

# The Mathematics Education Congresses of Central America and the Caribbean (CEMACYC) build educational capacities

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## INTRODUCTION

This document seeks to describe some elements of the history and nature of the *Mathematics Education Network of Central America and The Caribbean* (REDUMATE), as well as the *Mathematics Education Congresses of Central America and the Caribbean* (CEMACYC), in the service of educational capacity building, and specifically how this is being accomplished at the CEMACYC IV.

In doing so, it seeks to offer potential lessons that could also be useful beyond the region that is the focus of this educational organization.

### What is the Mathematics Education Network of Central America and The Caribbean (REDUMATE)?

REDUMATE was born in August 2012 in Costa Rica during a workshop of the *Capacity and Networking Project* (CANP), a project of the *International Commission on Mathematical Instruction* (ICMI) to support the progress of Mathematics Education in developing countries.



REDUMATE Header

The fundamental purpose of the Network is to design and implement collaborative initiatives among the academic communities of Mathematics Education in the Caribbean Basin, enabling the strengthening of Mathematics, its teaching, and learning.

REDUMATE has an *International Council*, which appoints a *Steering Committee* (executive). It elects its members at a *REDUMATE Assembly*, attended by the leading Network leaders and *national representatives* of the Caribbean Basin countries. These bodies include researchers, teachers, and students from Brazil, Colombia, Costa Rica, Chile, Cuba, Spain, the United States, Guatemala, Honduras, El Salvador, Mexico, Panama, Puerto Rico, the Dominican Republic, and Venezuela.

There is also a *REDUMATE (virtual) Community* that promotes a sense of belonging among its members (more than 200 people from many countries).

REDUMATE seeks to enhance the teaching and learning of Mathematics in the region, but with an internationalist vision.

In addition to ICMI, the Network has strategic alliances with the *Inter-American Committee of Mathematics Education* (CIAEM), the *Mathematics Education*

Community of South America (CEMAS), and the Mathematics Reform Project (Costa Rica).

REDUMATE has had an official website since 2012. The Network also co-publishes (with CIAEM) the Blog Mathematics Education in the Americas, and has a presence on Facebook and YouTube.

It publishes *Actualidad REDUMATE* (Newsletter, two times per year). See previous issues at <https://blog.ciaem-redumate.org/category/actualidadredumate/>. This newsletter has evolved. Today, it is entirely online. More than 3,000 people receive it.

## The CEMACYC

One of the Network's main activities is the organization of the *Central American and Caribbean Mathematics Education Congresses*, which take place every four years. The first three CEMACYCs were held in Santo Domingo (Dominican Republic) in 2013, in Cali (Colombia) in 2017, and in Costa Rica in 2021 (virtually).

The CEMACYCs include speakers of the highest scientific caliber in the international Mathematics Education community.

The Network and the CEMACYCs not only work with researchers; they also seek to integrate and support teachers from preprimary to higher education. At the first CEMACYC, for example, some 150 papers were presented. More than 400 teachers from the Dominican Republic participated, for a total of almost 600 participants. At the second CEMACYC, some 140 papers were presented, but the number of participants was approximately 200, including in-service and preservice teachers. A significant portion of the presentations were geared toward teaching interests. The posters showed many teachers' classroom experiences. This interweaving of researchers, teachers, and students is deliberately cultivated.

## THE ARCHITECTURE OF CEMACYC

### Through the CEMACYC IV organization we show the capacity building

In general, the organization of CEMACYC IV is like the one REDUMATE followed with the CEMACYC I and II. CEMACYC III was held entirely virtually during the pandemic.

Through CEMACYC IV, we will demonstrate how these events build educational capacity and strengthen collaborative work and networks in the region. This will allow us to visualize potential learning opportunities and raise awareness of the enormous amount of effort involved in an event of this nature.



*Official logo of CEMACYC IV*

## Designing the architecture of the Congress is the first step

For CEMACYC IV, our colleagues from the Dominican Republic graciously agreed to host the congress locally. However, this new event is taking place under different conditions than those that existed during CEMACYC I, thanks to a more consolidated network, but also with more complex demands for a CEMACYC.

Planning the architecture of this Congress began in 2023.

This included defining the presentation modalities and their scientific structure, all in accordance with the infrastructure, possible institutional support, and human resources. Defining the central themes, topics, and their approaches were part of this work.

The topics in Mathematics Education that this event supports are:

1. [Initial teacher training](#)
2. [Continuing education and professional development](#)
3. [Cultural, political, economic, and environmental dimensions of Mathematics and Mathematics Education](#)
4. [Curriculum and evaluation](#)
5. [History and Philosophy of Mathematics and Mathematics Education](#)
6. [Problem solving and modeling in mathematics education](#)
7. [Use of digital technologies in Mathematics Education](#)
8. [Research in Mathematics Education.](#)
9. [Strategies to improve the teaching and learning of mathematics in preschool and primary education](#)
10. [Strategies to improve the teaching and learning of Mathematics in Secondary and Higher Education](#)
11. [Videos](#)

The traditional open submissions at CEMACYC have been scientific communications, workshops, and posters (on paper). However, this year's event also included two innovative presentations: digital posters and videos. This represents a milestone in the region. See [Open Submissions](#).

Invited talks are a key resource for the Congress, as they define the types of topics and expertise to be addressed. On this occasion, a relevant topic is international comparative examinations and its impact on the teaching and learning of Mathematics in Latin America. See all [Invited Talks](#) categories.

The call for speakers was accepted by more than 40 international experts (mostly from the Americas), representing a balanced range of nationalities and genders, always seeking to strengthen the regional academic community. See [Guest Speakers](#). This is the crucial academic foundation for ensuring the quality and intellectual atmosphere of the activities.

### **A careful scientific structure to ensure quality**

High quality and academic relevance are central objectives of the CEMACYC. The premise is that high-quality presentations contribute to the region's international competitiveness. Therefore, all submissions are asked to:

- complete work in extended documents (not just abstracts) of about 8 pages in most formats,
- prepare documents using the *REDUMATE Style*, a set of guides that follows international standards, and
- submit proposals through an efficient technological platform, thus facilitating the management of presentations.

To ensure this academic administration and reviewing, a scientific structure for the Congress was designed consisting of: [Platform Directors](#), [Topic Directors](#), and [Reviewers](#), who work together to support this process.

Each submission is reviewed by at least two scientific reviewers, who are blind to the authors of a paper, making the process highly professional. In the event of a tie or doubt, a third reviewer is called in.

The Topic Directors are the true leaders of the process in their respective areas; they are two or three Spanish- and Portuguese-speaking professionals. The Topic Directors constitute the vast majority of the [International Scientific Committee](#).

Nearly 200 people generously participate in this structure.

It is a tremendous and crucial voluntary effort that strengthens the regional community, the host country, and also all of Latin America and even other countries beyond the Americas. In the current scenario, we must maintain an internationalist perspective.





*Platform and Topic Directors of the CEMACYC IV in a Zoom session*

With a scientific organization established with these characteristics, we seek to generate effectiveness, but also learning for everyone: authors, directors, reviewers, participants, etc.

From the outset, a [\*Local Organizing Committee\*](#) was established. It has been involved in the scientific management and review process, so that it will better understand the logistical demands of the scientific dimension.

### **Architecture rests on an “invisible” IT-base and a human team**

All REDUMATE and CEMACYC private websites have an IT backbone: a virtual server is rented in the United States. This is where the platforms are hosted, DNS and domains are acquired, as well as security certificates and packages to prevent website hacking. Additionally, payment is made for the WordPress *plugins* needed to organize the Congress platform. A private IT administration service is also provided.

This Information Technology base has always been provided and managed in Costa Rica by the same people who also support the scientific organization. These are not contracted personnel. Without this foundation and human resources, the architecture of the event and the Congress itself would be very different. Many of its objectives would not be possible.

## **AN ORIGINAL ORGANIZATION STRATEGY**

### **Congress management through a multi-instrument strategy**

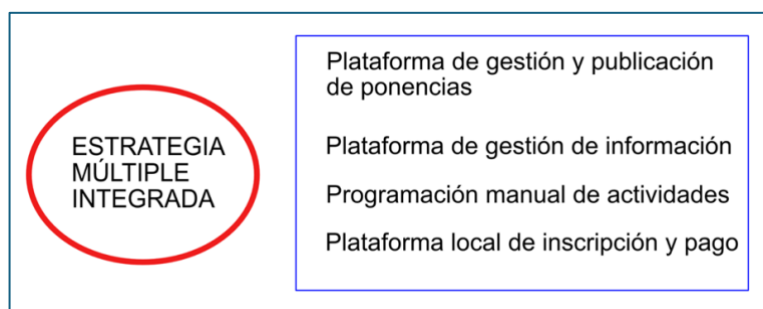
Ideally, an event of this nature would require a free platform that can seamlessly handle information, presentation management, publication, activity scheduling, and registration and payment processing. Such a platform was used at for CEMACYC I and II: *Open Conference. Systems* (OCS). However, the creators of this platform neglected to

maintain it, and in recent years it has become almost impossible to use. For this edition of CEMACYC, the organizers had to find an alternative, and well in advance.

There are platforms and private companies around the world that offer these types of integrated services, but their costs are very high. Furthermore, they only provide the management of one conference; they do not provide the software and materials for use in future editions. The money typically collected from CEMACYC registrations would not provide enough to pay for one of these options, and the services must be purchased in advance (before the registration payment process begins). The Network does not have donations or other resources to pay for these types of options.

Faced with this situation, the organizers opted for a multi-pronged strategy:

- A free presentation management platform (upload, manage, review, and publish presentations)
- A platform to place all the information and be the reference for everyone (a website using WordPress)
- Manual design of the programming of the activities of the in-person Congress
- Registration and payment through a platform associated with the Congress host institution



Executing this strategy and integrating all its components has required the work of many REDUMATE collaborators.

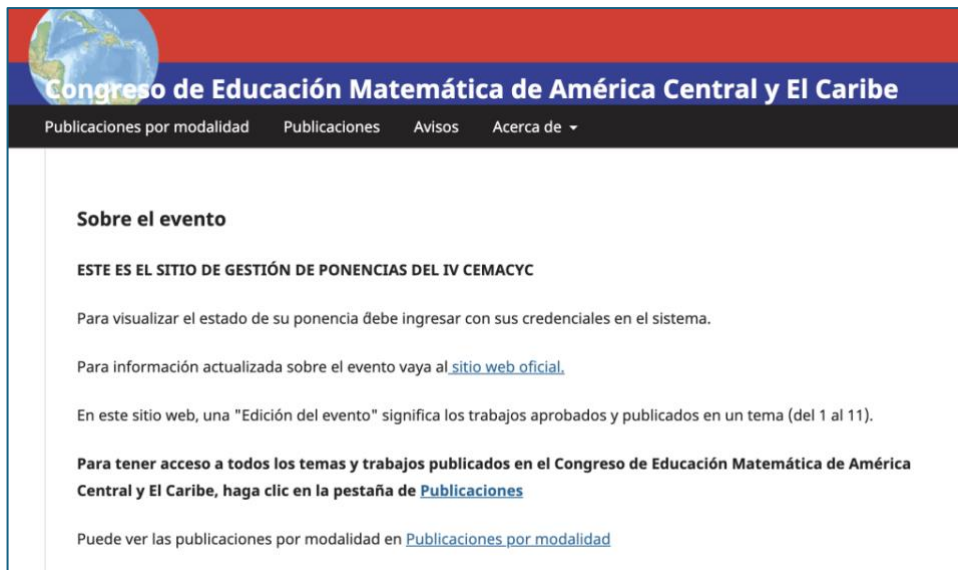
### Using OJS as a conference platform: a brilliant, original, bold, strategic idea

The Congress decided to use *Open Journal Systems* (OJS). This free platform was created for managing scientific journals and is well-known internationally. It is used by approximately 50,000 academic journals.

The goal was to explore whether, through adjustments, it could be used for an event. Transforming the nature of OJS into a conference manager, at least for presentations.

This was an extraordinary challenge. Multiple tests were performed on the platform's internal and external components to adapt OJS to the needs of a conference. The tests were successful. Now it was time to carry out all the fine-tuning work. This involved a huge amount of work, as it involved entering the OJS code and creating instructions, terms, automated emails, and multiple configurations. Furthermore, since this event accepted Spanish and Portuguese as official languages, the various texts and content had to be translated into both languages, which represented a double effort.

The result can be seen on the [Submissions Platform](#).



Home page for submissions: <https://ponencias.ciaem-redumate.org/cemacyc>

Furthermore, the instructions, texts, emails, and configurations were designed with future CEMACYC editions in mind.

All this work, "invisible" to most users of the event's presentation platform, has been crucial.

This is the first time something like this has been done in the Americas. It must be recognized as a brilliant, original, bold, and strategic idea on the part of the organizing team.

### An official website as an organizer of information and management of actions

Since OJS is not geared toward managing conferences (information, dozens of static pages, hundreds of images, etc.), CEMACYC needed to additionally use an information and general management platform: the [official website](#), which is based on WordPress.



Home page of the official website of CEMACYC IV



A significant amount of work has gone into this site's configuration, design, development, and publication. Approximately 200 static pages and the use of 400 multimedia resources are integrated into this website.

In addition, a blog-like media is managed and administered: [\*IV CEMACYC Informa\*](#). Its purpose is to notify 4,000 people about each article (post) written, thus strengthening the community. This blog uses the paid *Newsletter plugin and a Sendgrid* system for sending newsletters. The regional community is regularly informed.

This site is harmoniously articulated with the submissions site to execute the designed strategy.

### **The CEMACYC offers impressive documentation to support a congress.**

To support the various activities of submitting papers, reviewing, and gearing them, many supporting documents were created, almost always in Spanish and Portuguese, including:

[Guide for Authors: Communications, Workshops and Posters](#)

[Guide for Video Authors](#)

[REDUMATE Style](#)

- [Communications, workshops, videos](#)
- [Posters](#)
- [REDUMATE style for designing physically printed posters \(paper\)](#)
- [Instructions for generating keywords](#)

[Templates \( REDUMATE Style \)](#)

- [Communications and workshops](#)
- [Posters / Digital Posters](#)
  - [Template for proposal texts](#)
  - [Template for printed poster design in PPTX format](#)
- [Digital posters](#)
  - [Digital poster design template \(PPTX format\) 20240802 Digital poster template 104.06 x 58.52 cm](#)
  - [Digital poster example \(PPTX format\) 20240802 Digital poster example 104.06 x 58.52 cm](#)
  - [Digital poster example \(PDF format\) 20240802 Digital poster example 104.06 x 58.52 cm](#)
- [Videos](#)

[Sample presentations for the IV CEMACYC](#)

- [Workshop model example](#)
- [Two examples-model posters](#)
- [Example-communication model](#)
- [Digital poster design example template](#)
- [Example-model of video presentation](#)

[Guide for registration/access to the presentation site](#)

[IV CEMACYC Logo](#)

[Guide for reviewers of papers, workshops, and posters](#)

[Guide for video reviewers](#)

[Director's Guide in Spanish](#)

## Director 's Guide in Portuguese (Google Translate)

The *REDUMATE Style* refers to the format and style rules for the Congress. All of this can be found in [Documents for Submissions](#) and [Scientific Review Documents](#).

All this documentation was essentially prepared and published by the Costa Rica team.

### **Manual programming of activities**

Based on the information provided by the OJS platform regarding approved presentations and authors, the daily schedule is designed. It will be posted on the information website as a document. This schedule is expected to be published a couple of months before the event begins.

This manual design integrates data from the platform and available rooms on the university campus. The programming takes into account topics, languages, and participation expectations.

This work is not carried out by the local organization, but rather by an international team appointed by the Network with colleagues from the USA and Costa Rica. This ensures consistency between the scientific and logistical dimensions.

To identify the required infrastructure in detail, this team conducted technical visits to the country and the institutional headquarters. The first was in May 2024 and the second in May 2025.

### **Platform for registration and payment**

A registration and payment platform is provided by the host institution, in this case the Pontificia Universidad Católica Madre y Maestra (PUCMM). Close coordination between the institutional staff of this platform, the *Local Organizing Committee*, and the scientific organization is required. A requirement for including an approved submission is that one of its authors has paid the registration fee.

## **THE NATURE OF CEMACYC**

### **The high academic demands of these Congresses respond to a strategy**

The CEMACYCs like the CIAEMs (*Inter-American Conferences on Mathematics Education*) are conferences with high academic demands in terms of content, format, deadlines, submission mechanisms, and presentation management. This is not typical of other events in this region.

These demands make “massive participation” more difficult. This is a conscious academic decision. It is part of REDUMATE's commitment to turning the region into a hub of excellence in Mathematics Education. Progress would not be achieved with very

low quality requirements. Aiming for these high-quality contributions improves the product offered to teachers and students, and creates important academic foundations.

These conferences are an international benchmark for institutions, researchers, and teachers in service and in training.

### **Learning and quality assurance purposes involve long periods of time**

CEMACYC IV will be held in person in early November 2025; however, advertising began in 2023. The information and presentation platforms were ready in the first half of 2024 (all configurations and testing had been completed). Most of the documentation was ready by mid-2024. Proposals began being accepted in November 2024, and a management and review process began that will conclude in mid-July 2025.

The Congress had its platforms ready to accept papers many months in advance, precisely because the entire submission-papers process is required. This undoubtedly represents a major effort for those wishing to participate.

Perhaps what makes this process longer is the relatively slow management, multiple revisions, various rescheduling, etc. needed to provide more opportunities.

### **The importance of publishing works *in extenso* well in advance**

CEMACYC IV received more than 350 submissions, involving more than 600 speakers from 25 countries. It is expected that most of these submissions will be presented in Santo Domingo. This is the CEMACYC with the largest number of proposals received. This is an important sign of the consolidation of REDUMATE.

Despite the length and slowness of the process, the results of the work management are provided well in advance, which is unusual for events in the region. Providing this information many months before the Congress enhances the quality of the in-person sessions. And discussions and the use of materials are developed well in advance.

Approved submissions (in full) are published on the platform more than five months before the conference. See <https://iv.cemacyc.org/ponencias-publicadas/>

Participants have the opportunity to study these materials well in advance. These presentations will then be digitally published in one or more books, along with the *Proceedings*.

### **Strong campaigns to boost participation are necessary**

Given the nature of the Congress's submission and management process, a strong publicity campaign and close collaboration by REDUMATE members in each country are always required.

This is where social media, *REDUMATE's Newsletter*, and various media outlets are of great support.



Among other media, mini-videos have been used to publicize CEMACYC IV. The [CIAEM-REDUMATE YouTube channel](#) and various Facebook pages are also used.

This Congress competes with many other conferences in the region. And there are very few institutional resources to invest in academic events. Ultimately, individuals and universities must reckon the profitability of participating in one event or another. The nature of CEMACYC is a discriminating factor. There is a specific population that selects CEMACYCs.

Although the CEMACYCs are more academically demanding and timely than other conferences in the region, more and more people look forward to this event every four years to present their work. There is a population of professionals and educators who believe that participating in this Congress is worthwhile. The quality achieved is also reflected in the support that the region's institutions provide their academics to participate in this event.

## CAPACITY BUILDING

### **It seeks to promote teaching, personal growth and participation**

The Congress is not an end. It is an instrument that begins long before it is physically held.

The CEMACYCs seek to generate *multiple learning opportunities* not only for researchers, but also for teachers and students. Therefore, we repeat:

- The timeframe for the proposal, management, and scientific review is lengthy. The *timing* is slower to ensure no exclusions and to encourage maximum participation.
- Academic protocols are different: Although always very demanding, they are flexible.

- The call for in-service and developing teachers is a central purpose

Opportunities are offered that are unusual at other events. For example, papers with formatting and content issues are often allowed to be resubmitted for review and correction. Topic Directors and scientific reviewers are instructed to explain in detail how to improve a proposal in both format and content, and to provide advice. More than 75% of the proposals received are accepted but are subject to modifications. It's a complex educational process. And it's all free of charge. All work is voluntary.

### Local organizers can use the Congress to build local capacities

From the beginning, the CEMACYCs have taken into account the conditions of the host country and the local organizers. There is a synergy and chemistry between the scientific organization and local logistics.

The Network has committed its regional and international resources, including the work of nearly 200 people, to serving the Congress in the Dominican Republic.

On this occasion, our colleagues from the host university (Pontificia Universidad Católica Madre y Maestra) are deeply committed to the success of the congress.

It is always a challenge in our region to secure institutional support, auditoriums, venues, sponsorships, local participation, and attend to the thousands of details involved in an international conference. And this is in harmony with the scientific organization.

One challenge for the local organization is to generate all the logistical resources to host the academic activities that have been taking place over many months under parameters of high international quality and regional relevance.

It is also strategic that local organizers:

- generate the greatest participation of pre-service and in-service teachers,
- seek to ensure that the event has a powerful impact on education in their country at various educational levels,
- secure the commitment of various institutions, and
- strengthen internal ties and national networks.

In general, the idea is for local colleagues to “make the most of the Congress” in their country.

### Building capacities and building collaborative networks

In this part of the world, securing support for meetings or events is very difficult. There are very few financial opportunities, and institutions are very restrictive. Efforts must be concentrated and pursue diverse objectives.

CEMACYC brings together people in a way that would otherwise be nearly impossible. It promotes the exchange of learning, as with many events, but its design and organizational processes (over many months) *strengthen the community and the Network*. CEMACYC is carefully designed to achieve this. Therefore, when evaluating



CEMACYC, it must be considered distinct from other events held around the world that might formally resemble it.

The entire process of preparing papers, submitting papers, managing and reviewing them, along with the call for and broad participation of in-service teachers and students, make the CEMACYC an effective tool for *building educational capacity in this region*. This is precisely the overall objective of the *Capacity and Networking Project* of the *International Commission on Mathematical Instruction*.

REDUMATE embraces these goals in the Caribbean Basin countries. Furthermore, it can be said that REDUMATE constitutes a special example of these goals for the international Mathematics Education community.