International Mathematical Union -
Commission for Developing Countries

Panel Discussion

Online International Cooperation in Mathematics: Challenges and Opportunities for Developing Countries

Virtual ICM2022, July 12, 2022

Olga Gil Medrano
CDC Secretary for Policy

At the meeting of the General Assembly in Bangalore 2010 the CDC Terms of Reference were approved and the first CDC leadership (2011-2014) was elected, which **activated the CDC on 1st January 2011** and led it to hold its first meeting on the 30th and 31st January 2011 in Berlin, Germany.

The CDC has the mandate to manage all initiatives of the IMU in support of mathematics in developing and economically disadvantaged countries. The CDC is charged with the following missions:

to manage, strengthen and **promote** the programs of the IMU in developing and economically disadvantaged countries.

to search for funding to support the corresponding activities.

to establish institutional partnerships with scientific organizations with common goals.

CDC members 2019-2022

Dipendra Prasad (India) - CDC President

Olga Gil Medrano (Spain) - CDC Secretary for Policy

Alf Onshuus (Colombia) - CDC Secretary for Grant Selection

Mama Foupouagnigni (Cameroon) - African Member

Jose Maria P. Balmaceda (Philippines) - Asian Member

Andrea Solotar (Argentina)- Latin American Member

Galina Rusu (Moldova) - CDC member appointed by the IMU Executive Committee

Michel Waldschmidt (France)- CDC member appointed by the IMU Executive Committee

Anjum Halai (Pakistan)- CDC member appointed by the ICMI Executive Committee

Carlos Kenig (USA) - IMU President (2019-2022) and Ex-officio CDC member,

Luigi Ambrosio (Italy) is the CDC liaison Executive Committee (EC) member.

IMU List of Developing Countries

It was agreed in 2015 that the list should be revised every 4 years within the cycles of the ICMs, since some ICM decisions hinge on the definition of Developing countries. Also a division into 5 priority categories that is used in some of the programs.

Consequently, the 2019-2022 List of Developing Countries consists of:

All the countries classified by the World Bank (WB) in the categories: Low income (<USD 1,025), Lower middle income (USD 1,026 – 3,995), and Upper middle income (USD 3,996 – 12,375) in accordance with the WB Database by July 2019. These are all countries with Gross National Income (GNI) per capita in USD, not exceeding USD 12,375, with the WB data of 2018.

The list of Developing Countries, in alphabetical order can be found in:
https://www.mathunion.org/cdc/about-cdc/definition-developing-countries

CDC Activities

Grants

Conference Support Program
Projects Support Program
Library Assistance Scheme

Travel Grants

Abel Visiting Scholar Program
IMU-Simons African Fellowships
Individual Research Travel

Lecturing and Mentoring

Volunteer Lecturer Program

Graduate Fellowships

Breakout Graduate Fellowships
Graduate Research Assistantships

ICM related activities

The effects of the Covid-19 Pandemic on CDC activity and CDC response

Almost all the CDC programs have been disturbed since they are mostly addressed to support research mobility and participation in Conferences and Schools. **Only the two programs aimed to support postgraduate research in developing countries escaped from the effect of restrictions**.

CDC policy has been to continue the evaluation of the applications and the communication of the decisions. **IMU will secure granted funds for the future, up to the end of 2022**, to give the grantees the opportunity of rescheduling as soon as the situation permits.

Especially for the programs: Conference Support and Volunteer Lecturer, IMU-CDC decided **to allow possible expenses for acquisition of material or the payment of services to hold events in the online format**.

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Conference Support Program

In 2020, IMU-CDC awarded 26 grants, 16 were cancelled, 7 have concluded by May 2022 (all were hybrid events) and 3 have been postponed to take place later this year.

In 2021, IMU-CDC awarded 17 grants, 1 was cancelled, 7 have concluded by May 2022 (2 were hybrid and 5 were live) and 9 will be taking place later this year.

From the 9 hybrid events:
8 are Schools and 1 is a Conference,
8 took place in Africa and 1 in Asia.

Conference Support Program: Some examples.

Report from Lele Celestin and Emmanuel Fouotsa

- African Mathematical School: Algebra, Arithmetic and Combinatorial Geometry, Algebra number Theory and Applications to Cryptology. University of Dschang in Cameroon from the 19July to 30 July 2021.
- 59 present participants (2 Lecturers, 6 Cameroon lecturers and 51 Cameroon students) and 35 participants online (6 lecturers, 6 Cameroon students and 23 African students)

Pros:

"Thanks to the materials provided for the online teaching, we, for the first time, ensure a good success in having lecturers online, following them perfectly, we were able to allow participants in class and online to interact and ask questions to which lecturers answered perfectly."

Cons:

"The Dschang Postgraduate School Hall where we conducted lectures had a very up and down electricity voltage which finally destroyed many laptop's chargers. Fortunately, as we knew about the electricity failure in the city Dschang, we provided a solar battery and inverter to supply energy to main devices like video projector and main computer."

Conference Support Program: Some examples.

Report from Alberto Carrasi and Blaise Tchapnda

- CIMPA School: Mathematics of Climate Science at AIMS Kigali, Rwanda.From the 5 to 13 July, 2021
- 36 from AIMS Rwanda and 68 inscriptions online but participating only half of them.
- Using the Learning Platform provided by CIMPA and zoom. Some of the lectures pre-recorded (due to very different time zones or anticipating internet difficulties).

Pros:

"…it proved more lively that the lecturers who were on a similar time zone, either monitored their video by themselves, or gave a regular Zoom presentation by using slides associated with their recorded lectures. "

"*There is now a full amount of scientific material available on the LMS platform: lectures that had been recorded before the school, pdf or links for the slides of the online sessions, references.*"

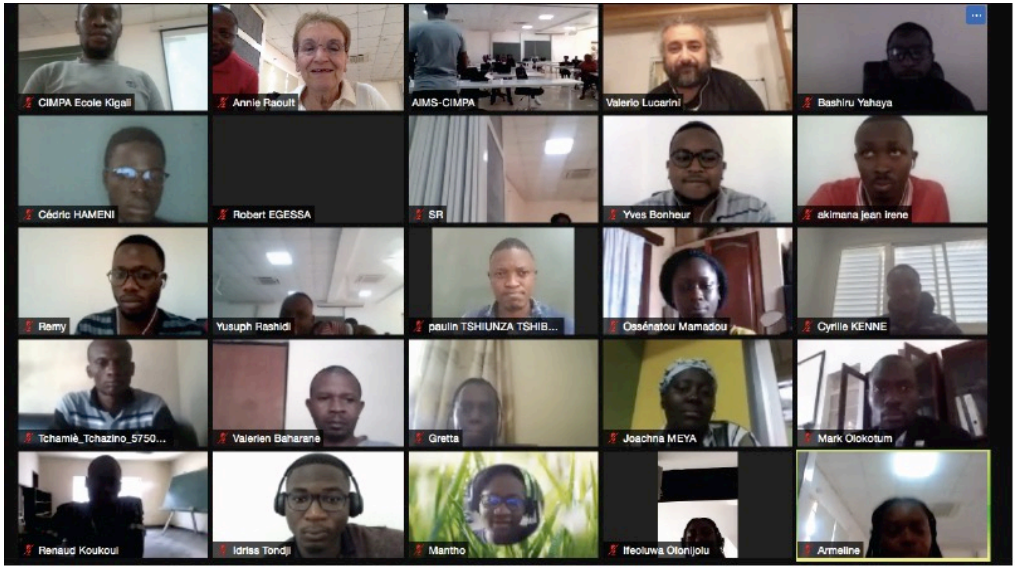
Conference Support Program: Some examples.

Cons:

"…additional burden for the lecturers: most lecturers were familiar with all sorts of editing, uploading material, adding links… Some others needed some help, …"

"… such a huge number [of online participants]*, was a failure."*

"The free time of regular schools where students can exchange was deeply missing "



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Volunteer Lecturer Program (VLP)

The goal of this program is to offer universities in the developing world lecturers for intensive 3-4 week courses in mathematics at the advanced undergraduate or master's level. Due to the pandemic CDC decided to allow possible expenses for acquisition of material or the payment of services to make possible to organise the courses in online or hybrid format.

The new strand Virtual Volunteer Lecturer Program (VVLP) aims to support lectures to take place remotely.

Funding can cover the expenses of the Volunteer Lecturer up to 4,400 EUR in the case of in person teaching. Additionally, in both cases, the grant can support preparation of course material (printing, photocopying, books) up to 1.000 EUR and possible expenses for the acquisition of material or use of services to conduct lectures entirely or partially in the online format up to 2.000 EUR.

The program is partially supported by the American Mathematical Society (AMS) and the Niels Henrik Abel Board (Norway).

Volunteer Lecturer Program (VLP) Example of lectures developed partially on line and partially in person

Organisation:
Math. Department, College of Arts and Sciences, Caraga State University, Philippines
Short Description of the Activity:
A course on P. D. E's for the PhD/MS in mathematics official programs.
Host: JAYROLD P. ARCEDE
Lecturer: JOAQUIM M.C. CORREIA (University of Evora, Portugal)
Combined onsite & online actions (CSU 2nd semester Master course, 2022)
-- Onsite: 2 visits in June and August 2022.
-- Online: Starting the week 14th-20th February and finish it in August.

Breakdown of students:
India (1)
Laos (3)
Vietnam (2)
Myanmar (1)
Portugal (2 Lao Ph.D. students)
France (2 =1 Lao +1 Filipina Ph.D. students), and
Philippines (10).

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Volunteer Lecturer Program (VLP) Example of lectures developed partially on line and partially in person

Interview with the organisers:

Q: Has the hybrid format being determinant for the international students to follow the lectures?

Answer: Absolutely, since our course is in a hybrid format, and given that our international participants were coming from different countries (i.e., India (1), Laos (3), Vietnam (2), Myanmar (1), Portugal (2), France (2)), and since each country has two or more participants, they were able to encourage each other to attend and discuss the topic online and offsite, respectively. Furthermore, since we have the Learning Management System (LMS) based on Moodle, every participant can follow and interact with each other. We also note that not just lecture notes but links to previous classes recorded on videos were also uploaded to the LMS to help the students remember and study better. This hybrid model serves as a venue to affirm the learning of the students and as a means of following up with the lecturers themselves on certain topics.

Moreover, since this course is based on the IMU-CDC-VLP initiative where the lecturer can come onsite, the students see an opportunity to interact and discuss with the lecturer which is far better than just pure online.

Finally, we want to point out that this applies to Philippine participants as well, since they were also coming from different islands/cities and universities.

Host: JAYROLD P. ARCEDE

Lecturer: JOAQUIM M.C. CORREIA

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Volunteer Lecturer Program (VLP) Example of lectures developed partially on line and partially in person

Interview with the organisers:

Q: Has CSU Mathematical Department used the online format for other matters in the Master or PhD program?

Answer: Yes, in fact, not only at the Master's and Ph.D. level but all the more at the Bachelor's level. We want to point out that CSU just started an online learning format just 3 months right after the pandemic struck the country. Prior to 3 months, all lecturers in the university subjected themselves to training and capacity building on how to teach online. By August 2020, the first semester of the academic year, all lecturers are now adept at teaching online as lockdowns have been constantly implemented.

But now, with these drastic changes in learning mode, we are exploiting the simultaneous use of online lectures and the LMS platform with the cooperation of the IMU-CDC Volunteer Lecturer Program.

Host: JAYROLD P. ARCEDE

Lecturer: JOAQUIM M.C. CORREIA

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Volunteer Lecturer Program (VLP) Example of lectures developed partially on line and partially in person Interview with the organisers:

Q: Would it make easy to mentor students Thesis online? Helps students to became familiar with technicalities of communicating mathematics online?

Answer: We say in the affirmative. In fact, since we aim to co-supervise some of these students this modality helps the student to have an opportunity to connect with potential advisor and possible topics in the preparation of their thesis/dissertation. This leverages our capability to have more students to co-supervise in the future and extend in areas where we need our help the most.

To answer the latter question, our students in the course use myriad of technologies to communicate mathematics. For instance, when doing assignments, LaTeX has been used. In some other instance, simulation is needed hence, the possibility of using a Python program. Although we agree that some students find it hard to learn these skills but in the finality of this course, it would be apparent for the students who pursue mathematics to learn these things which are communication skills (synchronous/nonsynchronous) and technical skills (LaTeX, Python, R, etc.).

Host: JAYROLD P. ARCEDE

Lecturer: JOAQUIM M.C. CORREIA

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Volunteer Lecturer Program (VLP) Example of lectures developed partially on line and partially in person

Interview with the organisers:

Q: Challenges with stable internet connection? If the students were at home, have they experimented more technical problems?

Host: JAYROLD P. ARCEDE

Lecturer: JOAQUIM M.C. CORREIA

Answer: Yes of course. Stable internet connection remains a challenge to a wider extent with varying circumstances from different places and times, quality remains a bigger issue. For instance, in the case of the Philippines where climate change is more pronounced, rainy seasons and stormy weather bring intermittent internet connection to the students. Furthermore, an internet connection from one continent to the continent also brings an issue of internet quality.

In Laos, most students access the internet in their own homes. Since the university does not provide an internet connection for the students. Although the university has an internet subscription, it may fail to include students due to its high cost.

In conclusion, the internet connection issues at home or university depend from country to country.

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Volunteer Lecturer Program (VLP) Example of lectures developed partially on line and partially in person

Interview with the organisers:

Q: Enough financial support to acquire technical equipment or to pay for use of a platform?

Answer: We could say that there is a huge challenge. We tried to keep existing funds available to support other relatively more important student needs. For example, we are using a Zoom subscription from the Portuguese University.

Q: If some of the students were following the lectures from the classroom at CSU and some of them were alone at home. Have you appreciated differences between the two groups?

Answer: We suppose no. We feel that the assistance we provide to the students through the alternative ways we mentioned above, it is more than enough for the students to follow and interact with the lecturers and between themselves.

Host: JAYROLD P. ARCEDE

Lecturer: JOAQUIM M.C. CORREIA

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Volunteer Lecturer Program (VLP) Example of lectures developed partially on line and partially in person

Interview with the organisers:

Q: The dynamics of the classroom and communication with students (due to method of communication) was fluent enough?

Answer: Yes, both lecturers provide enough support when outside the Lecture. Say, week assistance to any participant to provide alternative ways: (1) the LMS (Moodle) that each participant can access at CSU, so providing complimentary asynchronous teaching to the synchronous Lecture using Zoom platform; (2) by e-mail for, say, particular-personal issues (3) Facebook chat groups to easy access and real time questions posed by the students (4) or even particular-personal Zoom sessions if more convenient.

Host: JAYROLD P. ARCEDE

Lecturer: JOAQUIM M.C. CORREIA

Q: In your opinion, in the cases when onsite visits were impossible or very difficult, to what extend the online teaching could replace in person interaction?

Answer: We believe that it could “replace” the person interaction by 60%. But, online teaching must be synonymous with synchronous+asynchronous e-learning environment (not just Zooms!).

The experiences reported by the organisers of events supported by CDC are very important for us to take decisions. Special thanks to Jayrold and Joaquim.

Questions and comments are welcome via the chat of the session.

More information about IMU-CDC Programs
https://www.mathunion.org/cdc