacher Training in a Multicultural Context

"Cultural diversity is an internationally recognized fact today. The idea of an international convention on the subject, launched by France at the World Summit on Sustainable Development held in Johannesburg in 2002, culminated in October 2005 with the Convention on the Protection and Promotion of the Diversity of Cultural Expressions adopted by Unesco.

With this text, States have elevated cultural diversity to the rank of common heritage of humanity and affirmed that its protection, promotion, enrichment and maintenance are essential conditions for sustainable development.

Living together and promoting cultural diversity are major axes of a sustainable development policy. It is therefore necessary to establish a space of citizen dialogue with the inhabitants and associations of multiple horizons. Association des médiations interculturelles.

As Avruch and Black, or DuPraw and Axner remind us:

"Our culture is the lens through which we see the world, the logic with which we order it, and the grammar with which we decipher its meaning (Avruch & Black, in Berg et al., 2012).

We share common experiences that shape our understanding of the world. These include the group in which we are born and those to which we join (DuPraw & Axner, in Berg & al., 2012).

Favilli, Oliveras, & César, (2003) studied the activity of mathematics teachers in multicultural classes in Southern Europe.

These realities of teaching in multi cultural classrooms can be approached from the point of view of the different social and ethnic cultures of students and from a professional point of view (Akkari, 2006). Indeed, the resolution of certain technical practical problems may require the establishment of different methods compared to theoretical knowledge. The gap between the performance of students who come from the dominant culture and those who are not, continues to widen. In classes where the teacher uses methods rooted in the dominant culture, students who are not of this culture will be left behind. In these classes, students who are already marginalized experience more difficulties and often fail, which only reinforces their feeling of being "null" (Osborne, 2001, Steinback, 2012).

Several researchers have stressed the importance of taking into account cultures, the socio-cultural background of students, culture-related thought systems to teach mathematics effectively. This is the case of Spagnolo & Di Paola, (2010), Barton, & Frank, (2001), Radford, (1997).

Some questions

- Which strategies, both from research and practice, could make progress in bringing the essential and the most appropriate to teaching and learning, and ensure access to all levels of schooling, both primary and secondary school, as well as adults who have not been to university ?
- Does perception of excellence or mathematical achievement vary by culture and community? Does it depend on class, gender or ethnicity ?
- How can international cooperation foster dialogue and fairness in debates rather than a one-way

relationship ?

- Regarding the consideration of cultural diversity, how much of the responsibility for education is attributable to politicians, and more specifically to mathematics education? What actions can be taken to make the teaching of mathematics more sustainable in an increasingly diverse world?
- Is multiculturalism a force for teaching and learning? How can each culture enrich itself with diversity and multiculturalism?
- What will become of the cultural and social diversities in globalization? Will the internationalization of mathematics education and globalization equally respect the equity and autonomy of partners? What is the impact of competition between and within educational institutions ?
- How can new technologies serve the teaching of mathematics especially in relation to multiculturalism ?
- How can taking into account the cultural diversity of the mathematics class be an aid for the learning of all students ?
- How can the teacher use these differences within the classroom to enrich students' mathematical learning?
- Why are social networks like Facebook, Twitter, Facebook, LinkedIn, Tumblr, Pinterest, ... not widely implemented in mathematics in the classroom? Could this not help to improve living together in the group

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Subtheme 3 : Mathematics and Dialogue with Other Disciplines and Between Teachers and Researchers.

Transdisciplinary, interdisciplinary and multidisciplinary activities. Collaborative research between teachers and researchers.

Living together means also to be able to change our point of view and to work together from a perspective of a better understanding the phenomena that a single discipline can not catch completely.

Transdisciplinary, interdisciplinary and multidisciplinary activities.

In literature, we find the terms trans-, inter- and multi disciplinarity. We will rely on the definition of Bourguignon (1997):

"In a first approach, it could be said that in multidisciplinary several disciplines combine to study a common object, none of which can observe all aspects with the only techniques at its disposal, whereas in interdisciplinarity there is a need to establish cooperation between autonomous disciplines to broaden understanding of a particular area or to achieve a common goal."

Transdisciplinarity is then a superior stage of collaboration between disciplines in which connections are built within a system where disciplines meet and intersect (Piaget, 1972). Bourguignon continues: "Transdisciplinarity offers a new vision of Nature, opening up the disciplines to what passes through them and goes beyond them. It goes beyond the realm of the exact sciences that it must reconcile with the sciences of man. Transdisciplinarity places Man in the Universe. It postulates that the economy must be at the service of humanities. It dialogues with all humanist and non-totalitarian ideologies" (1997)

In the 1970s and the 1980s, CIEAEM took a new direction under the influence of Anna Sofia Krygowska, a Polish teacher and mathematician, Emma Castelnuovo, an Italian pedagogue, Claude Gaulin, a Canadian professor, and Hans Freudenthal, a Dutch mathematician. These people tried to break the "noble isolation" of mathematics and their orientation towards pure mathematics, to bring them closer to other sciences, social reality and the social practice of mathematics. It is thanks to their initiative that the themes of the CIEAEM meetings were formulated and perceived more and more in terms of transdisciplinarity and interdisciplinarity.

"From the beginning, mathematics is the language of physics, indispensable in the very formulation of the fundamental laws of nature. Mathematical modeling plays an important role in the social sciences, especially in economics, and an ever-increasing role in the life sciences. Conversely, as we all too often ignore, mathematics has always been fed with concepts and problems from other scientific disciplines. In their development through the centuries" (CREM, 2005).

Interdisciplinarity often makes it possible to approach a problem from a different angle than the one usually used by mathematicians. Currently, interdisciplinarity in the sciences, technology, engineering and mathematics (STEM) offers teachers and students a global approach to the apprehension of scientific phenomena (Becker & Park, 2011), CREM (2005), (Arnoux, 2006).

This sub-theme studies models in which mathematics is partially or largely involved, and through which, social, economic, ecological processes, etc. can be described, predicted and prescribed. (Alshwaikh & Straehler-Pohl, 2017).

Cross-disciplinary research in mathematics education linking the sciences of education, didactics and mathematics themselves is not plentiful but has proved fruitful (Will & Ryden, 2015). The questions of obstacles encountered and ways to overcome them can be studied in this sub-theme.

However, a precise reference is the text written by Piaget in 1970 on the occasion of a colloquium on interdisciplinarity : "Finally, at the stage of interdisciplinary relations, we can hope to see succeed a higher stage that would be 'trans-disciplinary,' which would not be satisfied with reaching interactions or reciprocities between specialized researches, but would situate these links within a total system without stable boundaries between disciplines."

Gunter Pauli, father of the Blue Economy (Pauli, 2010) has set up multidisciplinary teams of researchers. In the field of education, the Zero Emissions Research and Initiatives (ZERI) Foundation has developed ecological fables³ based on real scientific facts that “living together”, ecology and “know being” and that can be exploited in a trans, inter or pluridisciplinary activities. Mathematics are fully able to find their place. (Pauli, 2015). These fables are used in many classes in the People's Republic of China.

Collaborative Research Between Teachers and Researchers

In research work in education, researchers and teachers as well as engineers or computer scientists work on common topics and objects with different objectives related to their institutional positions. The aim is to foster collaboration between several communities for the construction and mobilization of scientific and professional knowledge in a pooling perspective for the benefit of all. Discussions on educational research paradigms (Wang & Hanafin, 2005, Swan, 2007, Sanchez & Monod-Ansaldi, 2015, Battaglia, Di Paola, & Fazio C. 2017). will help advance both the theoretical frameworks for explaining the interactions between different communities and the professional competences of all actors.

Some questions

- In what way does the dialogue between disciplines make possible the enlightening of a coherence of learning for students? How does this dialogue strengthen the teaching and learning of mathematics?
- How does interdisciplinarity contribute to the creation of concepts specific to the mathematics discipline?
- Any discipline is characterized by some markers or preliminary elements: history, literature, technical language, symbolic place of installation, recognition from outside, shared values and scientific tools. How do these markers promote cross-disciplinary dialogue and how can teachers take hold of these reflections from the perspective of improving mathematics education?
- How is it possible to establish relationships between investigation and hypotheses on learning?
- How is it possible to identify the different modalities arising from the convergence of disciplines and why?
- How to overcome institutional obstacles to build effective interdisciplinary teaching?
- What concepts are needed to describe and analyze collaborative research processes? How do they work?

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³ This book is published on crease and waterproof mineral paper.

bilingue Paris les éditions blu

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Sub-theme 4: Rethinking history of mathematics.

Forgotten Mathematics and Forgotten mathematicians. Classroom activities and history of mathematics. Ethnomathematics.

Forgotten Mathematics and Forgotten Mathematicians

It is essential, if we want to give a common culture to students, to revisit the History of Mathematics by highlighting the contribution of different cultures to the evolution of Mathematics) for example Djebbar (2001, 2005) describes the contributions of the Arab Muslim culture. For Thomas (2015), in his note concerning Rashed (2011), it is about "breaking the chronological boundaries inherited from political history (ancient, medieval, classical, modern mathematics), and to think about the place of the History of Sciences, between epistemology and social sciences."

The Arab Muslim world has become an issue of political and scholarly controversy. We must therefore give a scientific answer concerning the History of Mathematics. Several researchers (Büttgen, and all, 2009) Rashed (2011), have examined the question and have appreciated the true value of what the terms "Arabic," "Latin," "Greek," and "Jewish" meant in the Middle Ages and the Renaissance, thus allowing the restoration of the place of each in the transmission of sciences - among others - through the history of scholarly transmissions. Let us mention the many works of Aïssani concerning the history of mathematics in Algeria and exchanges between the two shores of the Mediterranean. (Aïssani & al 2014, Aïssani D. et al. 2014), (Verdier N., Romera-Lebret P. and Aïssani D., May 2016). Similarly, the update in Algeria of unknown ancient mathematical manuscripts can also help to change the way scientists view the role played by Arab mathematicians in the evolution of this discipline (Mechehed DE, Bekli MR and Aïssani D., 2013).

All these works has undoubtedly made it possible to bring down European-centric representations concerning the transmission of the History of Science and Mathematics in particular. This approach is essential if we want to restore living together because it allows to take into account the contribution of each.

In the same way, we are rediscovering today the role of black mathematicians in the United States in the great successes of the American aerospace program of the 1960s. They exploded prejudices and social barriers at the time of racial segregation. And who knows today that the only woman in the world to be awarded the Fields Medal is Iranian? It is of utmost importance to rediscover these forgotten mathematicians if we want to enable students from different cultures to learn about the contribution of different civilizations to the advancement of mathematics and to many discoveries (Büttgen et al., 2009).

Classroom activities using the history of mathematics.

Many researchers, for example in the French IREM (Research Institute for Mathematics Education), have shown that using activities related to the History of Mathematics in the classroom helps to promote the mathematical activity of students, and also to create a common culture integrating the contributions of different civilizations to mathematical discoveries (Collectif IREM, 1993,1997; Cerquetti-Aberkane, Johan, & Rodriguez, 1997; Cerquetti-Aberkane, & Rodriguez, 2002; & Cerquetti-Aberkane, 2000, 2004). This is fundamental, especially in multicultural classes.

In France, the group M.A.T.H. (Mathematics: Historical Literacy Approach) has been working since the early 1980s on the introduction of a historical perspective in mathematics education with the main objective of designing and experimenting with teaching scenarios incorporating the work on mathematics historical texts (Barbin & Maltret, 2015).

Ethnomathematics

Introduced in the 1970s by the Brazilian, Ubiratan D'Ambrosio (D'Ambrosio 1985), Ethnomathematics allows us to better understand human cultural diversity (Rosa, and All 2016).

According to socio-cultural groups there are, for example, different representations of geometric figures or bodily representations of numbers. The study of the use of traditional African games made it possible to highlight the setting up of sophisticated logical reasoning and the resolution of graph problems, among others,

to play for example the game of *Shongo*. Claudia Zaslavsky has shown that the 24 different types of patterns enumerated by the mathematician Coxeter (1969) are present in the African art of many ethnic groups (Zaslavsky, 1979,1999; Dhombres, 1992). Moreover, we find these 24 types of motifs in Islamic art present at the Alhambra in Granada. Several researchers have worked on this subject.

Vellard, (1982) have shown, by a choice of very precise examples concerning the mathematical activities of calculation and logic put in place in several African cultures, that "contrary to a very widespread belief, French, (no more than any European language) is the language of logic and reason without which it would be impossible to work scientificallyThe argument of "greater logical rigor" of French (or English) in relation to languages Africans to develop a scientific thought is a false argument, not devoid of understatement (...)"(p. 274).

Vellard (1982) has shown the importance of introducing training in mathematical activities in traditional African cultures into higher education. She introduced African Mathematics into her Mathematics History course for mathematics students at the University of Bukavu in the late 1970s and early 1980s, and she said, "I was able to notice with pleasure, the astonishment first, then the interest that they (the students) brought to this unusual course for them. For the first time, Africans, students of mathematics, heard both the words 'mathematics' and 'African,' the juxtaposition of these two words having always appeared to them, until then, as an absolute nonsense" (pp.275-276).

During this same period, Zaslavsky (1979) and Cambell (1976) also set up in the United States similar teaching practices with the same success.

Poirier (2005 and 2006) highlighted the traditional Inuit mathematical practices that need to be known and taken into account when teaching mathematics to Inuit students.

The ethnomathematical perspective can inform our practices and interventions in the schools, while ethnomathematical programs can be enacted in broader community projects by youth who lead with the processes of dignity, recognition, and reconciliation. One might also say that ethnomathematics can give the floor to critical voices, to other minority voices, and to different voices in mathematics education (Gilligan 1982; François & Van Bendegem, 2007).

The ethnomathematical perspective can inform our practices and interventions in the schools, while ethnomathematical programs can be enacted in broader community projects by youth who lead with the processes of dignity (Butler and Al 2016), recognition, and reconciliation. One might also say that ethnomathematics can give the floor to critical voices, to other minority voices, and to different voices in mathematics education (Gilligan 1982; François & Van Bendegem, 2007).

Stathopoulou, & Appelbaum, (2016) describe how such an approach might inform mathematics education in classrooms and in community organizations locally and via global collaborations. In light of "Living Together", they describe how Ethnomathematics prompts mathematics educators to consider the pursuit of dignity, recognition and reconciliation as forms of forgiveness – not in the common sense notion of acceptance, but rather in Hannah Arendt's framework of maintaining awareness of violations and dispossession while refusing to allow these violations and dispossession to affect our present or future (Arendt, 1963/2013; Biesta, 2013; Knott, 2011). embracing dignity and recognition through forms of refusal that enact forgiveness.

Currently this type of education is not implemented systematically in the university mathematics curriculum. Could not the introduction of such a teaching in mathematics contribute to a better life together?

Some questions

- How and why to update a common culture concerning the history of mathematics? How can this promote the Living Together ?
- What activities to put in place concerning the history of mathematics to promote Living Together ?
- History of mathematics and multicultural classes: how to show the links between different cultures thanks to the history of mathematics ?

- How to introduce into the university curriculum teaching about African mathematics among others ?
- How can Ethnomathematics contribute to the pursuit of dignity, recognition and reconciliation as forms of forgiveness for better present and future of Living Together in classrooms, at the school level, or across multiple school collaborations ?
- How can Ethnomathematics report being useful in cross-border collective projects for teaching and learning mathematics ?

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Organization of the conférence

The programme of the conference includes several activities: plenaries, semi-plenaries, working groups, oral presentations, forum of ideas, panels, and meeting the plenary speakers.

Plenary Presentations

The programme includes plenary and semi-plenary sessions where invited speakers will focus on aspects of the conference theme. The plenaries and semi-plenaries provide a shared input to the conference and form a basis for discussions in the working groups.

The plenary speakers are :

- Professor Michaela Kaslova (University Charles, Prague, Czech Republic), Mathematics and socialization in kindergarten
- Professor Jamil Aissani (University Abderrahmane Mira – Bejaia, Algérie), Rethinking the History of Maths
- Waiting for answer of the Speaker, Mathematics in dialogue
- Professor Moustapha Sokhna (University Cheick Anta Diop, Dakar, Sénégal), Mathematics and Digital Learning

Working Groups

Each participant is invited to be a member of one of the working groups that will meet several times. Working groups will focus on a specific subtheme (see the description above) or on a number of interrelated themes. This will provide opportunities both for in-depth discussions and for the linking of experiences. These are planned as interactive sessions and are the heart of the conference. Oral presentations are included in these sessions, and discussions and exchange of experiences and ideas are the essential aspects of this activity. Each group will be coordinated by two “animators”.

Oral Presentations within the Working Groups

Individuals or small groups of participants are encouraged to contribute to the conference through an oral presentation, thus communicating and sharing with others their ideas, research work or experiences. Relevant case studies are particularly welcome. Presentations should be related to the theme of the conference in general or to the subthemes. There will be between 15 and 20 minutes available for each presentation (depending on the organisation of the working group) followed by approximately 10 to 15 minutes for discussion.

Workshops

Individuals or small groups of participants are also encouraged to prepare and organise workshops. These are a more extended type of contribution which should focus on concrete activities and encourage the active involvement of the participants through working on materials, problems or questions relating to the subthemes. A workshop will last for about 90 min.

Forum of Ideas

The Forum of Ideas offers an opportunity to present case studies, learning materials and research projects, as well as ideas that are not directly related to the theme. There will be a specific time for contributors to explain and discuss their work with fellow participants.

Special Sessions

There will be a special session that will enrich the debates and get to know each other better in order to understand each other better

Official Languages of the Conference

The official languages of the conference are French and English. The speakers need to prepare their slides in both languages, but, of course, each speaker chooses the language of presentation. We rely on and appreciate the help of those who can translate, to assist their colleagues within each working group. Animators in most cases are able to help in both languages.

We hope that all participants will contribute actively to the conference by sharing with others their experiences and views in the various sessions, particularly in the working groups. Moreover, you are encouraged to send a proposal for an oral presentation or a workshop, or to bring a contribution to the Forum of Ideas. These proposals will be studied by the International Program Committee for validation. If the proposal is accepted, it will be presented by the author in a working group.

Please note that each author can present only one oral presentation. If an author submits two or more papers, one of the co-authors needs to present the second, third etc. oral presentation.

The person who will present the communication must be registered and present for the communication to be published in the proceedings of the conference.

Call for papers

Proposals for **ORAL PRESENTATIONS** and **WORKSHOPS** can be made by sending a **FOUR PAGE** text (about 1800 words or 12000 characters with spaces), **BEFORE FEBRUARY, 28, 2018**, including:

- Title, authors' names (please underline the presenting author) and affiliations,
- Aim and main idea of the reported study, methodology and the expected conclusions,
- References.

The language of the proposal should be the same as that of the oral presentation (English or French). Once your proposal is accepted you will need to prepare an abstract or summary in the other official language together with slides in both languages. Members of the Commission can assist the participants in translating their transparencies if they ask for help ahead of time.

Proposals for the **FORUM OF IDEAS**, can be made by sending a **ONE PAGE** text (about 450 words or 3000 characters with spaces), **BEFORE FEBRUARY, 28, 2018** including:

- Title, authors' names and affiliations,
- Short description of the content, including information about the type of material to be presented (poster, models, video, ...).

The language of the proposal should be the same as that of the oral presentation (English or French). Once your proposal is accepted you will need to prepare an abstract or summary in the other official language together with one single Power Point or other presentation in both languages. Members of the Commission can assist the participants with translations if they ask for help ahead of time.

The **Conference Proceedings**, which will be published as a special supplement of the journal *Quaderni di Ricerca in Didattica / Mathematics* (QRDM), will be edited by electronic typesetting of the submitted papers. For uniformity and the good quality of the edition, it is necessary to keep to the following specifications:

- The page size will be A4 with margins 4cm right and left, 5.3cm top and down. The text alignment will be justified, except the title and the author's names that will be aligned centred.
- The first page will contain in order:
 1. The title of the paper, in bold font and size 16.
 2. One blank line.
 3. The authors' names, affiliation and email, in font size 12.
 4. Two blank lines.
 5. Abstract of the paper: this will not exceed 15 lines, in font size 12.
 6. Two blank lines.
 7. The main text, in font size 12.

- All text fonts will be Times New Roman.
- Pictures, tables, graphs, that are included in the text, must also be saved in separate files submitted with the paper.

Please send us your computer file by using **Microsoft Word** (saved as .docx) with your proposal to the following e-mail address: cieaem70@gmail.com

Registration

Please register online on the website: [https // cieaem70.sciencesconf.org](https://cieaem70.sciencesconf.org)

Do not forget to fill in as precisely as possible on the site your registration form for you and your companions if necessary. Specify your choice of hotel room and departure dates.

Conference Fee + Hotel to be paid to the account of CIEAEM 70

Participant (before April 30, 2018)	320,00 € + 2 nights hotel
Quality-Class Student	200,00 € + 2 nights hotel
Student (before April 30, 2018)	200,00 €+ 2 nights hotel
Accompanying Person (before April 30, 2018)	200,00 €+ 2 nights hotel
Participant (after April 30, 2018)	360,00 €+ 2 nights hotel
Student (after April, 30, 2018)	240,00 €+ 2 nights hotel
Accompanying Person (after April 30, 2018)	240,00 € + 2 nights hotel
For all balance of the hotel before May 31st	

IMPORTANT

Registrations can not be taken after May 31st because there is a minimum period of one month to obtain the courtesy visa and the issuance of the invitation.

Please pay the conference fee by money transfer, or by check payable to the Association d'appui à la CIEAEM for participants living in France.

Checks should be sent to the following address :

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Please note: **All bank charges must be covered by the participant.**

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Once you have paid by money transfer, please immediately send a copy of the transaction document with your name on it to the Conference Secretariat: cieaem70@gmail.com

Do not forget to fill in the site your registration form for you and your companions if necessary.

The fee includes all documents for the conference, coffee breaks, social activities, lunches, excursion and conference dinner. For accompanying persons, lunches, excursion, social activities and conference dinner are included.

In order to facilitate your stay during the conference we have planned to organize all transfers, airport hotel and transportation to the university and to the places of meals and the hotel.

The planned excursion includes a visit to a stud farm Barbes, very old breed of Algeria. This visit will be followed by fantasias, traditional equestrian show.

For the companions three additional excursions are planned: Visit of the city of Mostaganem, Visit of the city of Oran, discovery of the bay of Mostaganem and activities beach.

Several social activities will be planned during the stay.

Important Dates

Proposals for oral presentations and workshops	February , 28, 2018
Proposals for the Forum of Ideas	February 28, 2018
Reply from the International Programme Committee (Proposal Reviews)	April, 15, 2018
Payment of conference fee (with reduced fees)	Until April, 30, 2018
End of registration	May,31, 2018
Submission of the final paper	May, 15, 2018
Third Announcement (Final Programme)	June, 15, 2018

Accommodation

The hotel selected for the conference is the hotel Al Mansour (4 stars) for which the prices were negotiated because during the summer the seaside hotels are in great demand and the prices double during the summer season compared to the price announced on the site. It was chosen for its comfort and to facilitate the movements towards the different places of the conference. This is a brand new hotel that just opened a few months ago. **For reasons of logistics and security it is imperative to reserve a room in this hotel during the 4 days of the conference.**

The hotel website <http://almansourpalacehotel.com/>

You will find attached a price list and the details of the services of the hotel. **The breakfasts are included and very rich. Internet access, access to the pool, access to the hotel's private beach are free.**

There are single, double, triple rooms, as well as suites, and apartments for 4 more spacious. The hotel has a private pool and direct access to a private beach.

Please quickly choose the type of room you choose because the month of July is a month of important tourism for Algerians and if you wait too much you may no longer have room.

The deposit (two night) for the hotel will be sent to the bank account of the conference to formalize your reservation at the same time as the inscription. The remainder will be paid before May 31 on the account of the CIEAEM. Again do not forget to specify the names of the occupants, the type of room and send the copy of the transaction to the email address: cieaem70@gmail.com

Kind of bedroom	Capacity	Number of people	PRICE per room	Descriptive of the rooms
Twins	102	2	50.00 euros	2 separate beds
Triplets	12	3	60.00 euros	3 separate beds
VIP	16	2	60.00 euros	1 double bed plus a living room
Junior Suites	10	2	75.00 euros	1 bedroom a queen bed more a separate living room
apartments	2	4	80.00 euros	1 bedroom with a double bed, a large living room, plus a room with 2 separate beds

NB: Buffet dinner or lunch: 15 €

Renseignements pour les congressistes

Hour and weekend	<p>Algeria is an hour ahead of Greenwich Mean Time (GMT + 1)</p> <p>In Algeria the weekend is Friday and Saturday. Sunday is a working day.</p>
Change	<p>The official currency in Algeria is the Algerian dinar. The official exchange is 130 dinars for about 1 euro. A currency exchange is provided at the conference venue.</p> <p>The majority of credit cards are accepted, but extremely little used. Cash is preferred in most stores, especially the smaller ones.</p>
Smoking	<p>The conference is a non-smoking event. In Algeria smoking is prohibited in public buildings, restaurants, bars and cafeterias</p>
Visa and Responsibilities And insurance	<p>To obtain the visa of entry in Algeria you will need an invitation of the local committee and a certificate of your insurance indicating that it covers well the expenses of repatriation if necessary as well as photographs (to see the details on the site of the Consulate or of the Algerian Embassy of your country). The Algerian Ministry of Foreign Affairs will grant free courtesy visas (usually 85 euros) with priority delivery.</p> <p>So that the local committee can establish the invitations and the courtesy visa application you will be asked to send expressly to cieaem70@gmail.com the copy of your passport whose validity must be at least 6 months before your arrival.</p> <p>Please also specify your place of residence so that the Ministry of Foreign Affairs can send the acceptance of the courtesy visa to the Consulate or Embassy you depend on. Be sure to include your name in the file name of your scanned document.</p> <p>A certificate will be sent to you. If you come accompanied you will have to do the same for your companions.</p>
Mobile phones	<p>The international calling code for Algeria is +213. Please consult your mobile provider regarding international and local rates for Algeria. It is often easier to get an Algerian chip at the airport to take a copy of the necessary passport when buying. The cost for a chip, internet and calls varies depending on the desired package. It takes about 20 to 25 euros.</p>
Come to Mostaganem	<p>The nearest airport is Oran. Three airlines serve Algeria: Air France, Air Algeria and Aigle Azur and some low cost airlines (Vueling for example) provide from Spain among other flights to Oran. There are flights from most European capitals. We can also go through Algiers and then take an internal flight to Oran or take the train to Algiers which in 4:30 takes to Oran. Price first class ticket (very</p>

comfortable and safe) around 10 euros. This may be a possibility for those who wish to visit Algiers before or after the conference.

From Oran coach shuttles will be set up. **It will be necessary for us to communicate as soon as you know them your schedules of arrival and departure at the airport of Oran or the station of Oran to the address : cicaem70@gmail.com**

From Marseille or Spain it is also possible to come by boat.