

Editorial

La dernière rencontre de la CIEAEM s'est déroulée du 21 au 25 juillet 2014 à Lyon et a compté un peu plus de cent participants autour du thème « Mathématiques et réalités ». Les conférences, toutes de très grande qualité, ont alimenté les discussions des quatre groupes de travail, le véritable cœur de ces rencontres. Les groupes de travail sont considérés dans les rencontres de la CIEAEM comme le cœur du travail et tendent à construire des communautés de chercheurs et de praticiens s'intéressant à l'enseignement et à l'apprentissage des mathématiques. C'est certainement un point fondamental de la « couleur » de nos rencontres qu'il s'agit de développer. Ainsi, la publication régulière de ce bulletin, disponible sur le site de la CIEAEM (<http://www.cieaem.org>) témoigne de la volonté de la commission de maintenir tout au long de l'année une culture commune et des échanges sur les travaux réalisés au sein de la commission. Les initiatives de livres scientifiques dont les articles sont issus des communications faites durant ces groupes de travail témoignent aussi de la volonté de prolonger les discussions et les débats au delà des rencontres elles-mêmes. Un premier ouvrage est en cours de publication chez Springer : *Educational path to mathematics, a CIEAEM source book* édité sous la responsabilité de Uwe Gellert, Joaquin Gimenez, Corinne Hahn et Sonia Kafoussi s'appuient sur les travaux des groupes de travail des CIEAEM 63 et 64. En prévision, un second ouvrage traitant plus particulièrement du rôle et des usages des technologies dans l'enseignement et l'apprentissage des mathématiques sera construit sur les discussions et les propositions des groupes de travail de CIEAEM 65 et 66. Nous espérons que ce travail apportera à la communauté internationale des idées et des réflexions qui dépasseront les seuls participants aux conférences de la CIEAEM.

Gilles Aldon, secrétaire de la CIEAEM



Editorial

The last meeting of the CIEAEM took place from July 21 to 25, 2014 in Lyon and scored a little over a hundred participants around the theme "Mathematics and realities."

Presentations, all of very high quality, have fueled discussions of the four

working groups, the true heart of these meetings. Working groups are the core of the meetings' work and tend to build communities of researchers and practitioners interested in the teaching and learning of mathematics. This is certainly a fundamental point of the "color" of our meetings that surely have to be developed. Thus, the regular publication of this newsletter, available on the website of CIEAEM (<http://www.cieaem.org>) reflects the desire of the Committee to maintain throughout the year, a common culture and exchanges on the work carried out within the commission. Initiatives of scientific books built on papers and communications coming from these working groups also reflect the commitment to extend the discussion and debate beyond the meetings themselves. The first book is going to be published by Springer: *Educational path to mathematics, a CIEAEM source book* published under the responsibility of Uwe Gellert, Joaquin Gimenez, Corinne Hahn Sonia Kafoussi relies on the work of the working groups of CIEAEM 63 and 64; a second book dealing specifically the role and uses of technology in teaching and learning mathematics will be built on the discussions and proposals of working groups of the conferences CIEAEM 65 and 66. We hope that this work will provide to the international community ideas and thoughts that will go beyond the conferences' participants.

Gilles Aldon, secretary of the CIEAEM

Vie de la Commission / Life of the Commission

Corinne Hahn, présidente de la CIEAEM depuis sept ans a accompli durant ces années un très grand travail permettant à la commission de redevenir un acteur essentiel dans le paysage de la recherche en éducation. Elle a réussi à maintenir les relations et les discussions entre les enseignants, les formateurs d'enseignants et les chercheurs qui donnent à la CIEAEM son caractère original et toujours novateur. Un grand merci pour son action au sein de la commission.

Corinne Hahn who was president of the CIEAEM since 2007, has accomplished very important work during these years such that the commission becomes again an important actor in mathematics education. She has particularly succeeded in maintaining a real dialog between teachers, teachers trainers and researchers giving to the commission its originality and its pioneering nature. A huge thank you for her work!

Nouvelles responsabilités dans la commission/New responsibilities within the commission

Uwe Gellert a été élu en juillet 2014 président de la CIEAEM. / Uwe Gellert was elected president of CIEAEM in July 2014.

Fernando Hitt a été élu vice président en charge des archives de la commission. / Fernando Hitt was elected vice president in charge of the archives.

Histoire / History

La commission commence un travail d'archivage et de mise à disposition des archives par numérisation à partir des documents originaux, comme ce tableau des rencontres, thèmes et membres des comités exécutifs des cinq premières rencontres de la CIEAEM.

The Commission has begun the work of archiving and organizing the archives by digitalizing original documents as shown in this table of meetings, themes and members of the executive committee of the first

five meetings of CIEAEM.

Entretien avec des membres de la commission / Interview of Commission members

Interview with Gail FitzSimons

Gail was a teacher of mathematics, statistics, and numeracy subjects to adult students of further and vocational education in community, industry, and institutional settings for 20 years.



My first CIEAEM

meeting was CIEAEM 51 in 1999 held at Chichester, UK.

I was impressed and inspired by the respectful collaboration between mathematics researchers and teachers. At that time I was both an experienced adult and vocational mathematics teacher and a beginning PhD student. The atmosphere was very welcoming and I began to make some lasting friendships.

I became a Commissioner in 2006 at CIEAEM 58, in Srní, the Czech Republic. I was very surprised and honoured to be invited. Even though I cannot always make the long journey from Australia to meetings, I am happy to contribute to the work of the Commission via email, reviewing papers, preparing and contributing to discussion documents, and making policy suggestions.

What drives my research as a vocational and workplace mathematics researcher?

My experience of teaching mathematics to adults

returning to study and other vocational students, people who often brought histories of negative experiences in learning mathematics at school, and then were likely to experience "more of the same" teaching and textbooks, drove me to look for other alternatives. My experience of teaching mathematics to competent workers employed in a

TABLEAU DES RENCONTRES, THÈMES, MEMBRES DES COMITÉS EXÉCUTIFS

No	Ville, Pays	Date	Thème	Comité exécutif (dans l'année où il a été désigné)
1	Dorchester (Dorset, GB)	Avril, April 1950	Relations entre les programmes mathématiques des écoles secondaires et le développement des capacités intellectuelles de l'adulte. Relations between the curricula of mathematics in the secondary schools and the intellectual capacities development of the adults.	
2	Kaiberg (pts de Beaufort, B)	Avril, April 1951	L'enseignement de la géométrie dans les premières classes des écoles secondaires. The teaching of geometry in the first years of the secondary schools.	Les quatre premières rencontres ont été organisées, convoquées et animées par Claude Gattegno en tant que Directeur de l'École normale internationale (parfois il se nomme le Directeur de la rencontre)
3	Herzberg (Arg sur Arona, CH)	Août, August 1951	Le programme fonctionnel : de l'école maternelle à l'université. The functional curriculum from the maternal schools to the University.	
4	La Rochette par Melun (F)	Avril, April 1952	Structures mathématiques et structures mentales. Mathematical and mental structures.	La CIEAEM est fondée au cours de cette 4 ^e rencontre. Président : Gustave Cheques (Univ. de Paris) Vice-président : Jean Piaget (Univ. de Genève et de Paris) Secrétaire : Claude Gattegno (Univ. de Londres)
5	Weidenbach (pts de Reichenbach, Luxembourg)	Avril, April 1953	Les relations entre l'enseignement des mathématiques et les besoins de la science et la technique moderne. The relations between the mathematics teaching and the modern science and the technique requirements.	Sans changement
6	Calw (Furt-Neier, D)	Juillet, July 1953	Les rapports entre la pensée des élèves et l'enseignement des mathématiques. The connections between the pupils thinking and the teaching of mathematics.	Sans changement

* Rencontres dans les Actes ont été publiés

pharmaceuticals manufacturing workplace led me to be critical of inappropriate vocational mathematics curricula. In this safety-critical and highly competitive industry, people who were quite capable of fulfilling all job requirements, and even supervising others, were humiliated by the curriculum which did not respect or value their experience and wealth of contextualised knowledge. Instead of supporting the integration of mathematical knowledge, such as linking measurement (which was the essence of many mathematical tasks done by workers) to the number system, the curriculum separated these over 3 years of the program, with all measurement sections optional in years 2 and 3. The teacher support materials did not help the situation: They promoted “tricks” to learn techniques such as multiplying and dividing decimal numbers by powers of ten, and resembled school mathematics textbooks with “adult” examples.

Why does there appear to be a disconnection between mathematics at school and mathematics at work?

When current and prospective mathematics teachers, and college students visit workplaces, they find it extremely difficult to see any mathematics apart from counting and measurement. Also, a great many adults, from low skilled workers to highly paid professionals, strongly assert that they never use anything in their area of work that they learned in school.

Why?

Partly due to the embeddedness of mathematical thinking in technologies of all kinds, and partly when approached from a school mathematics perspective, the mathematics that people actually use at work on a daily basis becomes invisible. To me, this is a result of isolating forms of mathematics education, where mathematics is taught in a small classroom, separated from other classrooms, in a building separated from the learners’ community. School students, right from the early years, often find it difficult to see any connection between their school mathematics work and their lives beyond. One consequence is the feeling of alienation from the subject of mathematics, or even more negative feelings of anxiety and loss of self confidence in this sphere.

The fact that so many mathematically well-educated people have difficulty in seeing the mathematics at work is not an indication that there is *no* mathematics being done. Rather, it is a strong indication of the disconnection between

mathematics at school and the world beyond.

This raises questions such as the following:

How often do mathematics teachers and academic mathematics educators interact with the community within the school or university in an inter-disciplinary way, or even the community outside of school boundaries?

How might learners be prepared from a mathematical perspective to communicate with a wide variety of people with diverse interests, who need to understand and be convinced in meaningful ways of the reasonableness of potential solutions to novel problems in life and work?

How can mathematics teachers and their students respectfully observe, learn from, and interact with people at work in their local communities?

What happens in vocational education?

In vocational education, with the possible exception of some mathematics programs, the justification question: “Why are we doing this?” is rarely heard. If it were to be heard on a regular basis, it would be cause for alarm — for teachers and for employers alike. The object of vocational education is to prepare learners for work in a specific or broad occupational area by combining accepted theoretical knowledge (disciplinary, craft, or trade) with current practical workplace knowledge as carried out within the regulatory legal requirements of the local situation. The theoretical, *conceptual* aspects support the worker’s ability to make decisions within a logical, cognitive framework (e.g., mathematics, science, business, trade-based theory); and the practical, *contextual* knowledge enables new workers to be aware of *how* that knowledge is used in practice. Both the theoretical (or *epistemic*) knowledge and the specific vocational social and cultural knowledges are necessary. Ideally, teaching staff are qualified in the vocational area, and it is highly desirable that they have recent practical experience in the industry concerned; otherwise it is expected that they are in regular contact with industry personnel. Students can gain practical experience in a variety of ways: through ongoing combined work/study programs, industry placements for given periods of time, attending lessons in laboratories or workshops, or using simulators, where appropriate, for the safety of themselves and others, saving money on expensive machinery, etc. Working interactively with experienced others, and possibly with members of the public (under supervision), enables the vocational learner to gain practical confidence, and

to learn in a controlled way from their mistakes! They can also become aware of the tensions and contradictions that can occur between the different forms of knowledge — conceptual and contextual — when solving a real problem with all its constraints of time, money, safety, size, speed, urgency, etc. — especially when some of these are mutually contradictory.

What happens at work?

From a mathematical point of view, solving problems at work requires workers to communicate verbally and non-verbally on many levels and with many different stakeholders: with co-workers and others closely concerned or affected by the outcome, with supervisors and customers (internal or external), local experts or other sources of information. Workers also make use of textual, diagrammatic, etc. forms of information on paper, posted on walls or machines, or via the internet. In addition, tools and machinery may offer expected or unexpected structural support in the problem solving process. Workers need to gain, as far as possible, a complete understanding of the problem in all of its complexity, they need to formulate possible solutions which may draw on their mathematical knowledge (often unconsciously!), explain and justify these to themselves and others, and react to the responses of others, perhaps negotiating until a final decision is made.

Processes such as these can happen many times over the course of a day: look at teachers' work, for example. This is exactly what happens in industry — from people spraying weeds and pests in a vineyard to professional mathematicians and engineers designing new furnaces to produce steel at extremely high temperatures. In other words, at work in all kinds of occupations and work sites, the mathematics knowledge that people actually have, whatever the level, needs to be *recontextualised* so as to be useful, correct, and accurate according to the demands of the specific context, especially when the stakes are high in terms of safety, time, and money. For the most part, the problems are novel to the people concerned, without pre-determined answers, and their solutions are not usually universally generalisable. There are no rules to be learned ahead of time, and the best mathematical solution may not be practical or even feasible at all.

What might this mean for mathematics education?

A deep understanding of theoretical mathematics

is essential, whatever level the learner reaches. (Decisions about *which* mathematics is selected from the discipline are important also but will not be discussed here.) However, the successful completion of formal assessments on paper or online are only part of what is needed. Just as for vocational students, students of mathematics at all levels need to find it meaningful, and be able to recontextualise what they know in complex situations without pre-determined solutions. Important aspects of recontextualisation at work are the acts of asking questions of others, explaining, justifying, arguing, and responding appropriately to others from different mathematical backgrounds. Embedded in the meaning of recontextualisation is the crucial aspect of relevance to context of all mathematical thinking — at work and elsewhere.

Possible practical options are for students and their teachers, also teacher education students and their lecturers, are:

- in small groups, to spend time respectfully observing the work of others, in the richness of workplace and specific job contexts and constraints, asking questions (e.g., who, what, why, how), and reporting back to the whole group. (Note: Taking photographs etc. needs to have the permission of the workers and/or workplace management.)
- to collaborate with others within the school, the local community, or even with local industry, on a joint project with outcomes that really matter to all concerned. Such collaboration should be documented in some form, be evaluated by all participants, and these findings exchanged in a follow-up meeting between relevant stakeholders. In the CIEAEM 66 Proceedings there are many pertinent examples of inter-disciplinary collaboration! There is an even wider variety to be found in the ICMI Study book, edited by Alain Damlamian, José Francisco Rodrigues, and Rudolf Sträßer, *Educational interfaces between mathematics and industry: Report on an ICMI-ICIAM-Study*, published in 2013 by Springer.

Prochaine conférence / Next conference

University of Vallee d'Aosta, Italy



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