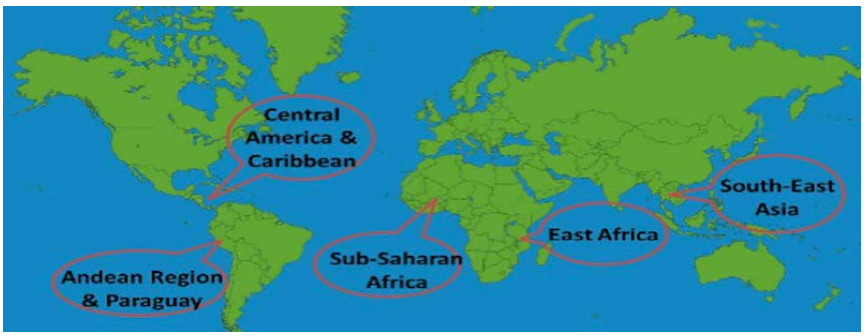
Evaluation of the Capacity and Network Project CANP 1-5 of the International Commission on Mathematical Instruction (ICMI)

Full Report



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List of Acronyms

AMU	African Mathematical Union
AIMS	African Institute for Mathematical Sciences
BMZ	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (Federal Ministry for Economic Cooperation and Development)
CANP	Capacity and Network Project
CD	Capacity Development
CDC	Centers for Disease Control and Prevention
CDC	Commission for Developing Countries (also IMU-CDC)
CEMAT	Comunidad de Educación Matemática de America del Sur
CIMPA	Centre International de Mathématiques Pures et Appliquées
AMMSI	African Mathematics Millennium Science Initiative
DAAD	Deutscher Akademischer Austauschdienst
EXCEED	Higher Education Excellence in Development Cooperation
ICME	International Congress on Mathematical Education
ICMI	International Commission on Mathematical Instruction
ICMI EC	Executive Committee of ICMI
ICSU	International Council for Science
IMU	International Mathematical Union
OCED/DAC	Organisation for Economic Co-Operation and Development
	Development Assistance Committee
IPC	International Programme Committee
JICA	Japan International Cooperation Agency
M&E	Monitoring and Evaluation
NFP	NORAD Fellowship Programme
NIE	National Institute of Education
NORAD	Norwegian Agency for Development Cooperation
NUFFIC	Netherlands Organisation for International Cooperation
PUC	Pontificia Universidad Católica del Perú
SIDA	Swedish International Development Cooperation Agency
SMASSE	Strengthening Mathematics and Science Secondary Education
AIMS	African Institute for Mathematical Sciences
ToR	Terms of Reference
UNCTAD	United Nations Conference on Trade and Development
UNESCO	United Nations Educational, Scientific and Cultural Organization

Definition Monitoring, Evaluation and Review

In this report the internationally approved definitions for Monitoring, Evaluation and Review which correspond to the OECD/DAC Glossary (2002) are used:

Evaluation: "The systematic and objective assessment of an on-going or completed project or programme, its design, implementation and results. The aim is to determine the relevance and fulfillment of objectives, development efficiency, effectiveness, impact and sustainability." (OECD/DAC, 2002, p.21f).

Monitoring: "A continuing function that uses systematic collection of data on specified indicators to provide management and the main stakeholders of an ongoing development intervention with indications of the extent of progress and achievement of objectives and progress in the use of allocated funds." (OECD/DAC, 2002, p.27f).

Review: "An assessment of the performance of an intervention, periodically or on an ad hoc basis. Reviews are usually less comprehensive and/or in-depth than evaluations. They tend to emphasise operational aspects". (OECD/DAC, 2002, p.34).

0.EXECUTIVE SUMMARY

The programme series 'Capacity and Network Project' (CANP) has been developed and carried out by the International Commission on Mathematical Instruction (ICMI) and funded by ICMI, its mother organisation the International Mathematical Union (IMU) and various sponsors since 2010. CANP provides mathematics teacher educators in developing countries with enhanced mathematical and pedagogical expertise through capacity and network building. The programme objectives are to strengthen mathematical education through fostering regional development for mathematics teacher educators, support the creation of self-sustainable networks concerned with mathematics education, assure better quality education and enhance the mathematical and pedagogical potential of developing regions (Terms of Reference -ToR). Each programme starts with a two-week workshop with approximately forty participants from one developing region, about 20 participants should be from the host country and 20 from regional neighbours'. At the end of each workshop a regional network should be created and further activities in the region should be planned.

Between 2010-2016 ICMI invested a significant amount of funding and human resources into this programme series. Since 2011 five two-week CANP workshops and several follow-up activities were held, spanning six years and five developing regions in Africa, Asia and Latin America. In 2015 the ICMI Executive Committee (EC) initiated the evaluation of CANP 1-5. A CANP review committee was set up and the author of this report offered to lead the evaluation process. The CANP review committee was mainly involved by commenting on first draft of the report and in particular the conclusions and recommendations of the first draft evaluation report.

This evaluation aims to provide input relevant to a decision by the ICMI leadership regarding the future of the CANP programme series and further support/activities/action for the five programmes, which are already running. The results of this evaluation can hopefully be used to decide future steps. Through evaluating and assessing CANP 1-5 the ICMI leadership has more legitimate data to answer the question of whether the CANP workshops deliver on what they promised and on the future of CANP in general.

0.1. Methodology

The methodological design is system oriented rather than addressing individual CANPs or attempting to compare these. For the evaluation, the author of this report collected quantitative and qualitative data using a combination of online surveys, a 3-hour Discussion Group meeting with participants during ICME 13[1] and reports and data from the workshops (desk study). Those methods were selected because they provide relevant information to answer stakeholders' questions and the approach mirrors the structure that CANP created and encouraged stakeholder engagement as well.

0.2. Evaluation criteria

The CANP evaluation aims to assess results of CANP according to the five evaluation criteria used by OECD/DAC: relevance, effectiveness, efficiency, (developmental) impact and sustainability (OECD/DAC, 1991, p. 4).

0.3. Results

The results of the evaluation are presented based on the five evaluation criteria.

0.3.1. Relevance*:*

The research question if CANP 1-5 is relevant and consistent to the needs and priorities of its target group and the policy of ICMI can be answered positively. Based on the result of the evaluation it can be concluded that CANP 1-5 was useful and relevant to the needs of the participants and supported capacity and network building. The results of the evaluation indicate that the content is scientifically relevant and the participants mention that they are using the teaching methods learned and improved their mathematical and pedagogical expertise. They also would like to participate in follow up activities. They are willing to help to organise follow up activities as they see CANP as a relevant tool for their professional development and capacity building. The visibility of the CANP and ICMI is expected to increase with the growing of regional networks. The key stakeholders (CANP participants, organisers and the ICMI EC) rate CANP as a relevant tool for strengthening and improving the scientific capacity of the

[1] About 3500 participants from 105 countries participated in the 13th International Congress on Mathematical Education, which took place from 24-31 July 2016 in Hamburg.

participants and for reaching one of ICMIs principles “to improve the quality of teaching and learning worldwide” (ICMI, n.d) in the CANP participating countries. The programme series has the potential of replication.

0.3.2. Effectiveness*:*

The criteria effectiveness focuses on the effects of CANP: What was the output? What are the key results of CANP? Related is the question if the aim to develop (or strengthen) regional networks has been realised or if it can be expected. The answers in the surveys as well as reports, documents and comments during ICMI 13 CANP Discussion Group show that all five CANPs reflected the philosophy, aims and objectives of CANP, and participants and organisers expressed their general satisfaction with the results of the workshops. All five CANP programmes have created regional networks and engaged in cooperation. The participants were satisfied with the quality of the lectures and scientific programme, and the participants are willing to support the network in the future. From the participants’ perspective, it was criticised by some participants that the workshops did not pay sufficient attention to regional specificities in the lectures. Several follow-up activities have taken place, but the intensity of activities differ between the five networks and regions. A useful tool to further support the CANP regions and networks could be strengthening regional research activities and supporting the participation of CANP participants in other ICMI activities. The general observation regarding effectiveness that can be drawn from survey answers and answers in discussions with participants is that the CANP 1-5 activities provided a platform for capacity and network building for participants and that CANP 1-5 has met the original aims and goals. Due to the short time since the initiation of CANP, it remains to be seen if the CANP activities and the newly established networks will have a long-term effect in their regions.

0.3.3. Efficiency:

Since ICMI and the local organisers were successful in raising local, regional and international funds, the cost for ICMI from the general ICMI budget was low. Considering the low financial cost for ICMI the programmes can be considered highly efficient. Comparing the situation before CANP and after, in all five CANP regions processes have started which, if continued, can have a long-lasting effect for mathematics education in those regions. But the administrative workload was quite high

for all stakeholders and all five CANPs have relied heavily on volunteer work. No CANP activity could have happened without the extraordinary work by many people who have put in many hours to make each CANP programme a success. This must be considered when planning new CANP programmes. The general assessment regarding efficiency of CANP 1-5 can be rated as very good.

0.3.4. Impact:

The assessment of impact shows that CANP has made a real difference to the participants and other beneficiaries. More than 600 people were directly affected through CANP activities through participating in the workshops or public outreach activities. Especially those 200 CANP two-week workshop participants who teach either in university or school affect in total several thousand students through their new teaching methods and knowledge about teacher education issues and practices. CANP contributes to the achievement of overall objectives/goals of ICMI 'to improve the quality of mathematics teaching and learning worldwide and to promote the collaboration, exchange and dissemination of ideas and information on all aspects of the theory and practice of contemporary mathematical education'. If the new networks keep growing and active, an impact on the regional development in mathematics education in the five CANP regions can be assumed.

0.3.5. Sustainability:

At the individual level, there is a high interest of many CANP participants to sustain the results of CANP and to keep active in the newly established networks to improve their individual profile and mathematics education in the region. At the organisational level, it shows that the new networks would need (basic) further support and strategies to sustain their impact and the results of CANP. It must be noted that many CANPs relied heavily on individuals (key organisers). Therefore the role of individuals in the organisation of CANP and for the sustainability of the CANP-Networks should be discussed by ICMI leadership and key organisers (CANP Managers, CANP Local Chairs and active members in the networks). It should be discussed how those individuals can be supported and how the group of active members can be enlarged. All members of the five networks should be involved strongly in any ICMI regional activities, e.g. Regional Conferences, ICMI Studies, at ICME's, in regional meetings or activities from ICMI Affiliated Organisations and Study Groups.

0.4. Recommendations

A central aim for the evaluation was the formulation of recommendations for the future of CANP. More than 30 recommendations divided into four groups regarding: existing CANP 1-5 networks; supporting new CANP regions/ activities and/or existing CANP 1-5 regions; new CANP programmes/regions and further activities to support developing countries, are presented in this evaluation.

0.4.1. Existing CANP 1-5 networks

Regarding existing CANP 1-5 networks it is recommended to continue to support and sustain the existing CANP 1-5 programmes. In order to strengthen and sustain the newly established networks they should be encouraged to cooperate with existing local, regional and international networks who are key stakeholders in mathematics education: teachers, mathematics educators, mathematicians, policy makers from governments and other interested parties like ICMI Representatives, ICMI Affiliated Study Groups and Organisations, IMU community, UNESCO, and ICSU. Attention should be given to the structures and functioning of the five regional networks and how to integrate them into the ICMI structure to support the sustainability of the networks. It is suggested to develop an operational strategy plan for the CANP 1-5 regional networks how to integrate them into the ICMI structure/community. Afterwards a strategy plan for new CANP programmes could be discussed with the members of the networks and the ICMI leadership.

As one of the central findings, the support of more research activities in CANP regions is requested by CANP participants and organisers. It is recommended to identify complementary programmes to strengthen the research cooperation and involvement of the network members in regional and international research activities. The possibility of some basic funding for research programmes in mathematics education in the context of development cooperation could be discussed with the ICMI leadership and the regional network representatives. Possible basic support programmes could be short time research sabbaticals for mathematics educators (similar to the IMU-CDC 'Abel Visiting Scholar Program[2]' but instead targeting mathematics educators).

Another central finding of the evaluation highlights the involvement of CANP

[2] The IMU-CDC Abel Visiting Scholar Program supports short time visits (research sabbaticals) of mathematicians from developing countries in mathematical centres of excellence to support their research). Per grantee up to USD 5,000 can be used for travel and living expenses.

participants in ICMI/mathematics education activities which is seen as a useful tool for sustainability: The members of the newly established networks should get involved in further ICMI activities to become a stable part of the ICMI community: for example through participating in the ICMI Regional Conferences, at ICMI Studies, ICMEs or activities of the ICMI Affiliated Organisations and Study Groups and in particular in the already mentioned ICMI research activities. This could ensure the empowerment of the new regions and help the CANP participants to become more active in the regional and international mathematics education community. At the same time, local ownership (and different regional needs) of the networks and its activities must be ensured. ICMI should support the participation for CANP participants in ICMI activities e.g. via informing the regional network members about ICMI activities.

For the further development of the five networks, some planning security regarding resources and funding is important: Funding for research and infrastructure is considered a factor which can sustain the networks. It would be helpful if the ICMI EC would consider an extension of some basic financial and international support for CANP 1-5 activities for 5 years to support the further development of a sustainable structure/network in the five CANP regions. Also, the involvement of CANP participants in ICMI Regional Conferences could be supported (e.g. via travel fellowships from the organisers and possibly from ICMI). Further third-party funding (fundraised locally, regionally and possibly internationally) needs to be explored further by the five regional networks and possibly in support by ICMI leadership and the international ICMI community.

Communication and cooperation within the regional network, but also between the five networks and other ICMI stakeholder/community members should be intensified, e.g. through social media and new technologies. It is also recommended that the use and best practice examples of social media and other means of communication should be discussed within and between the networks and with the ICMI community.

Improving the monitoring structures for CANP 1-5 networks and activities through requesting from the network responsible a short annual report which focuses on the network output/activities and future plans, would give ICMI a better insight about the results and impact of CANP (and network) activities.

To achieve measurable impact in mathematics education on a large scale, the regional networks have to grow and support mathematics education activities and research in larger quantities. The networks could consider extending each region with more participating countries (for example CANP 3 could involve Myanmar, CANP 4 could reach out to CANP 1, and CANP 5 could reach out to CANP 2.)

It must be noted that the five networks are still young and in a development state, and would benefit from further support from ICMI leadership and the ICMI community. Reports from CANP organisers show that the networks would need some further basic involvement and financial support from ICMI for a few years, for example basic financial support for follow up activities, involvement of ICMI community and leadership in the new networks and inclusion of the CANP 1-5 network members in ICMI activities (like ICMI publications, ICMI conferences and ICMI committees etc.). The CANP participants need to know what to do next and how they can become part of the ICMI and international mathematics education community. They need further leadership and a vision.

0.4.2. Supporting new CANP regions/ activities and/or existing CANP 1-5 regions

As a key result from the evaluation it is suggested that ICMI should support both: new CANP programmes (in new regions) AND the existing (CANP 1-5) programmes. Developing and enhancing the mathematical and pedagogical potential of a region takes several years, therefore it is recommended to continue the involvement in the CANP 1-5 regions.

The issue of regional (scientific) relevance should be monitored in all CANP activities very strongly, regional related topics should be included in all activities. Clearly defined monitoring and evaluation structures including defining clear objectives, results and indicators for measuring the success for each new CANP activity should be taken into consideration by the ICMI leadership, but also by involved local organisers when planning any new CANP activities.

0.4.3. New CANP programmes/regions

The ICMI EC should consider implementing new CANP programmes: participants of the Discussion Group (during ICME 13 in 2016 in Hamburg) from Mozambique and Cameroon expressed interest in participating in new CANP activities. They could be involved in the existing networks or in separate CANP workshops. Other CANP regions could include Nepal, Bangladesh and neighbouring countries; Pacific Islands; North African Region (Morocco, Algeria, Libya, Tunisia), Southern Africa e.g. Swaziland, Malawi, Lesotho, Botswana, Mozambique, Madagascar.

The evaluation results show that it must be considered before a new CANP programme (6+) is launched, if a pool of local and regional volunteers is available (with

an understanding that it is a commitment for at least 1-2 years) to manage all logistical, administrative and scientific duties (including local fundraising), and that sufficient regional support (not only a few individuals) is available to organise a first workshop and to create a sustainable regional network.

0.4.4. Further activities

As a result from various discussions with stakeholders during the evaluation process, the following ideas for further activities to support developing countries should be considered and discussed by the ICMI leadership: The newly established networks and ICMI should consider reaching out to policy makers and politicians in developing countries to raise the awareness of the importance of mathematics education and provide further legal, financial and administrative support to sustain the newly established networks. Another recommendation is to consider the creation of a database for mathematics educators worldwide- this would help mathematics educators or other people interested in the field to find each other for research and/or cooperation projects. Another recommendation is to establish summer schools for early career scholars as a tool for regional development. Those could be organised with the help of the CANP regional networks and could be modelled on the CANP workshops and CIMPA schools.[3]

Overall, the evaluation shows that the core objectives have been achieved and, in conclusion, CANP 1-5 is a successful developmental instrument which should be further supported by ICMI (if funding is available).

[3] CIMPA Schools are two-week summer schools for mathematicians in developing countries (held in developing countries) and usually focusing on one topic in mathematics. They get partial financial and organisational support from CIMPA.

1. Introduction

In various contexts and across disciplines the importance of mathematics and science and the role of higher education as a catalyst in capacity building for development cooperation have been demonstrated (Altbach, Reisberg, & Rumbley, 2009; UNESCO, 2010). Limited capacity is seen as a major constraint for the development process in many countries (World Bank Institute, 2009). In a highly competitive world economy, developing countries are at risk of being further marginalized due to the insufficient and inadequate capacity of their education systems (UNESCO, 2010); Wollny & Grendel, 2013). The United Nations Millennium Development Goals called for universal enrolment in primary education and the elimination of gender disparities in primary and secondary education, but those goals for basic education can only be achieved if developing countries have skilled human resources (UNESCO, 2010; NORAD, 2005). Successful instruments which can foster capacity building and institutional structures for autonomous research and educational development in developing countries are knowledge transfer, sharing and discussing research methods and building international networks (Wollny & Grendel, 2013; World Bank Institute, 2009; NORAD 2005) and through that contribute to the realisation of the Millennium Development Goals.

The Capacity and Network Project (CANP) is one such higher education capacity building, development and cooperation project. It has been developed by the International Commission of Mathematical Instruction (ICMI) and is supported by the International Mathematical Union (IMU), UNESCO and the International Council for Science (ICSU), several regional governments, institutions and the private sector. The project was initiated as a follow up of the UNESCO White Paper 'Les défis de l'enseignement des mathématiques dans l'éducation de base'/'Challenges in Basic Mathematics Education' (UNESCO, 2011[4]). The publication is the result of a common effort of a group of experts led by Michèle Artigue, ICMI President (2007-2009) with the involvement of many members of the ICMI Executive Committee at the time. In line with the declaration from the World Conference in Science held in Budapest in 1999, the authors of the White Paper argue that that anyone should have access to a scientific education of quality, and that such an education contributes to the realisation of the Millennium Goals adopted by the UN in 2000. The authors further argue that

[4] Michele Artique mentioned in the discussion that the French version 'Les défis de l'enseignement des mathématiques dans l'éducation de base' was already finalized in the end of 2009.

mathematics education is an essential component of scientific education, and connections between education in mathematics and in science need to be encouraged (UNESCO, 2011). The publication emphasises that it is important to mathematics, both in its content and practices, to raise students' interest towards the discipline and develop students' confidence in their mathematical capacities. Mathematics is part of the history of humanity and is a living and expanding science, whose development supports other scientific fields and is supported by them in return (UNESCO, 2011). The recommendations from the White Paper regarding teacher education and professional development, synergies between communities, and development of regional collaborations, were implemented in CANP.

1.1. Background and Aims of the Study

Between 2010-2016 ICMI invested a significant amount of funding and human resources into the CANP Programme Series. Regardless of the original intentions CANP, the evaluative and monitoring activities regarding the impact/results of the project have, up to this study, remained fragmented. Besides feedback to the workshop in Mali in 2011 and an informal workshop review during CANP 3 in Cambodia in 2013, no formal evaluation or research was carried out by ICMI and the outcome of the workshops has, up to this evaluation and study, been mainly measured by personal experience and observation. This evaluation taps into this gap.

The study has been initiated by the International Commission on Mathematical Instruction (ICMI) to evaluate the outcome of the first five Capacity and Network Project Programmes and was carried out by Lena Koch. The study analyses quantitative and qualitative data using a combination online surveys, document/desk study research (using reports and publications from the different workshops) and follow up meetings with participants and other stakeholders.

The CANP project was launched in 2010 and has, over the past six years reached more than 600 people involved in mathematics education from more than 25 developing countries in Africa, Asia and Latin America. A substantial number of them are women. The CANP programme series aims to enhance the mathematical capacity of developing regions and to create sustainable, regional networks (Barton, 2011). Each programme intends to provide a platform where the knowledge and skills the participants obtain can be used directly from the institutions and countries they represent. CANP is part of ICMI’s outreach to developing countries activities and fits

into the ICMI principle to improve the quality of mathematics teaching and learning worldwide. The CANP programme series objectives when the first CANP programme started and outlined on the ICMI website about CANP are: “Strengthening mathematical education through fostering regional development for mathematics teacher educators; Forming self-sustainable networks concerned with mathematics education; Assuring better quality education; Enhancing the mathematical and pedagogical potential of the region” (Objectives of CANP, n.D.).

This evaluation, seven years after the initiation of the first CANP activity analyses the results of the first five programmes and compares the current state of the networks and the feedback of participants with the aims and objectives when the programme series started. The evaluation of the results of the CANP aims to help to legitimise further decisions taken regarding the future of CANP and further funding decisions. **The ICMI leadership has to decide if follow-up activities in each of the five CANP region should receive further funding and/or if new CANP Programmes should be initiated.** Therefore the final goal of this evaluation is to analyse the performance of CANP to help the ICMI EC to decide how to proceed with the programme series. With limited resources and other eligible regions, it is critical to decide how best to spend the available resources to both ensure the funds already spent have maximum effect, but also to meet global responsibilities.

In order to evaluate CANP the Terms of References (ToR) of the evaluation were established by the ICMI EC. The terms of reference are:

- Evaluate the whole CANP programme for how well it meets the original aims and its other impacts.
- Evaluate the whole CANP programme for value for money and financial efficiency and sustainability.
- Review and update the aims, description and criteria documents for CANP.
- Make recommendations on how existing CANPs are further supported.
- Make recommendations on new CANPs, or other CANP activities. (ToR, 2015)

In addition to evaluating the outcome of CANP on the basis of their original objectives and the established Terms of References, this study focuses on the recommendations to the ICMI leadership. The recommendations focus on the question if and how existing CANP should be further supported and how to proceed with the programme series. It also includes unintended developments that emerged from CANP.

1.2. Structure of the report and research questions

This report is divided into six chapters and appendices A-G. Following the introduction, the methodology and evaluation process used for the CANP 1-5 evaluation is outlined. The evaluation results, conclusions and recommendations for further development are described in chapter 3, 4 and 5. References can be found in Chapter 6. The appendices includes a detailed description of CANP 1-5, the Terms of References (ToR), a timeline of the evaluation, references and selected data from the online surveys documents. Based on the main aims of this study, the objectives of CANP (and ICMI) and the ToR the identified research gaps and key questions for this evaluation are:

- What are the results, impacts and outcomes of the five CANP programmes?
- Have the objectives and aims of CANP been achieved?
- What are recommendations for the future of CANP?

Each of this question resulted in multiple sub-questions which are addressed in chapter 3 Results of the Evaluation.

1.3. Limitations of the Study

This study is limited by the fact that it relies substantially on the views and perceptions of the participants and organisers of CANP 1-5 during the period of data collection for the evaluation (January 2016 to July 2016). These stakeholders provided descriptions of their experience mainly focusing on the two-week workshop. The scope and time frame of the study allowed little opportunity for validating these views across a wider spectrum of stakeholders CANP 1-5 e.g., students, colleagues and employers of the participants, policy makers in the region and other stakeholders besides the CANP participants and organisers. Including assessments by other possible benefactors of CANP besides the CANP 1-5 initial workshop participants (like the institutions involved in CANP, colleagues and students of the CANP 1-5 participants who might have benefited from the newly trained teachers/educators or other educators, teachers and policy makers from the participant region and who did not have the chance to participate in the CANP activities themselves or donors) might have provided a somewhat different perspective. Doing this would have re-focused the Terms of Reference of this evaluation (ToR) accepted by the ICMI EC 2013-2016 in Macao 2015, which was not the intention. The study therefore remains within its described aims. This study was also limited by the fact that when CANP was developed in 2009/2010 detailed objectives and expected indicators and results were not defined

before the programmes started. A third limited fact was that in most evaluations which aim to analyse the extent to which anticipated outcomes of the programme were produced and to provide information about the worth of the programme are conducted by independent, external experts or in a team (Molund & Schill, 2007), while this evaluation was conducted internally and by one person (but involving as many stakeholders in the evaluation process as possible). For a list of involved stakeholders see the tables in the Appendices. A further limitation is the time frame of the evaluation. The first project had already started in 2011 while the last had just started when the online survey for the evaluation was carried out (spring 2016) and therefore rather short- and mid-term results could be assessed

1.4. Brief Description of CANP

First a brief description of the CANP programmes is given to gain a better understanding of the structure and history of the programme series. The overall objective of each CANP programme is the contribution to the growth of regional professional communities of stakeholders who are involved in training of mathematics teachers in developing countries. The networks should include professors of mathematics education in universities and higher education institutes, teachers, mathematicians, policy makers and institutions. In order to achieve this goal the CANP was launched. So far five regions have benefited from the initiative: French West Africa (2011), Central America (2012), South East Asia (2013), East Africa (2014) and Andean Region and Paraguay (2016). Each programme comprised 4-6 countries. The duration of CANP is currently indefinite. The region and host country is selected by the ICMI Executive Committee (ICMI EC) which also selects the Programme Manager/ICMI Liaison person (usually a member of the ICMI EC) and the Local Chair (LC). The ICMI EC, the Programme Manager and the Local Chair select together the participating countries. Each programme starts with a two-week workshop with approx. forty participants from one developing region: about 20 participants should be from the host country and 20 from regional neighbours' (three - four neighbouring countries- approx. five participants per country). Each CANP workshop combined plenary sessions (courses, synthesis) and group work (tutorials, workshops, discussion groups). Satellite activities to a wider audience such as public lectures were organised. The participants of those countries should form the centre of the regional networks to be established. Participants are mathematics teacher educators (mathematics education

professors in universities or other institutions of higher education who train mathematics teachers for elementary and secondary school), but each programme also includes mathematicians, researchers, policy-makers, and key (school) teachers. Each two-week workshop should have associated activities such as public lectures, satellite workshops for students or exhibitions reaching out to a wider audience. One or two years after the first workshop a follow-up activity should be organised in one of the participating countries. When CANP was launched, it was intended that ICMI would support (with a partial grant) one regional organised workshop/conference within 1-3 years (also in one of the countries of the new network). Each scientific programme of the workshop is developed by an International Programme Committee (IPC), a team of eight mathematics educators and mathematicians– half are from the region in which the particular CANP is held and the other half are international scholars. The IPC is usually chaired by one ICMI liaison person which also acts as program manager. The local chair and local committee are jointly responsible for the logistical aspects of the workshop as well as satellite activities, media outreach, local fundraising etc. In some cases the local chair is also a member of the IPC. Before each workshop starts, ICMI guarantees the basic funding for 40 participants and 5-10 lecturers. Each CANP region is urged to find other donors (e.g. locally and regionally) while ICMI is responsible for international fundraising. The workshop is free of charge for the participants and includes travel, accommodation and basic living costs.

2. EVALUATION FRAMEWORK AND METHODOLOGY

In this chapter the CANP evaluation framework, evaluation criteria and data selection tools are presented and discussed. In order to evaluate the CANP programme series the five evaluation criteria of the OCED/DAC were used as a starting point. Based on them, the author of this study collected quantitative and qualitative data using a combination of the data collection tools e.g. online survey, document/desk study research (using reports and publications from the different workshops) and follow up meetings with participants and other stakeholders. This approach mirrors the structure that CANP created and also encourages stakeholder engagement in the evaluation process.

2.1. Evaluation framework and CANP evaluation process

For this study the evaluation framework by Bobby Milstein, Scott Wetterhall, and the CDC Evaluation Working Group was used (Milstein & Wetterhall, n.d). The framework by Milstein and Wetterhall focuses on:

- Engagement of stakeholders;
- Description of the programme;
- Developing the evaluation design;
- Gathering credible evidence,
- Justifying conclusions
- ensuring use and share lessons learned.

This also complies with the evaluation framework developed by the Swedish Development Organisation SIDA (Molund & Schill, 2007). Based on this framework four projects stages were defined by the author of this study which form the structure of the CANP 1-5 evaluation process:

The first stage of the CANP evaluation deals with the inception and development of the evaluation.

Stage two focuses on evaluation design and definition what data is needed to analyse if CANP activities have been implemented in the way that was planned, and who can provide that information: Sources of Data, Data Collection Tools and Collection of Data (Methods).

Stage three finalising the evaluation, results, conclusions and making recommendations.

Stage four to ensure use of the evaluation will be implemented after the submission of this MBA thesis to the University of Osnabrück.

2.1.1. Overview of CANP Evaluation Process

The detailed stages of the CANP evaluation process are outlined in the following section.

2.1.1.1. Stage One: Inception and Development of the Evaluation

In June 2015, a proposal by two CANP Liaison members and the author to review CANP was accepted at the ICMI EC meeting in Macao, China. It was proposed to review of CANP as a whole (rather than individual evaluations of each CANP) and a Review Committee of six people was established. The Review Committee includes the two originators and CANP Managers of the programmes in Mali and Cambodia), the CANP ICMI Liaison from CANP Costa Rica, the ICMI President (2013-2016), the ICMI Administrator and the ICMI Secretary General (2013-2020) as ex-officio of the Review Committee.[5] The ICMI Administrator offered to coordinate the process of the CANP evaluation and use the evaluation as her thesis for her MBA in Higher Education Management and Science Management. The results of the evaluation can be found in this document. The detailed process and schedule can be found as part of the Terms of Reference (ToR) in Appendix D. It was very important for the author to involve as many stakeholders in the evaluation process as possible to ensure that their perspectives would be included. This was also one of the key points the authors in the literature review mentioned. The stakeholders involved in this evaluation were members of the ICMI leadership (ICMI EC), as well as participants and organisers of the five CANP programmes. Participants and organisers were the main source for evidence and data collection and were involved in the full circle of this evaluation process. A list of the stakeholders involved in the evaluation can be found in Figure 7 and Figure 8. The CANP programme series description is based on internal documents about CANP in the initiation phase in 2010 as well as reports and publicity documents which are listed in the reference list.

[5] In the terms of reference (ToR) the CANP evaluation was described as 'CANP review'. Based on the OECD definition as described in the introduction, this report is rather an evaluation, therefore in the following the author refers to CANP evaluation and not CANP review.

2.1.1.2. Stage two: evaluation design and methods

The methodological design is rather system oriented than addressing individual CANP's or attempting to compare these. The evaluation is based on an internal review and self-evaluation using: online surveys with the participants, lecturers, programme managers and local organisers, report/ document and desk study and discussions with key stakeholders. Those methods were selected because they provide relevant information to answer stakeholders' questions and the approach mirrors the structure that CANP created and also encouraged stakeholder engagement.

2.1.1.3. Stage three: finalising the evaluation, results, conclusions and making recommendations

The conclusions and recommendations were developed by the author of this study based on results of the evaluation. Afterwards the ICMI CANP Review Committee members commented on the document. The comments from the CANP Review Committee members were included in a final CANP Review Report which will be presented to the ICMI EC during the 2017 board meeting in Geneva, Switzerland**.**

2.1.1.4. Stage four: ensure use of the evaluation

This stage will be implemented after the presentation of the results of the evaluation to the ICMI EC leadership and other stakeholders and the responsibility lies with the ICMI leadership and the people involved in CANP and the new networks to ensure use of the results (and recommendations from the evaluation). It is suggested by the author of this study that the CANP Review Report will be made accessible (electronically) to all stakeholders involved in CANP. This includes local partners, donors and other interested partners. An online publication (ICMI website) should follow as well. This allows transparency and that insights from the evaluation can be utilised.

2.2. Evaluation Criteria

Based on the results of the literature review, the CANP evaluation is based on the five evaluation criteria used by BMZ, OECD/DAC (and of many development organisations

around the world)[7]: relevance, effectiveness, efficiency, (developmental) impact and sustainability. Additionally, feedback about the structure including the content of the programme was requested in the online surveys.

2.2.1. Guiding questions for the five CANP evaluation criteria

Based on the research questions in chapter 1 key aspects and questions were developed for each evaluation criteria.

Relevance focuses on the outcome for the participants. The guiding question for relevance is: Is CANP 1-5 consistent with the needs and priorities of its target group and the policies of ICMI?

Effectiveness focuses on the extent and status of goal and objective achievement and the identification of positive and negative factors for implementing measures. Has CANP 1-5 achieved its objectives or will it do so in the future?

Efficiency assesses cost/ benefit ratios: can the costs of CANP 1-5 be justified by the results?

Impact identifies positive and negative and intended and unintended effects**:** What are the overall results of CANP 1-5 (intended and unintended, short and mid-term trends, strengths and weaknesses?

Sustainability focuses on the continuation of the programmes after the workshops/longevity of benefits and the future of the CANP programmes and its created networks**:** Will the benefits produced by CANP 1-5 be maintained after the cessation of external support?

2.2.2. Indicators

Based on the objectives for the CANP programme series [8] several indicators who translate the general concepts of CANP and its expected effects into measurable parts were developed for the evaluation by the author. They address the five evaluation criteria which are used to assess CANP 1-5**.** Indicators include:

- participation rating of the usefulness of CANP
- CANP's capacity to reach its aims (rating by stakeholder);

[7] https://www.bmz.de/de/zentrales_downloadarchiv/erfolg_und_kontrolle/evaluierungskriterien.pdf

[8] Strengthening mathematical education through fostering regional development for mathematics teacher educators, forming self-sustainable networks concerned with mathematics education, assuring better quality education, enhancing mathematical and pedagogical potential of the region and in general the contribution to the growth of regional professional communities of stakeholders who are involved in training of mathematics teachers).

- the cost – benefit for ICMI and for participants
- participants rating of the outcome and impact of CANP
- level of participant satisfaction
- changes in participant behaviour after CANP participation
- changes in the environment and sustainability (e.g., new networks established to support the mathematics education in the CANP regions)

Table 1 gives an overview about the indicators for each evaluation criteria and questions guiding the evaluation. The indicators and questions were consequently used to develop the online surveys and analyse the internal reports and documents about CANP 1-5 (desk study).

Table 1 Indicators and guiding questions for CANP evaluation

Criteria for Evaluation	**Questions guiding the evaluation**	**Questions guiding the evaluation**	**Questions/ Issue guiding the evaluation**	**Indicator**
Outcome for the participants (and ICMI) RELEVANCE	In which areas did participants benefit most from CANP?	Are participants using the teaching methods learned? Has it influenced attitudes towards teaching mathematics?	Was CANP useful for the participants? (Quality of courses, composition and content). To principles of ICMI to improve the quality of mathematics teaching& learning worldwide correspond to the goals of CANP?	Rating of scientific and general usefulness and satisfaction (relevance) of CANP projects for participants.
Status of goal/ objective achievement EFFECTIV-ENESS	Did CANP 1-5 meet the original aims and goals?[9] Output: Extent to which major objectives were achieved.	Did CANP 1-5 provide a platform for capacity (and network) building for participants?	What factors were crucial for the achievement or failure to achieve CANP objectives? workshop to contribute to the growth of a regional professional community?	Rating of Stakeholders of extent CANP has achieved its goals and objectives. Mentioned results of CANPs in survey and documents, number of participants and number of women participants

[9]1) foster regional development for mathematics teacher educators in the regions CANP was held, 2) support the formation of self-sustainable networks, 3) support assuring better quality education, 4) help to enhance the mathematical and pedagogical potential of the region, 5) contribute to improving and strengthening the participant scientific knowledge

Assessment of Cost/ Benefit Ratios EFFICIENCY	Were the five CANP projects cost effective?	Financial efficiency and financial support	To which extent can the cost be justified by the results?	Resources used vs. results achieved (e.g. cost per participant)
and Un-intended Effects DEVELOP-MENTAL IMPACT	Did CANP Contribute to development in mathematics education in the participating countries?	Has CANP resulted in stronger involvement/ participation of participants in international mathematics education activities?	What happened as a result of CANP? Has CANP created a structure? What would have happened without CANP? What are the effects of CANP? Are participants using the learned teaching techniques? Has it influenced participants? attitudes in teaching mathematics? What were the key impacts for the participants?	Rating of impacts for participants (by participants and stakeholder), preliminary results (contribution to development), individual benefit, skills gap reduced. Changes in participant behaviour. Creation of Regional Network: yes/ no and number of follow up activities since first workshop.
Future of the five CANP Regions and CANP in General. SUSTAIN-ABILITY	Have the works-hops helped to form self-sustainable networks concerned with mathematics education?	Should ICMI develop new CANP workshops in other developing and emerging regions and if yes, how should the structure of those workshops be and which region should be targeted? What were strength and weaknesses and how can they be addressed in the future?	Should the existing CANPs (1-5) be further supported and if yes, how? To what extent will activities of CANP 1-5 be expected to continue without ICMIs help? How self- sustaining is the network?	Recognized results: establishment/ existence of networks, post-meetings, plans of new meetings, willingness to support network without further ICMI support. Answers of participants about future activities, local funds available.

Source: Author

2.3. Sources of Data, Data Collection Tools and Collection of Data

The following methods were used to identify information sources and collect information for the evaluation: analysis of relevant documents and reports (desk study), online surveys and focus group meetings/ discussions with participants and other stakeholders. During the evaluation process, special attention was given to the involvement of stakeholder perspectives- especially the participation as many

participants and organisers as possible was seen as every important. The participants were encouraged to present their views through the online survey and during the discussion group meeting during the ICME 13 conference, 2016 in Hamburg.

2.3.1. Surveys and samples of respondents

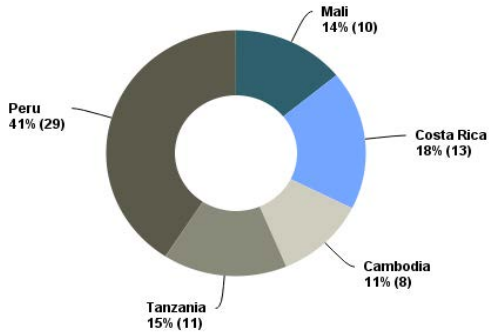
Two surveys (closed-end questions and open-end questions) were developed by the author and sent to the CANP 1-5 review members. After their input both surveys were finalized by the author of this evaluation report using the online tool 'survey monkey'. Survey 1 (for participants) could be filled out online by the participants from CANP 1-4 using the platform survey monkey. The online survey link was sent via email by the author and CANP Manager to the CANP 1-4 workshop participants in February 2016. CANP 5 participants received the questionnaire in paper directly during the CANP 5 workshop and the CANP 5 Programme Manager sent the documents via regular mail to the author who then uploaded the answers into the online survey database. CANP 1-4 had the same questionnaire. CANP 5 was held in the first two weeks of February 2016 and therefore received fewer questions since the questions about the mid- term impact could not been answered at the time of the evaluation (February-May 2016). Since the workshops where held in Spanish, French and English the questionnaire was multilingual. The two questionnaires (survey 1 and 2) can be found on the ICMI website.[10] Asking the same questions to all participants allows for more comprehensive information about what works and why. An unforeseen obstacle was the difficulty obtaining the contact information (updated email addresses) from the 1-4 workshop participants and/or for them to have reliable internet access to fill out the online survey. The workshop programme manager and chairs did not have for all participants the updated email addresses. Due to the difficult situation in many of the participant countries (due to political and economic instable situation) it was not possible to receive a reply from all participants. Unfortunately, there was no reliable database covering all participants with included the complete information (name, address, home institution). The link for survey 2 for organisers was send to key organisers (five Programme Manager, five local chairs and members of the International Programme Committee (IPC) associated with CANP. The time frame can be found in the appendix E.

[10] http://www.mathunion.org/icmi/activities/outreach-to-developing-countries/canp-review/

Responses Survey 1 and 2

Survey 1: CANP Participants from all 5 CANP regions (for the distribution see Figure 1 below) n=71, total responses from participants, (N=209)
Duration of data collection: January 27, 2016 - July 1, 2016

Figure 1 Responses from participants: Number and Distribution by Initial Workshop

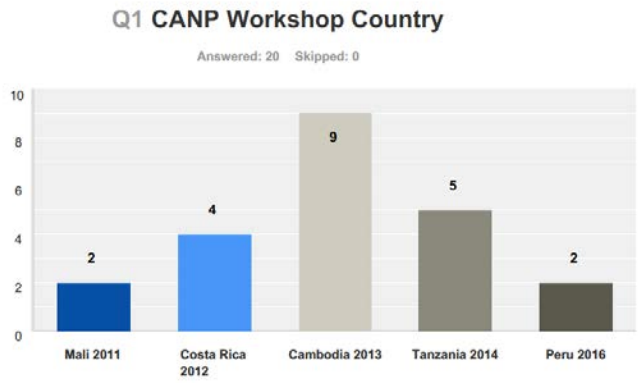


Answered: 71 Skipped: 0
Source: CANP Survey 1

The number of responses from CANP 5 participants is higher since they received the questionnaire in paper directly during the CANP 5 workshop. They answers were then uploaded into the online survey database (survey monkey).

Survey 2: IPC and Organisers from all 5 CANP regions:
n=20, total responses from Program Manager, IPC, and Local Chairs (N=41)
Duration of data collection: March 22, 2016 - July 12, 2016

Figure 2 Responses from IPC and Organizers Number and Distribution by Initial Workshop



Source: CANP Survey 2

2.3.2. Document Analysis/ Desk Study

All five CANPs had filed reports to ICMI and other donors which included relevant information and feedback about the workshops. CANP Mali submitted also results of the workshop feedback which was carried out during the CANP 1 workshop in 2011 in Mali, by means of a questionnaire submitted to the participants and of a meeting of assessment coordinated by the ICMI Programme Manager during the workshop. The results of the first examination of the questionnaire were in addition presented to the participants at the end of the workshop. The results of the analysis of the answers collected (49) were integrated with the information resulting from the oral assessment during the workshop. All reports and relevant documents about CANP 1-5 were assessed by the author (desk study). A list of documents can be found under 'Internal Documents' in the reference list (chapter 5)**.** The document analysis was used to structure the information and data with regard to information about the five CANP workshops relevance, effectiveness, impact and sustainability. The results of the desk study are included in chapter 3 (Results).

2.3.3. Discussion with Stakeholders

A CANP discussion group meet twice for 1,5 h during the ICME 13 conference in July 2016 in Hamburg, Germany to discuss CANP 1-5, its results and future. Participants were CANP participants from all 5 CANP programmes as well as CANP organisers and donors. The discussion group provided vital input to the evaluation. The report about the CANP Discussion Group can be found in the Appendix.

3. RESULTS OF THE EVALUATION

The results the CANP evaluation selected are presented in this chapter and are based on the five evaluation criteria and developed indicators.

3.1. Criteria 1: Relevance

In this section, the relevance of CANP is discussed according to the guiding question: Is CANP 1-5 consistent with the needs and priorities of its target group and the policy of ICMI? Equally important is whether the key stakeholders assess CANP as a useful and relevant programme. It must also be assessed if the basic principles of ICMI correspond with CANP, and if it has the potential of replication/continuation. The focus is if CANP matched the needs of the participants. It must be noted that different to other higher education program evaluations the relevance to the needs and priorities of the partner country governments and local donors is not assessed in this report. This issue was not requested in the ToR and due to the time limitation and missing data it could not be assessed if CANP is in line with the government policies and higher education capacity building priorities of the home countries of the participants as well as if CANP is concurrent with interventions supported by other capacity or networking building programmes in the participating countries. This could be assessed in a later study, possibly together with the members of the newly established networks. When analysing needs, priorities, value and usefulness (relevance) of CANP in the perspectives of the participants the following sub-questions were considered and analysed: In which areas did the participants benefit most from CANP? Are participants using the teaching methods learned? Has it influenced attitudes towards teaching mathematics? Was CANP useful for the participants (quality of courses, composition and content)? Indicator in this context is the rating of usefulness and benefit of the CANP programmes for participants.

3.1.1. In which areas did the participants benefit most from CANP?

In Figure 3 (below) the survey answers from participants regarding the question: 'In which areas did you benefit most from the CANP program?' (5 lowest/very unsatisfactory, 1 highest/very satisfactory) show that the participants felt that they benefited most from:

1. Getting to know and discuss new teaching methods
2. Deepening knowledge on the teaching and learning of specific mathematical domains
3. Creating new regional contacts and networking
4. Deepening knowledge on teacher education issues
5. Practices and learning about teacher education in the region

Regarding 'learning about specific issues of regional interest', the satisfaction rate is lower expected. The question of regional relevance is crucial, and a few participants expressed concerns about the partial lack of relevance to the region in previous evaluations and discussions about CANP. Some participants from CANP 1 commented during the workshop that the workshop did not pay sufficient attention to regional specificities (Artigue, internal report CANP 1).

Figure 3 Areas participants benefited most from CANP Programme

CANP Workshop Evaluation Form Participants (Survey 1)

In which areas did you benefit most from the CANP program?						
Order of 1-5 (1= highest/ 5= lowest)						
Answer Options	**highest (1)**	**(2)**	**(3)**	**(4)**	**lowest (5)**	**Rating Average**
Deepening knowledge on the teaching and learning of specific mathematical domains	40	17	10	1	1	1,64
Getting to know and discuss innovative teaching practices	45	15	5	3	1	1,55
Developing competences in the educational use of digital technologies	13	26	23	3	3	2,37
Deepening knowledge on teacher education issues& practices	37	20	8	3	1	1,71
Connecting math education with living mathematics	31	27	5	4	1	1,78
Learning about specific issues of regional interest	29	24	10	2	3	1,91
Learning about teacher education in the region	35	23	8	0	3	1,74
Confidence working with others	24	26	11	1	4	2,02
Creating new regional contacts and networking	38	23	6	2	1	1,64
Other, please write what						
answered question: 70, skipped question:1						

Source: CANP Online Survey 1

3.1.2. Are participants using the teaching methods learned?

97% of the participants who answered the survey question 'how often are you using the teaching methods learned at CANP' (see Figure 4), use at least once a month, and 51% use the teaching methods they learned at the CANP workshop every week.

Figure 4: Use of teaching methods learned at CANP

CANP Workshop Evaluation Form Participants (Survey 1)

How often are you using teaching techniques/ teaching strategies/ ideas or perspectives you learned at the CANP workshop in the classroom?		
Answer Options	**Response Percent**	**Response Count**
Every week	51,3%	20
Once a month	46,2%	18
Once every six months	2,6%	1
Not at all	0,0%	0
answered question		**39**[11]
skipped question		**3**

Source: CANP Online Survey 1

3.1.3. Has CANP influenced attitudes towards teaching mathematics or administration?

The large majority (69) of the respondents answered the question if CANP has influenced their attitudes in teaching mathematics or in administration with yes (87%).

Figure 5 Influence in teaching mathematics or in administration

CANP Workshop Evaluation Form Participants (Survey 1)

Has CANP influenced your attitudes in teaching mathematics or in administration?							
Answer Options	**CANP 1/ Mali**	**CANP 2/ Costa Rica**	**CANP 3/ Cam-bodia**	**CANP 4/ Tanzania**	**CANP 5/ Peru**	**Response %**	**Response Count**
Yes	8	13	6	11	22	87,0%	60
No	1	0	0	0	2	4,3%	3
I don't know	1	0	2	0	3	8,7%	6
answered question							69
skipped question							2

Source: CANP Online Survey 1

[11] The question was not in the survey of participants from CANP 5 (Peru first workshop) since they took the survey during their first workshop.

3.1.4. Was CANP useful for the participants? (Quality of workshop, composition and content)

The online survey answers, reports and discussions with CANP stakeholders showed that a wide range of topics was covered in CANP 1-5. The participants confirmed that the input from the lecturers during the workshop enhanced the scientific knowledge of the participants. They mention that their main motivation to participate in CANP was to deepen their area of interest, to support cooperation in the region, for profession development as teachers/ teacher educators and to get to know new teaching methods (Survey 1, Question 6). In Figure 6 the results what participants considered individual results of CANP can be seen; they found CANP useful for their job, they would recommend CANP to colleagues and that the workshop was useful to meet international colleagues from the outside the region and regional colleagues and particularly that they would like to attend a follow up workshop.

Figure 6 Usefulness of CANP 1-5

CANP Workshop Evaluation Form Participants (Survey 1)

In the following we list some statements regarding CANP.						
Please indicate to which extent you agree						
Answer Options	**Strongly Agree (1)**	**2**	**(3)**	**(4)**	**Strongly Disagree (5)**	**Response Count**
The CANP workshop was useful to my job	48	15	5	3	0	71
I would recommend CANP to colleagues	58	9	3	0	1	71
I would be interested in attending a follow-up, more advanced workshop	62	4	4	0	1	71
The workshop was useful to meet colleagues from my country	31	18	12	3	7	71
The workshop was useful to meet colleagues from the region	47	18	3	2	1	71
The workshop was useful to meet international colleagues from outside the region	55	11	4	0	1	71
answered question						**71**
skipped question						**0**

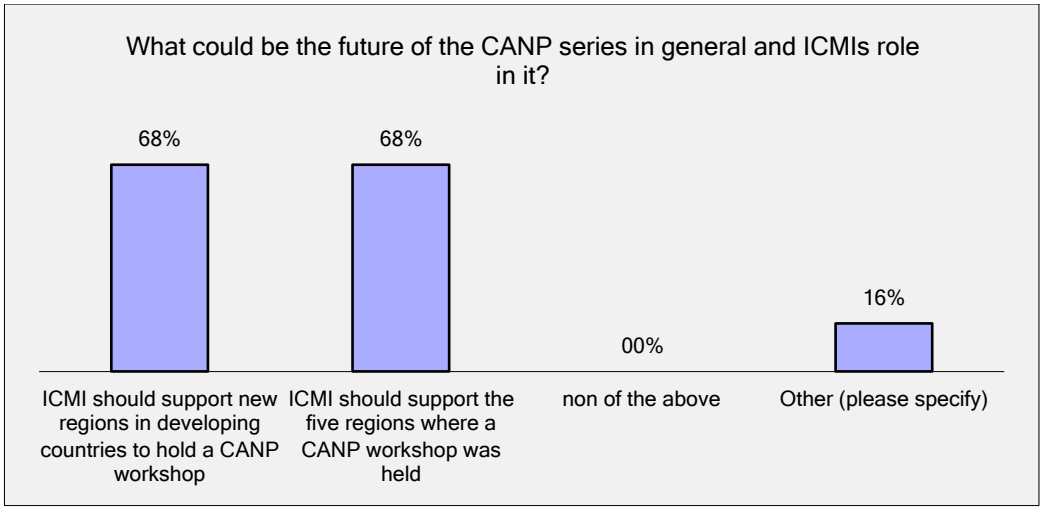
Source: CANP Online Survey 1

The wide variety of activities including discussion rounds during the workshops, outreach activities (e.g. involving teachers) and the social programme had an important impact, and it was seen as very useful for creating the networks and exchanging ideas. The participants of the discussion group in July 2016 also mentioned that they were in general satisfied with the quality and composition of the workshop. Regarding the content level, the participants mention in survey 1 that they are using a wide variety of

methods and topics learned at CANP e.g. Lesson Study, teaching mathematics using ICT, games, relating math to real life and many more. (Survey 1, Question 11). A further point of consideration in the context of relevance is to what extent do the basic principles of ICMI to "improve the quality of mathematics teaching and learning worldwide", as described on the ICMI website (ICMI, n.D.), correspond to the goals of CANP. The observations that can be drawn from the discussion with the ICMI leadership (EC members) as well as in the discussion round during ICME 13 is that there is the general understanding that CANP corresponds very well with the basic principles of ICMI. The analysis of CANPs relevance also must take into consideration if it has the potential of replication. Indicators are the replies from the organisers and participants in the surveys and the discussion during ICME 13 and ICMI leadership. The answers to Question 49 of Survey 2 (organisers) show that organisers who responded in the online survey (20) see a potential in replicating CANP – they suggest that ICMI supports both: new CANP programmes (in new regions) AND that ICMI should support the existing (CANP 1-5) programmes.

Figure 7 Future of CANP (respondents Organiser)

CANP Workshop Evaluation Form Organiser (Survey 2 Question 49)



answered question	19
skipped question	1

Source: CANP Online Survey 1

Also, the participants are interested in replication of the CANP programmes and particularly to participate in follow up workshops and other activities. More than 80% from 61 surveyed participants would like to participate in a follow up activity (Question 47, Survey 1) and 45 participants from all five CANP regions would like to help organizing a CANP follow up activity (Question 52, Survey 1). The high number of

follow up activities (see Appendix CANP 1-5 in Detail) and high rating of the participants of regular contact with other participants and organisers (Question 27f Survey 1) show that there is a high interest in CANP, in regional cooperation, capacity and network building.

With regard to the question 'if CANP 1-5 is consistent with the needs and priorities of its target group and the policy of ICMI', it can be concluded that CANP 1-5 supported network building and was useful and relevant to the needs of the participants. The participants are using the teaching methods learned and would like to participate in follow up activities. They are willing to help to organise follow up activities. The visibility of the CANP and ICMI is expected to increase with the growing of the regional networks. The programme series also has the potential of replication. The key stakeholders rate CANP as a relevant tool for better quality education, strengthening and improving the scientific capacity of the participants and for reaching one of ICMI's key principles to improve the quality of teaching and learning worldwide in the CANP participating countries.

The following recommendation should be considered for further (or future) CANP workshops and follow up activities: The issue of regional (scientific) relevance should be monitored very strongly, regional related topics should be included in all activities. ICMI should consider supporting existing CANP programmes (CANP 1-5) and implement new programmes.

3.2. Criteria 2: Effectiveness

The criteria effectiveness focuses on the effects of CANP: Has CANP 1-5 achieved its objectives or will it do so in the future?

It must consider if CANP (1-5) meet the original aims and objectives[12]; to which extent were major objectives achieved and what was the output of CANP. Related is the question 'if the aim to develop (or strengthening) regional networks has been realised or if it can be expected' that was to be examined. Selected indicators are the mentioned results of CANP 1-5 in surveys and discussions; number of participants

[12]The ToR lists the following aims and objectives of CANP: 1) foster regional development for mathematics teacher educators in the regions CANP was held, 2) support the formation of self-sustainable networks, 3) support assuring better quality education, 4) help to enhance the mathematical and pedagogical potential of the region, 5) contribute to improving and strengthening the participant scientific knowledge

and participation of women, usage of new skills and knowledge; creation of the regional network and if yes, strengths of the regional networks (number or members, intensity of partner relations (network activities, regular contact and exchange of information) and rating of stakeholders of the extent CANP has achieved its original goals and objectives. First, it has to be noted that all five CANP regions have created five regional networks: EdiMath, Mathematics Education Network of Central America and the Caribbean (REDUMATE), South East Asian Mekong Network, East Africa Mathematics Education and Research Network (EAMERN) and the Comunidad de Educación Matemática de America del Sur (CEMAS). The networks have organised (or are planning) follow up meetings and inter-country visits. The survey answers from the participants from CANP 1-4[13] show that participants use the regional reports and some have participated in further ICMI or IMU activities. In particular, they have participated in ICMI Regional Conferences where they could meet more members of the regional ICMI community. (Questions 42, Survey 1). The participants also mention in the online survey that they got inspired to continue their own training/ education: for example, one participant is now (2016) doing a PhD in Math Education following ideas the participant got from CANP. CANP also helped them to improve the participants' knowledge about lesson planning and teaching techniques (Question 11 & 13 Survey 1). One participant answered that the participation in CANP: "has helped me to demystify mathematics to my learners thereby improving their level of interest and performance. It also assisted me complete writing my thesis for my MSc" (Survey 1, Question 13). Several participants mention in the online survey that the participation in a CANP workshop helped them to become a better teacher and improve teaching and practical activities done in the classroom; they have learned methods to have learners become more interested in mathematics and they have a better understanding of the work relationship between teacher and student. (Survey 1, Question 13).

3.2.1. Which objectives and aims of CANP have been achieved?

One key question of this study and regarding the criteria effectiveness is 'if CANP 1-5 met the original aims and objectives and to which extent were major objectives achieved'. In the following section, each of the main aims and objectives as formulated in the CANP original proposal and also in the ToR is analysed.

[13] This question was not asked to the participants of CANP 5, since the participants filled out the questionnaire during the workshop.

3.2.1.1. Fostering regional development for mathematics teacher educators in the five CANP regions

About fostering regional development for mathematics teacher educators in the regions CANP was held, the participants and organisers were in general positive that CANP 1-5 supported (some) regional development for mathematics teacher educators, since stakeholders from the regions met, discussed and decided to work together on future activities in the field. 'How much the CANP participants could already act as multiplier/facilitators in their home countries and in the region', is a question that, due to the short-term impact of CANP and the mentioned limitations of the study, cannot be verified in this report and needs further follow up from the CANP 1-5 networks and ICMI leadership/ community.

3.2.1.2. Support the formation of self-sustainable networks

All five CANP regions have established regional networks and fulfilled one of the main aims of CANP. Angel Ruiz, Programme Manager of CANP 2 describes: "The creation of the Mathematics Network REDUMATE-www.redumate.org) was one of the most important outcome of the event" (Ruiz 2017). In the answers in Survey 1 and Survey 2 regarding the willingness of the participants and local organisers to support networks, both groups indicate their interest to support and help organizing future activity of the newly established networks. The participants mention in the surveys and in discussions that they appreciated the opportunity to participate in CANP activities and are willing to invest time and money in their professional training. Many are also willing to contribute financially to travel cost (Report CANP 1, workshop Senegal). They also suggest increasing the number of countries in the network and particularly the number of young members (in particular CANP 1). At the same time, it must also be noted that there is a gap between the organisers and participants in understanding the advantage of regional network and cooperation, especially in the beginning of the first workshop. The Programme Manager of CANP 5 reported:

> The answers in the survey questionnaire to evaluate the perception of the participants about the CANP5 reflect the lack of recognition of most participants of the opportunity to build a community of collaborators that could enhance the efforts and the initiatives in their home country. The survey was collected the day before the closing day, so that most of participants only converged into an understanding of network capabilities during the final discussions on the last day. The finding above should be considered to

> improve further CANP projects in developing countries, in preparing the ICMI collaborators to face the challenges. (Yamamoto Baldin, 2016).

Nevertheless, the organiser of CANP 5 received after the workshop feedback from some participants about the impact the CANP5 has had for them and their colleagues, as well as their raised understanding of the need to participate and strengthen the CANP 5 regional network for mathematics education CEMAS[14]. The participants and organisers of CANP 5 suggest that working group of leading people could be set up in each participant country and then they would to work towards a composition of a directive board of the CANP 5 network CEMAS, in order to keep the community of CANP 5 together (Yamamoto Baldin, 2016). But looking at the activities of the newly established CANP 1-4 networks (see appendix) and the feedback from the CANP 5 organisers, it can be concluded that CANP is a useful tool to the initiative of regional networking and fosters capacity building for mathematics education. But, in the discussion with organisers and still active network members it became quite evident that the networks are still weak and need further support to gain strength and impact in their regions. The CANP participants assessed that CANP 1-5 had fruitful collaborations with various regional organisations and institutions that should be deepened. The participants also agreed that it was important to collaborate with organisations and institutions already existing in the region CANP is held or nearby countries.

The following recommendations should be considered by the ICMI leadership: The regional networks are still young and in a development state and would benefit from further support from ICMI leadership and ICMI community members. Reports from CANP organisers show that the networks still need at least basic attention and support from ICMI. It does not necessarily have to be large amounts of financial support, but further involvement in the regions through ICMI leadership and the ICMI community. Possible examples for financial support could be basic support for infrastructure for the regional networks and support for follow up activities. The members of the CANP 1-5 network should be informed about and involved in ICMI activities like ICMI publications, ICMI conferences, in ICMI committees etc.)

Involving ICMI Representatives, ICMI Affiliated Study Groups and Organisations in the new networks and in CANP activities (for example through CANP meetings and activities during CMI Regional Conferences) could also be a useful tool to strengthen the five existing CANP regions, its networks and members. The role of regional mathematics education organisations and in particular ICMI Affiliated

[14] This was mentioned by the organiser during the discussion group in July 2016.

Organisations like IACME should be considered. For example IACME played a crucial role in the organisation of CANP 2 in Costa Rica. Further steps to support mathematics education in developing countries and support the existing five networks/CANP regions and possible new CANP regions could be to strengthen the cooperation between ICMI/CANP networks with existing cooperation partners and networks: establishing a closer connection between ICMI and IMU-CDC and connecting to existing mathematical bodies and organisations (for example AMMSI, AIMS and African Mathematical Union in Africa). Furthermore, links between the newly established networks with institutions like UNESCO; JICA and local ICSU offices should be strengthened. After each CANP activity a short assessment should be done about the impact of that CANP to participants and students and which other organisations should be involved in the networks.

3.2.1.3. Support assuring better quality education

There is a clear feedback in the surveys and discussions that participating in CANP contributed to the participants scientific knowledge, that participants found CANP useful for their job and that they are using the new tools and skills in the classroom and that forming networks can support and assure better quality education. The report about CANP 4 by the Local Chair Anjum Halai shows the impact of CANP for better quality education in the East African region:

> (…) relatively little is known about the quality of secondary mathematics education in the East Africa region from the perspective of: a) mathematics curriculum and syllabus in public secondary schools; b) teaching & learning in public secondary mathematics classrooms; c) achievement in mathematics; and d) mathematics teacher education. (…) a strong value of the collaboration and the resulting outcomes and achievements (of CANP) is that it is responding to a great need in the area of quality education in the region. A significant effect of an initiative like CANP4 is that it brings together the hitherto fragmented community of mathematicians and mathematics educators in the region. (…) East Africa was not connected through a network focussed on improving mathematics education in the region. This partnership is aimed at filling this gap, and to bring together key players in the field (e.g. Strengthening Mathematics and Science Secondary Education (SMASSE), Mathematics Association of Tanzania, AIMS). (Halai, 2015)

Based on the results of the evaluation it can be confirmed that bringing together key stakeholders in mathematics education in the region and providing comparative

perspectives on the status of mathematics education in the participating regions is an instrument to support better quality education.

3.2.1.4. Help to enhance the mathematical and pedagogical potential

It is noticeable that the answers in survey 1 regarding the quality of the lectures and scientific programme are very positive and participants rate CANP participation as useful for their job (Survey 1, Question 9). But it needs to be noted that in many of the participating countries the structures to produce scientific papers to be published by an indexed periodical in mathematics education (e.g. *Cuadernos* in Latin America) and for the members of the new networks to become part of the regional (or international) academic communities and to actively participate in mathematics education conferences are still fragile (Baldin, Report CANP 5). The participants mention in the CANP survey and in the discussion during ICME 13 that they have enhanced their knowledge in mathematics education which could be seen as an indicator that the mathematical and pedagogical potential of the region has been enhanced. But at the time of this review further data and verification how much CANP had enhanced the mathematical and pedagogical potential of the region was too limited to allow further assessment of this objective. It needs more than just a few years to see clear results of a broader influence. Due to the short time of the initiation of CANP it cannot be verified but it is hoped that CANP participants become facilitators/multipliers and spread their knowledge and network to colleagues in their home institutions and countries. Through the established regional contacts, the new networks and stronger cooperation between mathematics educators, mathematicians, teachers and policy makers and with the inclusion in the international community of mathematics educators, the five regions are expected to increase in the next years the mathematical and pedagogical potential of the regions. The short-time results based on this evaluation show that CANP Programme Series, in particular, CANP 1-5 contributed to the growth of a regional professional community and CANP 1-5 has initiated a process to foster regional development in the field of mathematics education in the regions CANP took place. In this context, it should be considered that developing and enhancing the mathematical and pedagogical potential in a region takes several years, therefore it is recommended to continue involvement in the CANP 1-5 regions and to support the further development of the regional networks.

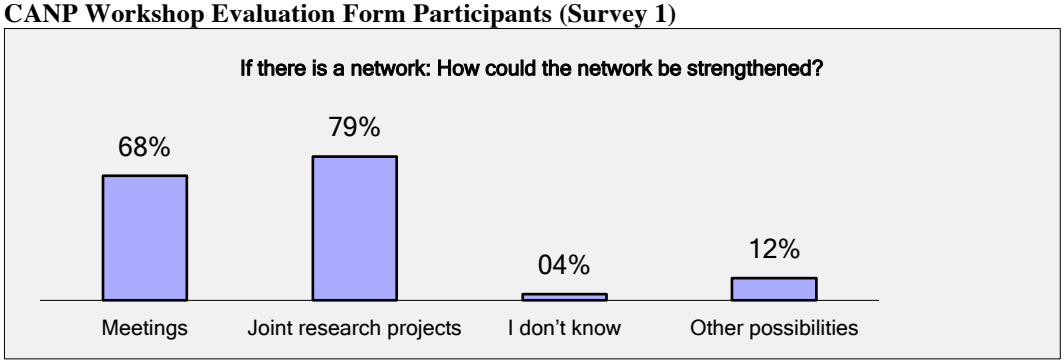
The question if the aim of CANP to enhance the mathematical and pedagogical potential of the participating region been realised or can be expected can be answered positively. The results of the surveys, reports and discussions show that all five CANPs

have created regional networks and have started to enhance the mathematical and pedagogical potential in the five participating regions. But the intensity of network activity differs by region. The number of activities from the five networks can be found in Appendix A.

The following recommendations should be considered by the ICMI leadership and the members of networks to keep developing the mathematical and pedagogical potential of regions and to sustain the networks: Success indicators for the effectiveness of CANP and in particular the effectiveness of the regional networks could be a) the integration and cooperation of CANP 1-5 networks in existing regional and international networks, b) the support of the organisation of the network communication and cooperation and c) the definition of main benefits and difficulties in the network cooperation. Support for joint research projects is seen by participants and organisers as a factor to strengthen and to develop the network. It must be commented that the participants favoured as a tool to strengthen the network first joint research projects and then meetings, while the organisers favoured first meetings and then joint research projects.

Figure 8: Strenghening of Five Regional Networks (Participants)

CANP Workshop Evaluation Form Participants (Survey 1)

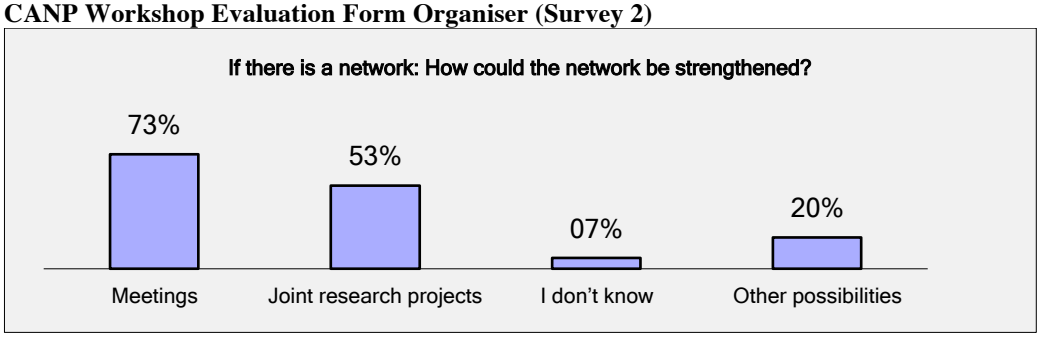


answered question 57 skipped question 14

Source: CANP Online Survey 1

Figure 9: Strengthening of Five Regional Networks (Organisers)

CANP Workshop Evaluation Form Organiser (Survey 2)



answered question: 15 skipped question: 5

Source: CANP Online Survey 2

Therefore, it would be helpful for ICMI to identify complementary programmes to strengthen joint research cooperation (regionally and internationally) and involve the network members in joint research activities. The possibility of some basic funding of research in mathematics education in the context of development cooperation and options for a flexible approach could be discussed with the ICMI leadership and the network representatives. Possible programmes could be short time research sabbaticals for mathematics education (e.g. like the IMU CDC "Abel Visiting Scholar Program" but the targeting mathematics educators). The participation of five CANP participants in the ICMI Study 23 Conference in Macao 2015 was seen as a very effective tool for them to get involved in research activities. This option/tool should be considered for further ICMI Studies and other ICMI research activities. During the CANP Discussion Group it was also mentioned by one local organiser to consider launching regional research activities: e.g. an ICMI Regional Study. From the participants' perspectives it would be helpful to have joint meetings of CANP participants e.g. during ICMEs to share experiences. It also would be helpful for the network members to organise meetings/ discussion groups and or network sessions during the ICMI Regional Conferences.

3.2.1.5. Contribution to improving and strengthening the participant scientific knowledge

Between 2011-2016 five CANP Workshops and several follow up events have been held: a total of more than 200 (fulltime) participants (approx. 80-100 were women) from more than 25 developing countries in 5 regions participated in those activities. The workshops helped the participants to understand the importance of regional cooperation and strengthened their scientific knowledge. They have improved their individual and/ or joint research activities and started (partially) joint activities. The answers in the online surveys and reports show that the workshops improved and strengthened the individual participants scientific knowledge. Through CANP, first steps were taken to improve the scientific knowledge of the mathematics educators who participated in the workshops. During the discussion group, it was discussed how to support CANP participants to do more research and strengthen their research skills. A best- practice example is the participation of five CANP observers in the ICMI Study Conference in Macao (2015). The selected five CANP participants did not have to go through the (regular) selection process of sending papers in to apply for participation in the conference, but they were asked to present a paper afterwards. It is a model that

could be applied in the future for next ICMI Study Conferences. The ICMI Study Conference was a great opportunity for the CANP participants to experience firsthand mathematics education research. They could experience how mathematics education researchers work together, meet members of the international ICMI community and introduced them to possible research topics. The table 2 Learning outcomes of CANP (below) developed by the author of this study and based on a scheme by the World Bank (Otoo, Agapitova & Behrens (2009) gives feedback about contribution to improve the participants scientific knowledge and further outcomes of CANP 1-5.

Table 2 Learning Outcomes of CANP [15]

Learning outcomes	**Generic results indicator**	**Specific results indicator**	**Measures of Indicators**	**Evidence/ Key Results**
Raised Awareness and motivation	CANP Participants motivation increased	Participants mention results based on higher motivation (e.g. Phd started or continued.)	High number of CANP participants who report increased motivation	Positive Feedback from participants in discussion and survey regarding raised awareness and motivation
Enhanced Skills/scientific knowledge	Participants report usage of new skills/ knowledge gain	Trained participants use new skills when teaching	Number of CANP participants who report improvement of teaching and research skills	Participants in discussion and survey report enhanced skills and use of new knowledge
Improved individual or joint research activities or teaching activities	Participants started joint activities, started individual research projects	Consensus among stakeholder about importance of joint activities	CANP participants report improved individual or joint research/ teaching activities	Participants and organisers in discussion and online survey report higher research activities and improved teaching skills
Fostered networks	Five formal networks created	Created formal networks for regional mathematics education	Number of Activities of network (follow up activities and personal contact)	Participants and organisers in discussion and online survey report activities in newly established regional networks

Source: Author, based on scheme by World Bank.

It can be concluded that all five CANPs reflected the philosophy, aims and objectives as formulated in the CANP original proposal and in the Terms of Reference of the evaluation. Participants and organisers expressed their general satisfaction with the results of the workshops. All five CANP have taken steps to constitute (and implement)

[15] Based on the scheme by World Bank

regional networks and cooperation; the quality of the lectures and scientific programme was rated highly in the evaluation; the participants are willing to support the self-sustainable network and the participants rate CANP as a tool that has raised their scientific knowledge. Some participants criticised by that the workshops did not pay sufficient attention to regional specificities in the lectures. That has to be considered for new CANP activities.

The general observation regarding criteria 'effectiveness' that can be drawn from the survey answers and the answers in the discussions with participants and organisers is that the CANP workshops provided a platform for capacity and network building for participants and that CANP 1-5 has met the original aims and goals.

3.3. Criteria 3: Efficiency

The CANP 1-5 efficiency is evaluated based on the relationship between resources used and results achieved and the assessment of the cost/ benefit ratio. Can the costs of CANP 1-5 be justified by the results?

3.3.1. Cost efficiency of CANP

A guiding question of the evaluation was if CANP 1-5 was cost effective and to what extent can the cost be justified by the results? An indicator is the cost/ benefit ratio: the resources used vs. results achieved (e.g. cost per participant). Assessing the cost efficiency of CANP is a complex issue because of the difficulties in establishing comparable means of measurement. Determining the total cost of a single CANP and the cost per participant is almost impossible due to various factors:

- Each CANP had received additional funding from local and/ or regional sources, which vary greatly. The author did not have the complete information how much was locally fundraised and spend for each CANP 1-5 from local and regional sources. The estimation is based on the discussion with the Local Chairs and Programme Managers and available data from internal CANP Reports to ICMI.
- Also the total number of CANP participants can only be estimated; all five programmes had public outreach activities for which the total participant numbers

are not available.

- The follow up meetings varied greatly in form and size: CANP 1 had a follow up meeting/workshop which was rather modelled on the first workshop (but only one week, with more participants especially from the host country); CANP 2 had held a conference for the newly formed network; CANP 3 held a meeting during the ICMI regional conference EARCOME in the Philippines in 2015; and CANP 4 had a follow up meeting with 13 participants.

Therefore, the assessment of cost/benefit ratio focuses on the cost for ICMI and the funds ICMI received directly from donors for CANP for the two-week CANP workshop and the first follow up event after 1-2 years. Locally fundraised support and paid costs had no impact on the ICMI budget. On average the total cost per CANP 1-5 two-week workshop with 40 full-time participants and one follow up meeting with fewer participants including local funds was between €40.000 - €80.000. Table 3 gives an overview of the overall expenses for CANP 1-5 and the approximate cost per participant.

Table 3 Cost of CANP Overview

	Cost for ICMI in Euro	**Total Cost (excluding locally raised funds for each CANP) in Euro**	**Total Cost <u>including</u> local funds in Euro**
Per participant/ two-week workshop (1-5) (approx.200)	€180	On average €1280 per participant.	On average €1750 per participant.
CANP 1-5 (2010-2017)	€36.000	€ 256.000 (See table 4)	Estimated € 350.000.[16]

Table 4 (next page) gives an overview for ICMI during 2010 until May 2017 (excluding local funding). The table shows that most of the CANP costs where covered by external funds and grants and ICMI spent from its annual budget about €36.000 for all five CANPs initial two-week workshop and the first follow up meeting. The cost for ICMI was approx. €180 per CANP 1-5 participant of the first initial two-week workshop and the follow up activity. The total cost per participant (including regional and local funding) for the first initial two-week workshop was approx. €800 (for local participants) – €2000 (for regional participants). Since ICMI and the local organisers were very successful in raising local, regional and international funds, the cost for ICMI from the general ICMI budget was very low. Considering the low cost for ICMI (from the financial side) the assessment of the cost/benefit ratio is very good. Comparing the

[16] The author did not have the complete information how much was fundraised and spend for each CANP 1-5 from local and regional sources. The estimation is based on the discussion with the Local Chairs and Programme Managers and available data from internal CANP Reports to ICMI.

situation before CANP and after, in all five regions a significant development can been seen and all CANPs have started a process which (hopefully) continues to have a long-lasting effect for mathematics education in the five regions.

Table 4 Cost for ICMI for CANP 1-5 (2010-2017)

Expenses for ICMI 2010-2017 (excluding local funding)	
CANP 1 Sub-Saharan Africa	
CANP two-week workshop in 2011 in Mali and follow up meeting Senegal in 2012	
Total CANP 1	**€ 32.000**
CANP 2 Central America and the Caribbean	
CANP two-week workshop in 2012 in Costa Rica and follow up meeting Dominican Republic 2013	
Total CANP 2	**€ 74.000**
CANP 3 South East Asia (Mekong)	
CANP two-week workshop in 2013 in Cambodia and follow up meeting during the EARCOME conference in 2015 in the Philippines	
Total CANP 3	**€ 59.000**
CANP 4 East Africa	
CANP two-week workshop in 2014 Tanzania and follow up meeting in 2015 in Rwanda	
Total CANP4	**€ 59.000**
CANP 5 Andean Region and Paraguay	
CANP two-week workshop in 2016 in Peru and follow up meeting in 2017 in Ecuador	
Total CANP 5	**€ 32.000**
Total CANP Expenses (under ICMI Budget and excluding locally/ regionally raised funds)	**€ 256.000**
Grants for CANP (fundraising by ICMI EC and ICMI Administrator), no local fundraising and institutional support included.	
Total Grants from IMU-EC	€ 110.000
Total Grant from IMU-CDC	€ 28.000
Total Grant from ICSU	€ 60.000
UNESCO	€21.200
CIMPA	€ 800
Total grants in support for CANPs	€220.000
Expenses for ICMI for CANP 1-5 (initial two-week workshop and first follow up activity)	**€36.000**

Source: Author, based on internal reports and ICMI 2010-2016 Activity Reports.

3.3.2. Administration of CANP: Efficiency and Cost

The administration of the five CANP programmes was carried out by the local organisers, the ICMI Programme Manager, the IPC members and members of the IMU Secretariat (ICMI Administrator and IMU Accountant). It is not possible to assess the direct administrative efficiency and costs for CANP since most of the CANP

administration was done without payment from ICMI. Almost all local administrative cost was covered from other sources (e.g. the local universities, employers) and/ or the work was done during free time of those individuals. Therefore, ICMI had almost no cost for the administration of CANP. On average €1.000 was spent from ICMI funds for administration per CANP workshop. Given that it must be mentioned that all five CANPs were organized on a very high level and the participants were quite satisfied with the organisation of the workshop. The survey and reports show that the organisers where very highly motivated and dedicated many (voluntary) hours into CANP. None of them received (as far as it could be assessed) any direct honorarium for their time and efforts spent on CANP. It must be mentioned that the administrative workload is very high for each CANP and all five CANPs have relied heavily on volunteer work. No CANP could have happened without the extraordinary work by many people who have put in countless hours to make each CANP a success. It must be considered for each new CANP programme that a pool of local volunteers have to be available to manage all logistical, administrative and scientific duties.

3.3.3. Roles and Responsibilities

An important role in efficiency is the division of work that allows all stakeholders to do what they know best and have a clearly demarcated line of responsibility. There are three main actors in each CANP: ICMI EC (usually presented by ICMI President and ICMI Secretary General), CANP Programme Manager and the ICMI Local Chair. Since 2012/ CANP 2 the ICMI Administrator from the IMU Secretariat was involved in supporting administration, PR and fundraising for CANP Programmes. The responsibility for each CANP differed slightly in each CANP, but in general the distribution of responsibility was based on the CANP general policy document which was developed in 2010 by the ICMI EC. The ICMI EC decided first the region and host country and then appointed the CANP Programme Manager (for CANP 1-5 also a member of the ICMI EC) followed by appointment of the Local Chair. Then the ICMI President and SG, the Programme Manager and the Local Chair choose the IPC members (which had to follow the guidelines of the CANP policy). The CANP Programme Manager was automatically a member of the IPC and in some cases also the Local Chair was a member of the IPC. The local chair chose the local organizing committee members. The IPC was responsible for the scientific programme while the local organizing committee was responsible for the logistics and administration of each CANP workshop. The role of the IMU Secretariat, in particular the ICMI Administrator

was to support CANP 1-5 (starting in 2011) administratively including fundraising, logistics and PR. The CANP Programme Manager and Local Chair chose for each participating country one national representative who helped with the nomination and selection of participants and supported the creation of each national report which formed together the CANP Regional Report. CANP 4 and CANP 5 had agreements between ICMI and the Local Chair and CANP hosting institutions, which spelled out the responsibilities between ICMI and the local organisers. There seem to have been no significant problems with the division of responsibility and the main collaborators of each CANP have worked smoothly together. However, there are two issues to take into consideration for future CANPs. One issue is the division of responsibility between ICMI EC and the local organisers regarding the scientific programme. Since one key aim of CANP is to develop regional capacity it is very crucial that the IPC members are not only excellent mathematicians and mathematics educators but also have very good knowledge about the scientific needs of the region, in particular, about the situation in the participating countries.

The following recommendation can be given: It could be considered for future CANPS to involve the national contact people in the development of the scientific programme. This would allow more input regarding the direct needs of the participants. This was also requested in the surveys. Another issue is the agreement with the local organisers and ICMI: ICMI could consider developing a set of CANP guidelines and/ or policies of the role of the local organisers and local chair including issues like scientific programme, fundraising, amount of support from ICMI, selection of participants, reports etc. to avoid misunderstanding. This should be part of an agreement between ICMI and the Local Chair/ host institution[17]. It could be quite basic and be modelled on the contract with ICME organisers.

The general assessment regarding 'efficiency' of CANP 1-5 can be rated as very good. Due to fundraising the cost for ICMI remained very low. The administrative workload was quite high for all stakeholders and has to be considered when planning new CANP Programmes and activities.

[17] For CANP 4 and 5 agreements (terms of reference) were signed between ICMI and the local organisers and their institutions.

3.4. Criteria 4: Impact

For the evaluation of impact, first results and trends which were mentioned in the surveys and reports were analysed. The expected contribution of CANP to foster mathematics education as well as further intended and unintended results of CANP 1-5 were analysed and the author tried to answer the following questions based on the available qualitative and quantitative data: What impact had CANP for different stakeholders? Has CANP resulted in stronger involvement/participation of participants in international mathematics education activities? What are the overall results of CANP 1-5? Did CANP 1-5 contribute to foster development in mathematics education the participating countries? What would have happened without CANP/ what would the situation of the target group (participants) have been like without CANP? Indicators to answer those five questions include the impact of CANP rated by participants and other stakeholders, general changes and impact in participant behaviour and attitudes towards mathematics education. It must be noted that this analysis concentrates on the very first effects of the impact and expected contribution of CANP to foster mathematics education in the five CANP regions since the some of the programmes have just started recently.

3.4.1. Results of CANP 1-5 for stakeholder

In this section the impact and results of CANP for different stakeholders is analysed based on the question to what extend did CANP create structures and had a broad impact/outcome on participants, organisations and policy makers/public?

3.4.1.1. Impact for participants

A key source for the assessing the impact of CANP, are the answers from the participants in the online survey. In the survey the participants were asked what were the major impacts of CANP for them and the way they function in their job. The question was open. The results show that the participants valued in particular that they learned new teaching methods and topics and improving teaching methods; that they established regional networks and started to cooperate with colleagues from home country and the region; that they learned about assessment of teaching and learning in the classroom; they have a better understanding of learners behaviour; they started to implement research activities; they have more interest in research and reflection of teaching; and started to reflect the mathematics education system and structure in their

countries/ region. (Survey 1, Question 14) The surveyed participants ranked the individual benefit of CANP as very beneficial. They mention the following benefits of their CANP participation in particular: the opportunity to meet fellow colleagues; to discuss regional issues; the high-level lectures; and in general, the great opportunity to gain skills.

3.4.1.2. Impact on the organisational level

A common assumption in developmental capacity building programmes is that the individuals can become facilitators in their home countries and home institutions and that training of individuals has an impact on the organisational level (Aragon & Valle, 2012; Fielden, UNESCO, 1998). The training of individuals should support the home institutions to improve their own education and training needs. (Boeren, 2012). Due to the short time since CANP started it cannot be answered in this evaluation if (and how much) the training and capacity building of the individuals who participated in CANP has a larger impact in the participating countries and what is the impact of CANP on the organisational level. Integration of the newly learnt qualification in the home institutions and countries also depends on the readiness of the home institutions/ countries and not only the motivation and efforts of individuals. The participants and local organisers of CANP mention that a collection of best-practice examples (and possibly a vision/ guideline) how individuals can have an impact in their organisations/ institutions could increase the general impact of CANP. Institutions who participated in CANP (NIE in Cambodia, PUC in Peru, Aga Khan University in Tanzania, the curriculum reform group in Costa Rica/ Ministry of Education) have benefited from CANP and started further mathematics education activities they would not have started without CANP (Reports CANP by Ruiz; Barton; Halai; Arzarello). How to integrate the newly learnt qualification might be a topic to discuss in further CANP meetings e.g. using best –practice examples. It this context it should be considered to have for future CANP activities a formal/ informal agreement between ICMI and the home institutions of the individuals who participate in the CANP workshops about CANP and its benefits for the individuals and the home institutions.

3.4.1.3. Impact on policy level

It cannot be assessed at this point of time if CANP had a direct impact on policy decisions regarding mathematics education and teaching in the CANP home countries of the participants. But one participant mentioned:

> I had the opportunity to involve a group of colleagues from my country which has been very valuable for curriculum design tasks. One of this persons is the head of the Mathematics area in the Ministry of Education and another is the head of the Mathematics education department of the largest public university in the country, for example; all others constantly participate in Mathematics education tasks of high impact in the country. (Survey 1, Question 13)

An indirectly impact at the policy level might be expected through public outreach activities, publications and awareness rising like participation in high level conferences and meetings with policy makers and opinion leaders. Possible indicators for impact on policy level could be for future evaluations the number of requests for policy advice from members of the CANP network. The CANP programmes 1-5 tried to raise public awareness through public outreach activities like lectures for teachers, involvement of policy makers in the workshops (e.g. during opening and closing ceremonies) and mass media (TV and Radio coverage of the workshops) but at this point of time an assessment of the policy impact is not possible. ICMI EC could consider continuing to collaborate with policy makers, who need to understand the importance of education. ICMI could consider drafting a document why CANP is important for countries which could help to get local support (this method was used for AIMS Cameroon: the international support helped to seed up the local support). Many participants of the CANP Discussion Group during ICME 13 in Hamburg agreed that it could become an activity/task of the ICMI leadership and community to reach out to politicians and policy makers in developing countries.

3.4.1.4. Impact on regional development

The impact on regional development cannot be assessed at this point of time due to the time limitation (the programmes just started recently), and since neither ICMI nor the local organisers defined clear results/ indicators for measuring the success of the programmes concerning regional development (e.g. number of partnerships, involvement in curriculum development, number of regional cooperation activities). The issue was also already discussed under “Effectiveness”.

3.4.2. Stronger involvement/ participation of CANP participants in international mathematics education activities

One unintended result/not defined objective of CANP is the raised participation in ICMI and IMU activities. In the survey, the participants were asked about the involvement in international activities from ICMI and IMU-CDC. More than 50% of the surveyed participants (participants CANP 1-4) participated in further ICMI activities after participating in CANP. The majority (90%) of them participated in an ICMI Regional Conference. Five participants also participated in an ICMI Study and more than 20 participated in ICME 13 in Hamburg. During the Discussion Group the importance of ICMI activities for CANP participants was pointed out. In order to sustain CANP ICMI needs to involve CANP participants in other ICMI activities: e.g. Regional Conferences like AFRICME, EARCOME, EMF and IACME, ICME's and other regional and international events in mathematics education. ICMI EC and the international ICMI community should consider how CANP participants could participate in ICMI regional conferences and other regional and international events. The CANP participants need to know what to do next and how they can become part of the ICMI and mathematics education community. They need further leadership and a vision.

3.4.3. Overall results of CANP 1-5

As already mentioned above an unintended (but important) result of CANP was the higher participation rate of CANP participants in regional and international ICMI and IMU activities, in particular in ICMI Regional Conferences. Intended results are the successfully established networks; that the participants use the new teaching techniques and that CANP has changed for many participants the attitudes in teaching mathematics. There are many specific cases of immediate impact for participants (e.g. one has started a PhD based on CANP ideas, they exchange information with colleagues, use the data from the regional reports). The joint preparation of the regional reports by the participants and the presentation of the reports and discussion was a very important feature of the workshop. It supported the awareness of the regional characteristics and shared needs and thus the networking. A short-term trend is the risen acknowledgment of the advantage of regional connection and a mid-term trend is the growing number of the inter-country visits and activities (see CANP 1-5 in Detail in the appendix). The participants mention in the survey as a weakness the difficulty to spend

two weeks abroad/out of school or university for the first workshop. At the same time they acknowledge that two weeks are necessary to achieve the goals of CANP and to set the groundwork for establishing a regional network. The strengths mentioned by the participants are diverse; they listed the appreciation to have learned new teaching and researching methods and to have gained new skills. They appreciated the time to meet regional and international colleagues and discuss issues or regional and international relevance for mathematics education.

3.4.4. Contribution to fostering development in mathematics education in the participating countries

The discussions and surveys confirmed that there is a direct impact on capacity building and development in mathematics education for the participants. The survey with the organisers shows that most of the respondents are of the opinion that the CANP workshop helped to improve the participants professional development in mathematics and didactics (Survey 2, Question 16), it helped to improve the cooperation between mathematicians, experienced teachers and administrators in the participating countries (Survey 2, Question 17) and that the workshop helped to foster and/or reinforce regional connections. Also, the participants answered positively regarding questions about the contribution of CANP to the development in mathematics education. The majority of the respondents of the participant survey confirm that the workshops helped them to get to know innovative teaching methods, learn about teacher education in the region and regional networking, (Survey 1, Question 8). Those are important indicators for the development of mathematics education.

3.4.5. What would have happened without CANP? What would the situation of the target group (participants) have been like without CANP?

Without CANP the more than 200 participants would not have been able to meet for two-weeks, exchanging ideas and knowledge. It is unlikely that the regional networks would have been established. 200 institutions in 25 countries would not have had the chance to benefit from staff capacity building for mathematics education. The public outreach activities would not have reached more than 400 additional people and many follow up activities of CANP would not have taken place. For a comprehensible assessment of the long-term impact of CANP the monitoring structures for CANP networks and CANP 1-5 activities should be improved. Possible monitoring

instruments would be annual reports from each network which focuses on the network output and future plans and allows a regular insight about the results and impact of CANP (and network) activities.

The assessment of impact shows that CANP has made a real difference to the participants and other beneficiaries. More than 400 people were directly affected through CANP activities and especially those who participated in the two-week workshop (approx. 200) and teach either in university or school affect in total several thousand students through their new teaching methods and knowledge about teacher education issues and practices. CANP contributes to the achievement of overall objectives/ goals of ICMI to improve the quality of mathematics teaching and learning worldwide and to promote the collaboration, exchange and dissemination of ideas and information on all aspects of the theory and practice of contemporary mathematical education. If the new networks keep growing and active, an impact on the regional development of mathematics education in the CANP regions can be assumed.

3.5. Criteria 5: Sustainability

Mid and long-term sustainability is a key condition for institutions and individuals to invest in capacity building. The sustainability refers to the results achieved and the likelihood that the benefits from CANP will and can be maintained in the future (at an appropriate level and after ICMIs support has been withdrawn). The question is whether CANP has the potential for being sustained and that its positive impact will be a lasting one. Will the benefits produced by CANP 1-5 be maintained after the cessation of external (ICMI) support? This evaluation concentrates on the sustainability of the newly established networks and the individual sustainability e.g. considering the question if the impacts to the individuals who participated in CANP and the newly established networks are sustainable. The extent to which the local partners and participants are willing to sustain the network and regional activities without further (or very limited) ICMI support is considered. Furthermore steps to be taken to secure the sustainability of the CANP results are regarded. Indicators for sustainability used in this report are the interest to participate, support and/or organise other CANP workshops, follow up workshops and meetings, the interest of the participates to help organising the network/ follow up activities and the development/status quo of the regional networks.

3.5.1. Expected sustainability at individual level

The online surveys provide an insight to estimate the expected sustainability at an individual level. Question 9 in Survey 1 shows that 89% (in absolute numbers 54) participants would like to participate in a follow-up, more advanced workshop. 82% (45 in absolute numbers) would like to help organizing follow up activity (Survey 1, Question 52). But 67% (30 participants) mention that they would need some financial support for a follow up meeting. 78% (35) think that their home institution would be interested to host/ support/ organize a follow up workshop. They also mention various support they would expect from their home institutions for a CANP follow up activity (administrative support and academic support are highest mentioned (both 58%), logistical support (50%), followed by financial support (16%).[18] On the other hand, the reports and discussion with both, participants and organisers show that it is quite difficult for many participants to sustain CANP results on an individual level- for example to keep active in the network and to help organizing follow up meetings. The local organisers mentioned in discussions that further involvement and support in the five regions would be necessary to sustain the results on an individual level and help the participants of the workshops to become facilitators in their regions. Furthermore, it is necessary to keep supporting the five CANP regions to foster the understanding of the usefulness of regional networking and collaboration. As discussed under 'Effectiveness' … "the lack of recognition of most participants of the opportunity to build a community of collaborators that could enhance the efforts and the initiatives in their home country has to be mentioned" (Baldin, CANP 5). In order to improve further CANP projects in developing countries, preparing the ICMI collaborators and organisers to face the challenges has to be considered.

3.5.2. Expected sustainability at an organisational level

This concentrates on the sustainability of the newly established networks and regional connection. The answers from the surveys, reports and discussions show that the participants and organisers are very much interested to sustain the contact with the colleagues and raise regional connection. The regional networks have started to work and many follow up activities have been organized. The list of activities and events listed in the appendix 'CANP in Detail', show that there are significant number of CANP 1-5 follow up activities. They demonstrate the motivation of the participants on

[18] This differs by region.

the ground to sustain the work of CANP in building capacity in mathematics teaching. The activities also demonstrate a strategic range in the outreach and networking as they go from the local to regional and then international (Report CANP 4). If sustained through regular support/ mentorship from senior mathematics educators and mathematicians, and adequate resourcing, the networks could become a thriving node for mathematicians and mathematics educators in the five CANP regions. Therefore, it is recommended that the ICMI leadership considers developing a policy and strategy for the CANP regional networks and how to integrate them into the ICMI Structure. Afterwards a strategy plan for CANP (1-5) but also new CANP programmes could be discussed with the stakeholder and be ratified by the ICMI EC.

3.5.3. Which steps have been taken or should be taken to sustain achieved results?

The CANP participants and local organisers as well as the members of the networks are willing to sustain positive results and show a high interest of future activities and cooperation, but it is difficult without some basic further support for a few years. Almost 70% of the respondents from survey 2 (organiser) suggest that ICMI should support new regions in developing countries to held a CANP workshop (see Figure 7 Future of CANP). The same number (70%) suggests that ICMI should support the five regions where a CANP workshop has been hold. In case ICMI decided to support new regions, the following three regions received the highest approval rate for getting supported: Nepal, Bangladesh and neighboring countries, Pacific Islands and North African Region.

Figure 10 Possible new CANP Regions (Organisers)

CANP EVALUATION/ SURVEY FOR IPC/ PROGRAM Manager/ Local Chair/ Local Organizer		
If ICMI should consider to support other regions to hold a CANP workshop, which regions should be supported?		
Answer Options	**Response Percent**	**Response Count**
Nepal, Bangladesh and neighboring countries	64,3%	9
Pacific Islands	50,0%	7
Countries in the Middle East	21,4%	3
North African Region (e.g. Morocco, Algeria, Libya, Tunesia, Egypt)	35,7%	5
Southern Africa (e.g.Swaziland, Lesotho, Botwana, Zimbabwe, Zambia, Mozambique, Madagaskar)	21,4%	3
Other (please specify)	21,4%	3
answered question		**14**
skipped question		**6**

Source: CANP Online Survey 2

Also, the majority of the respondents from Survey 1 (participants) showed a high interest and motivation to continue CANP activities, to organise follow up activities (Survey 1 Question 47), to keep in contact with participants and organisers of the workshops and to be active in the five networks and regions. Many activities have been organized to sustain the network and the results (listed in the Appendix "CANP 1-5 in Detail". As mentioned before it would be very positive for future development to initiate and support research activities. In order to sustain the regional networks all CANP participants should be contacted to join the network activities and also further outreach in the CANP regions should be considered. The CANP participants can use the networks to improve their teaching and research skills and possibly help effect changes in policy making (e.g. curriculum development) in their home countries. Further mobility and technical support of the five CANP networks depend on the sustainability of funding and without some external support the new networks might be in danger of vanishing before they can 'fly off'. Some technical support e.g. to have a sub-website of ICMI for each network with updated information (also in the region's language of communication), or the service of email lists could help to strengthen the networks. For further mobility (to joint regional or international meetings) funding for travel cost would be helpful. The reports, discussions and surveys have shown that local organisers, participants and partners of CANP are very much interested to sustain CANP and further activities, but external funding will be necessary. Those funds do not necessary need to come only from ICMI, already for the initial CANP activities external funding was made available. Those external funds came mainly from local donors (institutions, public and private sector) not only from major international donors like ICSU. This promising further third-party funding needs to be explored further by the regional networks and possibly in support by ICMI leadership and the ICMI community. All CANP networks discussed actions regarding sustainability of the networks during the workshops, but as far as it could be assessed by the author of this study, no operational/ strategic plan has been developed or discussed with the ICMI leadership.

The following recommendations regarding sustainability are given: A strategic plan from ICMI/ ICMI leadership how to continue support (e.g. mobility and technical) for the five networks would help to sustain achieved results. An extension of the financial and international support for CANP 1-5 would help to establish a sustainable structure/ network in the five CANP regions and possibly allow to extend each region

with more participating countries. For example CANP 3 could involve Myanmar[19], CANP 4 could reach out to neighbouring countries as well as to CANP 1, and CANP 5 could reach out to CANP 2. For CANP 1 also the extension to close countries should be envisaged (Cameroon, Benin, RDV, Congo). This would be easier from a language perspective. The five networks should be involved strongly in any ICMI regional activities, e.g. Regional Conferences, ICMI Studies, at ICME, in regional meetings or activities from ICMI Affiliated Organisations and Study Groups. This could ensure the actual "empowerment" of the five regions and help the CANP participants to become more active in the ICMI community, at the same time, local ownership of the networks and its activities must be ensured. Monitoring structures of the CANP 1-5 (and future) CANP network activities and of possibly third-party funding should be considered, e.g. annual reports by the network to ICMI leadership. The structures of the five regional networks should be discussed with the ICMI leadership, e.g. should the ICMI leadership support a basic structure e.g. with at least one contact person per country and one main contact person for the entire network. Research activities should be supported and possibly a joint cooperative approach needs to be implemented.

The assessment regarding sustainability is positive on the individual level. There is a high interest of many participants to sustain the results of CANP and to keep active in the new network to improve mathematics education in the region. At the organisational level the results show that the new networks need further support and strategies to sustain their impact and the results of CANP. The five networks and their members should also get involved in ICMI regional activities, e.g. Regional Conferences, ICMI Studies, at ICME, in regional meetings or activities from ICMI Affiliated Organisations and Study Groups. The evaluation shows that the networks and projects initiated through CANP can be sustained at a certain level in the future, but further support and some basic funding for the networks and follow up activities is required for at least 2-5 years.

[19] It was already planned to involve participants from Myanmar to the first CANP 3 workshop in 2013. Due to the political unrest at the time of the workshop preparation and missing links with the mathematics education community, was not possible to involve participants from Myanmar in the 2013 CANP 3 workshop in Cambodia.

4. CONCLUSIONS

Based on the findings of this report the results and outcomes of the five CANP programmes are concluded in this chapter.

The evaluation showed the following results: CANP 1-5 reached during 2011-2016 more than 600 participants from 25 developing countries in 5 different regions around the world. More than 200 participants who took part in the first two-week workshop and more than 400 additional people were reached through public outreach activities besides the initial workshops. As result of CANP, five Regional Networks were created which need further action, a vision and further development. The short-term effects were: bonding of participants, five created established networks, creation of regional reports, and increased understanding of participants about importance and necessity of regional network and professional training. The mid-term effects include: follow up activities were organised which also support capacity building and networking in the five regions. The follow up activities included inter-country visits, CANP follow-up meetings and conferences, meetings during other ICMI activities (e.g. during Regional Conferences, ICME, ICMI Study Conferences), sharing resources for teacher education or master and doctoral programmes in mathematics education and joint research activities.

The long-term or ultimate effects and how much the CANP participants could already act as multiplier/facilitators in their home countries and in the region and how much CANP had enhanced the mathematical and pedagogical potential of the region can, due to the recent start of CANP and the mentioned limitations of the study, not be verified in this report and needs further follow up from the CANP 1-5 networks and ICMI leadership/ community. It needs more than just a few years to see clear results of a broader influence.

But the answers of the CANP survey with the CANP 1-5 organisers and participants show that CANP 1-5 contributed to improving the individual scientific capacity of the participants and supported network building. The visibility of ICMI is expected to increase with the growing of the regional networks. CANP is in line with ICMI's policies - one of the key basic aims of ICMI is to improve the quality of teaching and learning worldwide - and CANP is an important tool to reach this aim for the selected participating countries. There is also a clear feedback from the surveys and

discussions that participants found CANP useful for their job and that they are using the new tools and skills in the classroom. On the individual level, several CANP participants mention that they are doing their PhD (or MA) in Math Education following ideas they got from CANP. Several participants mention also that participating in CANP helped them to become a better teacher; to improve teaching and practical activities done in the classroom; to have learners become more interested in mathematics and to have a better understanding of the work relationship between teacher and student.

Thanks to international, regional and local support and extensive fundraising the cost of CANP for ICMI were quite low and the survey and discussions show that regional and local funding is feasible, but it differs by region. The majority of the CANP participants would like to participate in joint research projects and follow up activities. They also would be interested to help organizing mathematics education events in their home institutions. The evaluation shows that CANP fulfilled the objectives and aims for which it was created and that there is a general satisfaction of CANP by the participants who took the online survey and participated in the discussion group.

At the same time, the evaluation shows that there is still much work to be done to sustain the results the CANP workshops achieved and to foster the newly established regional networks. They need further support/mentorship from senior mathematics educators and mathematicians, and adequate resourcing, then networks could become a thriving node for mathematicians and mathematics educators in the five CANP regions. In some cases (impact on policy decisions regarding mathematics education and teaching in the CANP home countries of the participants, impact on organisational level) not sufficient information was available, and the evaluation was too soon after the workshops to draw further conclusions regarding long- term results.

As conclusion, it can be stated that CANP 1-5 was a successful development intervention, which initiated a process of regional capacity building and network development in mathematics education in developing countries. The recommendations regarding the future of CANP can be found in the following chapter.

5. RECOMMENDATIONS

A central aim for the evaluation was the formulation of recommendations regarding the future of CANP. The analysis of CANP in accordance with the OECD/DAC evaluation criteria includes several recommendations. This chapter is a summary of those recommendations, divided as follows:

- Recommendations for the existing CANP 1-5 networks including resources and funding, communication and monitoring
- Recommendations in terms of new CANP regions/activities vs. supporting existing CANP (1-5) regions
- Recommendations for new CANP Programmes/Regions
- Recommendations for further activities to support developing countries

5.1. Recommendations for the existing CANP 1-5 networks

The following recommendations are given to support and sustain the five CANP programmes:

1. The **newly established networks should cooperate with existing local, regional and international networks who are stakeholders in mathematics education**: teachers, mathematics educators, mathematicians, policy makers from governments and other interested parties like UNESCO, and ICSU. Examples are:
   1.1. Establishing a closer connection between ICMI and IMU CDC; connecting the networks to existing mathematical and mathematical education bodies and organisations (for example AMMSI, African Mathematical Union, AIMS in Africa).
   1.2. Strengthen links between the newly established networks with institutions like UNESCO; JICA and local ICSU offices.
   1.3. Involve ICMI Representatives, ICMI Affiliated Study Groups and Organisations in new CANP network activities.

2. The ICMI EC and the representatives from the networks should **discuss the structures and functioning of the five regional networks**. This could include technical (and very basic financial) support for a structure e.g. with one contact person per CANP participant country and one main contact person for each network for the next 5 years.
3. The ICMI leadership could **consider developing an operational strategy plan for the CANP regional networks and how to integrate them into the ICMI structure/ community** to support the sustainability of the networks. Afterwards a strategy plan for CANP (1-5) but also new CANP programmes could be discussed with the members of the networks and be discussed by the ICMI EC.
4. **Support more research activities in CANP regions** with CANP participants:
   In many of the participating countries the structure to produce scientific papers to be published by an indexed periodical in mathematics education, to become part of the regional (or international) academic communities and to present research results in regional or international Mathematics Education Conferences is fragile. Therefore, the following is recommended:
   4.1. Research activities should be supported and possibly a joint cooperative approach for all five networks could be discussed.
   4.2. **The ICMI EC could identify complementary programmes to strengthen the research cooperation and involvement of the network members in regional and international research activities.** The possibility of some basic funding of research in mathematics education in the context of development of cooperation and options for a flexible approach could be discussed with the ICMI leadership and the network representatives. **Possible programmes could be short time research sabbaticals for mathematics educators (e.g. like the IMU-CDC "Abel Visiting Scholar Program" but instead targeting mathematics educators).**
   4.3. The **participation of selected CANP participants in the ICMI Study 23 Conference in Macao 2015 was considered as very effective tool for getting involved in research activities.** This option/tool should be considered for further ICMI Studies and other ICMI research activities.
   4.4. ICMI should **consider initiating regional research activities**: e.g. an ICMI Regional Study.

A central finding of the evaluation:

5. **Involve CANP participants in ICMI activities: ICMI Regional Conferences, ICMEs, ICMI Studies, ICMI Affiliated Organisations and Study Group activities**: The members of the newly established networks should get involved in further ICMI activities to become a part of the ICMI community: for example, through participation in the Regional Conferences, at ICMI Studies, ICMEs, or activities of the ICMI Affiliated Organisations and Study Groups and, in particular, in ICMI research activities. This could ensure the "empowerment" of the new regions and help the CANP participants to become more active in the ICMI community, at the same time, local ownership (and different regional needs) of the networks and its activities must be ensured.
    5.1. ICMI should **facilitate the participation for CANP participants in ICMI activities** e.g. via informing the network about ICMI activities, discussing with ICMI Regional Conference organisers the possibilities of travel support and possibly through supporting the organisers with fundraising activities if necessary.
    5.2. It would be helpful to have meetings/ discussion groups and or network sessions during the ICMI Regional Conferences and other ICMI related events.

Resources and Funding

For the further development of the five networks, some planning security regarding resources and funding is important:

6. The survey shows that **funding for research and infrastructure is seen as a factor which can sustain the newly created regional networks**. **It would be helpful if the ICMI EC would consider an extension of some basic financial and international support for CANP 1-5 activities for five years which would support the development of a sustainable structure/network in the five CANP regions.** (For example, some support for follow up and if necessary some small support for administration e.g. a total of EURO 500 per year per network would cost ICMI 2.500 EURO per year.)
7. The **involvement of CANP participants in ICMI Regional Conferences** could be supported (via fundraising from ICMI and/or travel fellowships (e.g. Solidarity Fund Grants from the Registration Fee at Regional Conferences).

8. Further **third-party funding** needs to be explored further by the five regional networks and possibly in support by ICMI leadership and the ICMI community. ICMI support (financially but also via supporting fundraising activities from potential sponsors) for the network activities that would integrate the efforts and exchange the expertise/knowledge, e.g. itinerant workshops for teachers and/or interactive showcases of mathematics activities and models for students, etc. could be considered by ICMI EC.
9. ICMI EC and ICMI representatives could be involved in CANP fundraising activities.
10. Several participants from Peru mention that for activities in the CANP 5 region (Andean Region and Paraguay) financial support from local institutions (e.g. from the Ministry of Education and the National Council of Science (CONSITEC) might be available to continue the work of CANP 5. This should be explored and **the best practices how to fundraise locally should be monitored by the ICMI leadership and shared with the five networks.**

Communication

11. Keeping the CANP spirit alive and continue the collaboration **using new technologies:**
    - 11.1. Social media and new technologies can be a useful tool for cooperation and networking. In some regions *WhatsApp* (*WhatsApp* groups), or Facebook groups can help spread news and keep in contact. Mobile phones are used intensively in many developing countries. Members of the East African Mathematics Education Network for example created short videos for learning and distributed those videos via *WhatsApp*. The CANP 2 Mathematics Education Network of Central America and the Caribbean network has an active Facebook Page. The CANP 5 participants are now (2017) better connected: the creation of an *WhatsApp* group facilitated easy and free exchange of information and was used as a tool to distribute information about the follow-up activities in 2017. Those best-practice examples could be listed on the ICMI website.
    - 11.2. ICMI EC could consider some technical support e.g. to have a sub-webpage of ICMI for each network with updated information (also in the regions language of communication), or the service of email lists could help to strengthen the networks.
    - 11.3. Create a website for the new networks on the ICMI website

11.4. Discuss use and best practice examples of social media

ICMI supported the translation of the CANP 2 Regional Report from Spanish into English, something similar is planned for CANP 1 (currently only available in French). It should be considered to support the translation of the results of CANP 5 (Regional Report) into English as well to make them available to raise the visibility.

Monitoring

12. **Improve the monitoring structures for CANP 1-5 networks** and activities through requesting from the network responsible for a short annual report which focuses on the network output/activities and allows a better insight about the results and impact of CANP (and network) activities.

Extend the Participating Countries of the Network

13. The networks could consider **extending (slowly) each region with more participating/cooperating countries** (for example CANP 3 could involve Myanmar, CANP 4 could reach out to CANP 1, and CANP 5 could reach out to CANP 2.) In order to achieve measurable impact in mathematics education on a large scale, the regional networks have to grow and support mathematics education activities and research in larger quantities and levels of education.

CANP Leadership and Vision

It must be noted that the five networks are still young and in a development state and would benefit from further support from ICMI leadership and the ICMI community. Reports from CANP organisers show that the networks would need for a few years some further basic attention and support from ICMI. It does not necessarily need to be large amounts of financial support, but further involvement in the regions through ICMI leadership and the ICMI community (for example from ICMI supported follow up activities, involvement in the new networks and inclusion of the CANP 1-5 network members in ICMI activities like ICMI publications, ICMI conferences and ICMI committees etc.) The CANP participants need to know what to do next and how they can become part of the ICMI and mathematics education community. They need further leadership and a vision.

14. ICMI EC should discuss the future role of the ICMI EC in CANP 1-5 and new CANPs and what vision does ICMI have for the existing programmes and possibly new programmes.

5.2. New CANP Regions/ Activities vs. supporting CANP (1-5)

The organisers see a potential in replicating CANP (Survey 2). They suggest that ICMI supports both: new CANP programmes (in new regions) AND that ICMI should support the existing (CANP 1-5) programmes. Also, the participants are interested in replication of the CANP programmes and in particular to participate in follow up workshops and other activities. The high number of follow up activities and high rating of the participants of contact with other participants and organisers show that there is a high interest in CANP to continue CANP twofold:

15. **Continue the involvement and support in the CANP 1-5**: Developing and enhancing the mathematical and pedagogical potential of a region takes several years, therefore it is recommended to the ICMI EC to continue the involvement in the CANP 1-5 regions to support the further development of the networks and sustain the results. The networks could also consider to slowly reach out to more countries to join the networks.
16. ICMI should also **consider implementing new CANP programmes**: Participants of the Discussion Group from Mozambique and Cameroon expressed interest in participating in new CANP activities. They could be involved in the existing networks or separate CANP workshops. New CANP regions/ programmes could involve Nepal, Bangladesh and neighbouring countries; Pacific Islands; North African Region (Morocco, Algeria, Libya, Tunisia), Southern Africa e.g. Swaziland, Malawi, Lesotho, Botswana, Mozambique and Madagascar.
17. It should be considered to involve members from CANP 1-5 in the initiation of new CANPs.

Reach out to Policy Makers

18. The newly established networks and ICMI could consider **reaching out to policy makers and politicians in developing countries to raise the awareness of the importance of mathematics education.**
19. ICMI could consider drafting a document highlighting the reasons that CANP is important for countries which could help to get local support (this method was used for AIMS Cameroon: the international support helped to sure up the local support).

5.3. New CANP Programmes/ Regions:

Administrative Arrangements and Processes for CANP 6+

20. Draft an agreement with the local organisers and ICMI: ICMI EC could consider developing a set of CANP guidelines and/ or policies of the role of the local organisers and local chair including issues like scientific program, fundraising, amount of support from ICMI, selection of participants, reports etc. This should be part of an agreement between ICMI and the Local Chair/ host institution. It could be quite basic and be modelled on the contract with ICME organisers. As well, the role and the responsibility of ICMI liaison to the organisation of a CANP and support to the after CANP activities could be established with some form of agreement.
21. How to integrate the newly learnt qualification might be a topic to discuss in further CANP meetings e.g. using best–practice examples. It could also be considered to have a formal/informal agreement between ICMI and the home institutions of the individuals who participate in the CANP workshops about CANP and its benefits for the individuals and the home institutions.
22. Before a new CANP is launched, it must be considered **for each new CANP programme** that **a pool of local, regional and international volunteers is available to manage all logistical, administrative and scientific duties.**

Importance of Regional Needs

23. The **issue of regional (scientific) relevance should be monitored very strongly**, regional related topics should be included in all activities. Even though this was from the very beginning an important aim for CANP, the CANP evaluation shows that the specific regional needs have had to be defined in close cooperation with local partners, and the role of partners in defining regional research topics should be considered to be enhanced in the structure for future CANPs. A participant from CANP 5 Peru mentioned the importance of regional needs- in their case the work in ethno-mathematics was crucial for the participants from CANP 5. Within their region they have the need to strengthen their identity but also to connect to the international community. The following actions are recommended to highlight regional needs:
24. Foster the role of national contact persons and local chair in the scientific decision-making. This can also ensure commitment of the individuals and their institutions in securing local funding for the CANP network but also foster

research activities.

25. It could be considered for future CANPS to involve the national contacts in the scientific program to allow more input regarding the direct needs of the participants.
26. While planning a new CANP, it should already be assessed which local and regional organisations and institutions should be involved in the network (which should be established as a result of the CANP workshop).

Definition of Objectives, Monitoring and Evaluation of new CANP Programmes

27. ICMI and the local organisers should **define clear objectives, results and indicators for measuring the success of each CANP programme and further ICMI activities.**
28. New CANPs should include **clear defined (basic) monitoring and evaluation structures.**
29. Each evaluation/ monitoring activity should include assessing the impact of CANP to participants and their students/ institutions.

5.4. Further Activities to Support ICMI Activities Developing Countries

As result from the discussion with CANP stakeholders during the Discussion Group the following further activities to support developing countries should be considered by the ICMI EC:

30. Create a database for mathematics educators world-wide to register, then people can find each other for research projects. The access to such database must be largely diffused through various communication channels besides of those of ICMI (e.g. regional mailing lists).
31. **Establish Summer Schools for early career scholars** as a tool for regional development. Those could be organized with the help of the CANP regional networks and could be modelled on the CANP workshops and CIMPA workshops.
32. **Consider expanding CANP onto primary school level**: CANP 1-5 focused on secondary school level, but there is a huge need to support primary school education, this is a task to be considered by CANP participants and the new networks. It must be noted that the size of such a task would be huge, due to the size of primary education in each country.

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Appendices

Appendix a) Logic model of CANP

The following "Logic Model"[20] gives a good overview about the input, activities, output and effect of CANP 1-5. The logic model was developed by the author of this study after the evaluation was carried out and is based on the reports from CANP, documents from ICMI policy makers about CANP and the results of the evaluation. The Model for the CANP Programme Series is based on the Logic Model by Milstein and Wetterhall (n.d). The model might be useful for further discussions about CANP.

Figure 3 Logic Model of CANP

Purpose and Mission of CANP: Strengthening Mathematics Education in the regions by promoting regional development and capacity building for educators or mathematics teachers and forming self- sustainable regional networks.

Input and Resources	**Activities**	**Output**	**Effect**
Lecturers and trainers for the workshops, Local Organisers, IPC, Agreement with local hosts, endorsement by participants and their employers Constraints and barriers: Limited local funding, small number of mathematics educators/ communities, in some cases multilingual regions, in some cases political instable regions,	*What will CANP do with its resources to direct the course of change?* CANP aims to connect mathematics educators, mathematicians, administrators and teachers who will then work as multipliers in their home country and in the region and continue to work together *to build a regional network* for improvement of mathematics education in the regions. Means of activities: workshop and public outreach activities CANP will train mathematics educators and mathematicians who work in mathematics teacher education and improve their knowledge (*capacity building*).	*What evidence is there that the activities were performed as planned?* (Indicators include the number of participants, stability of network and activities in the regions. More than 200 participants plus more than 400 additional people were reached through outreach activities besides the initial workshops. Five Regional Networks were created and need further action and development. Many follow up activities included inter- country visits, follow up meetings and conferences, meetings during other ICMI activities and events.	*What kinds of changes came about as a direct or indirect effect of the activities?* Short-term or immediate effects: Bonding of participants, newly established networks, creating of regional reports, and increased understanding about importance and necessity of regional network and professional training. Mid-term or intermediate effects: same as short term effect + follow up activities which also support capacity building and networking in the region Longer-term or ultimate effects: remain to be seen and to be discussed by ICMI leadership. What should be the long-term effect?

Context and Conditions How will new network be aligned with existing networks in the relevant regions and be involved in ICMI activities? What trends compete with the effort to engage mathematics educator, teachers and other stakeholders to improve mathematics education in those regions? What is the political and economic situation for investing in mathematics education in the different regions? →**Those questions should be discussed with all stakeholder of CANP.**

Source: Author, based on scheme by Milstein and Wetterhall.

[20] A logic model is part of the program description and *"synthesizes the main program elements into a picture of how the program is supposed to work"* (Milstein&Wetterhall n.D.). It describes the sequence of events that are presumed to reach the aims of the program. It allows stakeholders to improve and focus the direction of the program and describe assumptions about conditions for the program effectiveness and provides a frame for evaluation of the program.

Appendix b) CANP 1-5 in Detail

Data based on reports about CANP 1-5, summary by Lena Koch

CANP 1: Francophone Western Africa Region

1st Workshops held:
2011: "CANP-EDiMath1" held in Bamako, Mali

1st Workshops Participants per Country:
Benin (1), Burkina Faso (6), Ivory-Coast (5), Mali (20), Niger (4), Senegal (5). Total: 41

1st Workshops Lecturers and organisers:
Burkina Faso (1), Ivory-Coast (2), France (5), Mali (9), Morocco (1), Niger (1), Senegal (1).
Total: 20

Duration and dates: 18th to 20 September 2011 (12 days)

Supported by
UNESCO, IMU, ICMI, CIMPA, SCAC-French Embassy in Mali, University Joseph Fourier in Grenoble and the Ministry of Education of Mali

Main outcomes:
- Constitution of EDiMaths, a network for mathematics educators and teachers in the sub-region of Western Africa and the election of board members
- Constitution of a national committee of representatives involved in the education and training of mathematics teachers in the respective region/country and therefore the local "backbone" of EdiMaths
- Online publication of a regional report (French, 2013)
- Presentation of EDiMaths at EMF 2012 in Geneva, Switzerland
- Follow up workshop 2012: CANP-EDiMaths2 held in Dakar, Senegal (11-16.09.2012) with 75 participants from Senegal (59), Mali (9), Cote d'Ivoire (3), Niger (3) Burkina Faso (2), Lecturers 5 (Senegal, Algeria (1) Mozambique (1), France (1), Quebec (1).

Current Projects (2016):
- Organization of a third workshop
- Opening of the EDiMaths network to Francophone, Anglophone and Lusophone countries of the sub-Saharan region
- Translation of the regional report into English and its Publication with Springer
- Identification and organisation of joint research projects (of the member of the EdiMath Network) based on the existing resources (human, cultural, material)

The first initial workshop of CANP was held in the Faculty of Science and Technology of the University of Bamako, Mali in September, 2011. The aim was to reinforce mathematical and didactic competences and capacity building of mathematics teacher

educators of French-speaking Western Africa. Special attention was given to issues of common interest to the educators of the region.[21]

Before the first workshop started, national contact persons for the five participating countries in Mali, Senegal, Burkina Faso, Ivory Coast and Niger were identified. The selection of participants was made in consultation with national contacts, the *inspectorate* and teacher training institutions. Besides 41 participants, six international lecturers, the five national contact persons, two African faculty members who gave the talk on gender, and nine members of the local organizing committee participated in the workshop. The workshop was primarily focused on the training of mathematics teachers of secondary level but included elementary school teachers level.

The scientific program was organised around seven major topics:

- Fundamental mathematics
- Contemporary mathematics
- Situations for class research
- Technology and mathematics education
- Cross-cutting themes relevant to regional priorities
- Building a professional community
- The promotion of mathematics

For each topic a team of two persons (one from the region and one international scholar) was selected to manage the relevant sessions. The scientific programme had an emphasis on group work, collective presentations, discussions and syntheses.

Outreach activities during the first workshop

Selected parts of the workshop in Mali in 2011 were broadcast on Mali television. The Minister of Education, the Elimination of Illiteracy and the National Languages who substantially supported the event was present at the opening ceremony. Also the French embassy, which supported the workshop held an event for the IPC. Unfortunately, in spite of made efforts, it was not possible to organise a meeting with the UNESCO office of Bamako, Mali.

Network of CANP 1

Participants created a network to sustain the achievements of CANP 1/ EdiMaths. The network is managed by a board with members coming from the participating countries. The structure is as follows: President, secretary, treasurer, scientific advisors. It is aimed to form structures/ networks in each country to connect different communities involved in teacher training and promote exchanges and cooperation between them. Particular attention is paid to gender issues to reduce imbalances observed from the workshop.

Follow up activities

In September 2012 CANP-EDiMaths2 was held in Dakar, Senegal with 75 participants from Mali, Senegal, Burkina Faso, Côte d'Ivoire, and Niger, as well as colleagues from Algeria, Canada, France and Mozambique, contributing through lectures and workshops. It was supported by ICMI, its French commission, the CFEM, CIMPA, le Ministère de l'Enseignement Supérieur et de la Recherche du Sénégal, APSA

[21] The issues were: Teaching in multi-lingual contexts; Transition between the first and second cycles of basic education; The relationship between mathematical content and useful mathematical competence in the curricula, strengthening of the connections and collaborations between different communities involved in the training of teachers (mathematics, didactics, teacher trainers from secondary schools, inspectors).

(Association pour la promotion de la science en Afrique) and the FASTEF. The meeting in Senegal was an opportunity to revitalise the mathematics educators Network in Francophone West Africa created in Mali in 2011. The following future issues were decided as future activities: developing network statutes, network's member participation in international scientific activities, a third workshop in Burkina Faso in 2014 (which did not take place due to political unrest in the region).

Suggestions for future activities in the region:

- Limit the number of topics of the scientific programmes of future activities to be more content focused and centred on the (regional) needs of the participants (like in the follow-up workshop in Senegal with two main themes (epistemology, history of mathematics and mathematics education, ethnomathematics).
- Reducing the imbalance observed in the two first activities in terms of gender (involve more female participants and speakers).
- Developing and distributing useful resources for mathematics teacher education in the EDiMaths network.

CANP 2 Central America and the Caribbean

1st Workshop held:
August 6 to 17, 2012 in San José, Costa Rica

1st Workshop Participating Countries and Number of participants:
Colombia (5), Venezuela (4), the Dominican Republic (4), Panamá (4) and Costa Rica (25)
(43 participants in total)

1st Workshop Lecturers and Organisers (23)
10 speakers and 13 organisers from Mexico, Spain, Cuba and Costa Rica

Duration and dates: 12 days - August 6 to 17, 2012.

Supported by
ICSU, Ministry of Public Education of Costa Rica, Instituto de Ciencias Matemáticas ICMAT Mexico, University of Costa, Instituto Tecnológico de Santo Domingo, Universidad Autónoma de Santo Domingo, Costa Rican Editorial Tecnológica, International Mathematical Union (IMU, CDC, ICMI)

Main outcomes and follow up activities:

- Founding of the Mathematics Education Network of Central America and the Caribbean http://www.redumate.org
- Follow up meeting: First Mathematics Education Congress for Central America and the Caribbean and General Assembly of Network held in Dominican Republic, November 5th–8th, 2013.
- Regional reports were published in English and Spanish on the ICMI website
- English report will be published by Springer in 2016/ 2017.

Current projects:

- Next REDUMATE network General Assembly and conference will be held in Cali, Colombia in 2017.

The first workshop of CANP Central America and the Caribbean was held in August 2012 in San José, Costa Rica and brought together a group of 66 Mathematics educators, mathematicians, university administrators, and elementary and secondary institutions from Colombia, Venezuela, the Dominican Republic, Panamá and Costa Rica. The participants had a diverse background, from a wide range of ages, academic occupations and nationalities as well as a high number of female attendants and was successful in promoting the involvement of women scientists and young scientists.

The main goal of CANP Central America and the Caribbean was to promote progress in Mathematics Education in the region; as such it was a unique experience in the region. It was organised by persons associated with the Mathematics Education Reform Project in Costa Rica and the Inter-American Committee on Mathematics Education (IACME). The workshop program included lectures, courses, a national reports forum, a forum for the construction of a regional network, and an open symposium.

During the 2012 workshop, four national reports covering Colombia, Costa Rica, the Dominican Republic and Venezuela on the current situation of the initial and

continuing preparation of Mathematics teachers, an important reference in undertaking common development activities in teaching and learning of mathematics in the region were presented. The written reports “Initial and Continuous Mathematics Teacher Preparation in Colombia, Costa Rica, the Dominican Republic and Venezuela” were finalised by the authors after the workshop. They were published in Spanish in a special edition of the journal “Notes on Research and Preparation in Mathematics Education (Cuadernos de Investigación y Formación en Educación Matemática”. http://revistas.ucr.ac.cr/index.php/cifem/issue/view/1281).

Outreach activities

A one-day open symposium “Costa Rican Symposium XXV on Math, Science and Society” was held during the workshop in 2012 with 181 participants from the scientific community and related disciplines (school math advisers, mathematics policy-makers as well as the general public). All lectures and courses were filmed and an edited collection of videos has been uploaded. Multimedia was used extensively for greater impact, to serve as an online library and to increase the materials and resources available online for educators. The videos can be found at: http://www.youtube.com/user/redumatematicacyc

During the first workshop the local and international community was involved through public lectures and the one-day public symposium as well as media coverage. Several televisions, radio and newspapers reported on the workshop. The presence of the Costa Rican minister of public education at the opening ceremony of CANP Central America and the Caribbean showed strong support from the government. The Director of the Regional Office of ICSU (ROLAC) participated in the workshop. The event increased public interest in mathematics education, mathematics and necessary reforms and raised the awareness of the several collaborative partners including ICSU and in particular the regional office ROLAC.

CANP 2 Publication

The CANP 2 book "Teacher preparation in Central America and the Caribbean" was published in 2016 as e-book and a soft copy by Springer. The book is a synthesis of the initial and continuing preparation for Mathematics Teaching in Colombia, Costa Rica, Dominican Republic and Venezuela, from which comparative analyses can be made that show similarities and differences, and highlight various perspectives. The book is a result the first workshop (CANP 2 held in Costa Rica).

Network of CANP 2: REDUMATE

The most important result of CANP Costa Rica 2012 was the establishment of the Mathematics Education Network of Central America and the Caribbean, which seeks to enhance capacities in Mathematics and Mathematics Education in the region and to engage associations, institutions and individuals in pursuit of the progress so essential to the social and cultural development in the region.(REDUMATE www.redumate.org).

Since September 2012 this network has developed, carried out and planned several activities:

- Creation of a virtual community of the Network to support the activities of its members and supporters: www.redumate.org
- Preparation and publication of national reports from Venezuela, Colombia, Dominican Republic and Costa Rica, in academic format for the indexed journal Cuadernos de Investigación y Formación en Educación Matemática (Journal of Research and Training in Mathematics Education) published in Costa Rica: http://revistas.ucr.ac.cr/index.php/cifem/issue/view/1281.

- First Congress on Mathematics Education for Central America and the Caribbean (CEMACYC): This was a follow-up of CANP 2012. The congress was held with great success during November 6 to 8, 2013, in Santo Domingo, Dominican Republic. It attracted more than 600 participants, and 150 presentations, 230 speakers from 19 countries: Argentina, Armenia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Spain, USA, France, Guatemala, Mexico, Peru, Portugal, Puerto Rico, Dominican Republic and Venezuela.
- The Network has elaborated a strategic partnership with IACME, which is the only Multinational Organization in the Americas formally affiliated to ICMI.
- REDUMATE organised a strong participation of Central America and the Caribbean in the XIV Inter-American Conference on Mathematics Education in Chiapas, Mexico, May 3-7, 2015.
- CEMACYC II and the next REDUMATE CANP 2 Network General Assembly will be held in Cali, Colombia in 2017.

CANP 3 Southeast Asia (Mekong) (started 2013)

1st Workshop held
14th–25th of October, 2013 in Phnom Penh, Cambodia, Myanmar and Vietnam)

1st Workshop Participating Countries and Number of Participants:
Cambodia (16), Laos (6), Thailand (8), and Vietnam (4)
Total 34 participants (15 female and 19 male participants)

1st Workshop Lecturers and Organisers
5 facilitators from the region and 4 from overseas.

Supported by
ICMI; IMU CDC, Cambodian National Institute for Education (NIE), University of Khon Khan (Thailand)

Main outcomes and follow up activities:
• Draft of the regional report, a vision for the future document (focusing on secondary mathematics education)
• Infrastructure of a regional network established

Current projects:
• further Inter-country visits planned
• Finalization of the regional reports for publication on the ICMI website and with Springer

CANP South East Asia (Mekong Area) was held from 14th to 25th October, 2013 in Phnom Penh with 34 participants (15 female and 19 male) from Cambodia (16), Laos (6), Thailand (8), and Vietnam (4), plus five facilitators from the region and four from overseas.

The Workshop programme included welcome sessions and national presentation from each of the four countries as well as lectures on both mathematics and mathematics education, group activities on mathematical tasks and mathematics education issues, cross-national group discussions, and social events. Examples of topics were: Mathematical Vignettes from the Klein project, Pre-Service Teacher Education, Educational Change, Developing a Mathematics Education Community, Resource Websites, and Using the History of Mathematics. These sessions were designed to encourage participants to share ideas and information from each country, and to discuss their wishes for the future. As the Workshop progressed the participants increasingly took control of the programme and organised working sessions on a variety of topics, including: Common Issues, Curriculum, Technology in Mathematics Education, Assessment, and Developing Resource Materials. The final day contained sessions planning future collaborations and meetings, and a brief workshop review (no results were available for this evaluation).

Outreach Activities
Several activities were organised to allow participants to meet each other and get into personal contact. At the end of each day a Mathematical Puzzle Session was organised. External activities included a delegation that met with the Secretary of State, presenting a report on their recommendations with respect to key questions about mathematics education in Cambodia. In addition, four members of the international team gave

presentations at a local University in Phnom Penh (Khemarak University) to a group of 150 teachers.

CANP Cambodia Outputs and follow up activities

The Workshop produced three outputs: a regional report; a vision for the future; and plans for follow-up activities in 2014 through the newly established regional network.

The members from each participating country prepared a report on the state of mathematics education in that country—these are combined into a Regional Report that is aimed to be published in the CANP series by the end of 2017. Participants also produced a Vision for the Future document, focusing on secondary mathematics education.

Since 2013 network members has developed, carried out and planned several activities:

In addition the infrastructure of a regional network was established. Since 2013 several activities took place:

- A follow up meeting was held during the ICMI Regional Conference EARCOME in 2015 (Philippines) with 15 Participants
- A CANP SEA meeting took place at the WALS-APEC from 23-27 November 2015) 30 participants including from Myanmar participated (Thailand (10), Cambodia (4), Laos (9), Vietnam (1), Myanmar (6).
- A Workshop "Teaching for Higher-Order Thinking in Mathematics for Cambodian Teachers -Lesson Study and Open Approach-"was held 13-14 June 2016at the National Institute of Education, Phnom Penh, Cambodia
- A Meeting on cooperation to develop professional teacher Development in CLMV countries (Cambodia, Laos, Myanmar and Vietnam) was held on 2 July 2016 at the Faculty of Education,National University of Laos, Laos
- A Memorandum of Agreement Ceremony between Thailand and Japan to Develop Teachers in Thailand and in CLMV countries (Cambodia, Lao PDR, Myanmar and Vietnam) was signed on 4 July 2016at the Faculty of Education, Khon Kaen University, Thailand (with CANP 3 network members participating).

CANP 4: East Africa (started 2014)

1st Workshop held
September 1st–12th, 2014 in Dar es Salaam, Tanzania

1st Workshop Participating Countries:
Tanzania, Kenya, Uganda, and Rwanda

Supported by: Aga Khan University, ICMI, ICSU, UNESCO

Key Activities: public and plenary lectures, workshops for secondary school teachers, panels, round tables, visits to schools, cultural events

Main outcomes:

- Creation of regional network of mathematics teacher-educators, collaborating mathematicians, mathematics educators, and mathematics policy-makers in East Africa.
- Follow up-workshop in 2015 in Rwanda
- The Regional Report
- Publication of the book „Mathematics Education in East Africa Towards Harmonization and Enhancement of Education Quality“ by Springer

Current and Future Projects:
Strengthening network activities

The fourth Capacity and Network Project (CANP4 East Africa) held its first workshop September 1-12, 2014 in Dar es Salaam, Tanzania at the Aga Khan University Institute for Educational Development East Africa. The Programme included a variety of activities with a special emphasis on improving mathematics education in the East Africa region e.g. public lecture(s), demonstrating mathematical modelling on real life issues of significance to East Africa; keynote address (es) on significant aspects of mathematics education in the region; teacher development workshops on mathematics topics drawn from the regional high school curriculum; media engagement sessions; and opportunities for the wider community to participate in mathematical activities. A series of events were held following the programme to create a regional network and to sustain the progress made during the CANP4.

Participants (80) were mostly mathematics teachers, teacher educators and curriculum developers including participants from remote locations in the East Africa Region as well as international mathematics education community members. Participants included a strong representation of women. Effort was also made to include participants who could sustain the effort and work of CANP 4 after the first workshop. For example the workshop included representatives of networks and organisations active that lead capacity development in science and mathematics education in East Africa like CEMASTEA, SMASSE (Strengthening Science Mathematics in Secondary Education)[22], SESEMAT (Secondary Science Education and Mathematics Teachers Project[23]) and the Special Interest Group in Mathematics and Science Education

[22] An initiative launched in 1998 by the Ministry of Education of Kenya in collaboration with the Japan International Cooperation Agency and later extended to further countries)
[23] An initiated in 2004 by the Ministry of Education and Sports of Uganda in collaboration with the Japan International Cooperation Agency.

(SIGMAS) of the Aga Khan University Institute for Educational Development or organisations who are supporting science and research in Africa in general e.g. the ICSU Regional Office for Africa.

CANP 4 Outputs and achievements

- Bringing together key stakeholders in mathematics education in the region with international experts
- Establishment of an 'Mathematics Education Research Network East Africa'. This network offers potential sustainability to the CANP4 initiative and through this establishing a sustainable community of mathematicians and mathematics educators
- Publication of the book "Mathematics Education in East Africa Towards Harmonization and Enhancement of Education Quality" by Springer
- Providing comparative perspectives on the status of mathematics education in Kenya, Tanzania, Rwanda and Uganda.

Since the first workshop in 2014 several activities took place:

- On Pi-Day[24] (March 14th, 2015) the members of the CANP4 community worked with regional partners to lead workshops for school children and teachers. Partners included mathematics educators and mathematicians including from AIMS-Tanzania. The mathematics activities aimed to promote a broader, more enjoyable vision of mathematics.
- In May 2015, a female member of the CANP4 local organizing committee participated in the ICMI Study 23 meeting in Macao. Her participation was funded by the Aga Khan University and the ICMI Study 23 Conference organisers (ICMI and University of Macao)
- The follow up to CANP 4 took place on October 1, 2015 and was hosted by the University of Rwanda, College of Education (UR-CE) Kigali organised by the working group on the 'Mathematics Education Research Network East Africa'). Participants in the follow-up meeting were key stakeholders in mathematics and mathematics education from Kenya, Tanzania, Uganda and Rwanda. The Follow-up Meeting resulted into a list of activities to consolidate the newly created East Africa Mathematics Education and Research Network (EAMERN). It included setting up a structure of the newly established East Africa Mathematics Education and Research Network by describing aims of the network, membership, duties and terms of the office Executive committee and plan of activities for the network in 2015 – 2016.
- Members of the CANP 4 community participated in the International Congress Mathematics Education (ICME) in Germany in July 2016. Members of the network initiated the CANP Discussion Group on the achievement and implication of CANP and the networks.

Future activities:

The CANP4 community decided to hold AFRICME 2017 in Tanzania and to be hosted by The Aga Khan University Institute for Educational Development East Africa. Subject to funding and availability of resources, the Aga Khan University has agreed to host AFRICME 2017.

[24] Pi Day is an annual celebration of the mathematical constant π (pi). Pi Day is observed on March 14 (3/14 in the *month/day* date format) since 3, 1, and 4 are the first three significant digits of π.[2][3] see https://en.wikipedia.org/wiki/Pi_Day (14.11.2016)

CANP 5 Andean Region and Paraguay (started in 2016)

1st Workshop held:
February 1 -12, 2016 in Peru.

Participating Countries:
Boliva, Ecuador, Paraguay and Peru (33 delegates)

Lecturers and Organisers
Coming Brazil (1), Canada (1), Costa Rica (1), France (1), Spain (1), Italy (1), Japan (1), USA (1)

Supported by
CDC-IMU, ICMI, PUCP and CASIO-Latin America and well as the host institutions of the participants

Main outcomes:
- The workshop was held in Spanish and English and consisted of different activities and themes of Mathematics and Mathematics Education.
- Creation of regional network of mathematics teacher-educators, collaborating mathematicians, mathematics educators, and mathematics policy-makers in the participating countries

Current and Future Projects:
- Follow up-workshop in 2017 was held in Ecuador in April 2017
- Finalization of the regional reports for publication on the ICMI website
- Translation of the regional reports and publication with Springer
- Developing and strengthening of regional network and connecting the network to the existing networks in the region

The 5th CANP was held in Lima, Peru from 01 to 12 February, 2016, hosted by Pontifícia Universidad Católica del Perú – PUCP with the participation of four countries in South America: Bolivia, Ecuador, Paraguay and Peru. The total number of participants was 105, composed by 52 participants (5 IPC, 8 LOC, 33 delegates, 6 invited lecturers) plus 53 Peruvian school-teachers, who were invited for special 2-day program on 8 - 9 February, 2016.

Summary of objectives:
The CANP 5 has been organised according to the general objectives of Capacity and Network Project as established by ICMI aiming at the improvement of the quality of mathematics education in the region. In August 2015, during the pre-meeting with the representatives of participating countries and local organizing committee, it has been agreed and established the main focus of the activities to compose the scientific program of CANP5: the issue of "Initial and Continued Teacher Education" that would lead and permeate the discussions split in themes: stimulus to mathematical thinking; curriculum of mathematics in the education of all levels; assessment; relations among the mathematics, mathematics education, the sciences and the technology; the collaborative network among the participant countries in the region.

Outreach Activities

On the 2-day special program lectures and workshops were held for the 53 Peruvian school teachers with included short oral presentations from the participants to share the scientific contribution in the region.

The four country delegations brought to the workshop the Country Reports about the teacher education system of each country. All reports were discussed and share to detect common issues. The reports were based on a guiding script of CANP-ICMI with questions about the main theme of "Mathematics Teacher Education: initial and continuous".

CANP 5 Outputs and achievements

- The constitution of a network, the Comunidad de Educación Matemática de America del Sur - CEMAS, with website accessed through a link in the site of REDUMATE: //ciaem-redumate.org/ciaem/?q=en/principal, associated to IACME-CIAEM.
- Project of publishing the "Country reports", as an academic publication by Cuadernos de Investigación y Formación en Educación Matemática (//revistas.ucr.ac.cr/index.php/cifem).
- Participation, as CEMAS, in II CEMACYC (the network conference of CANP 2) in Colombia, 29 October – 01 November, 2017, possibly proposing a round table discussion about networking activities.
- Preparation to participate in the ICMI regional conference for Latin America CIAEM: XV CIAEM in 2019, Medellin, Colombia. CIAEM is an ICMI Adhering Organisation which holds every 4 years its regional conference.
- The construction of CEMAS has been strongly supported by REDUMATE which was formed at CANP 2, and CIAEM. It is also aimed to link CEMAS to other existing networks active in science and education in Central America and Caribe like UMALCA and ICSU-ROLAC, as well as other academic associations of Mathematics Education in the region.
- The resolutions about future possible actions by the participants have been summarised in a document and been distributed among the participants classified by the themes and with the possibilities/expectation of the periods of execution. The following future issues were identified:
- Support participants in research activities to be able to become part of the academic community of mathematics educators
- Joint activities with other organisations and networks in the region (REDUMATE and CIAEM-IACME.) as well as ICMI representatives in the region
- Constitute first a working group of leading people in each country and then to work towards a composition of a directive board of CEMAS, in order to keep together the community of CANP 5.

Follow up activities and future implications

- Members of the CEMAS network participated in ICME 13 in Hamburg and the Discussion Group about CANP. The follow up activity will place in Ecuador in April 2017 organised by the participants from Ecuador.
- The participants aim to actively participate in the academic events of REDUMATE, CEMACYC, as well as in the international events of ICMI, such as ICME-14 to integrate CEMAS in the ICMI activities.

Appendix c) Numbers of CANP Participants and Speakers and outreach activity during the first workshop

CANP workshops	Held in (country and dates)	Number of participants of the first two-week workshop	Number of trainers, lecturers, speakers and local organisers	Outreach activities
CANP 1	18 to 30 September 2011 in Bamako, Mali	41	20	Selected parts of the workshop in Mali in 2011 were broadcast on Mali television
CANP 1 Follow up	Senegal	73	Not known.	Not known.
CANP 2	August 6 to 17, 2012 in San José, Costa Rica	43	23	One-day open symposium "Costa Rican Symposium XXV on Math, Science and Society" was held during the workshop in 2012 with 181 participants from the scientific community and related disciplines (school math advisers, mathematics policy-makers as well as the general public).
CANP 2 Follow up	Dominican Republic on November 6-8, 2013	The CANP 2 Network held its 1st General Assembly with 28 participants	Not known.	The first Mathematics Education Congress for Central America and the Caribbean held in the Dominican Republic on November 6-8, 2013. Over 600 attendees—with 150 papers or posters from 230 speakers hailing from 19 countries. This event was the main result of CANP 2.
CANP 3 Southeast Asia (Mekong) (started 2013)	14 to 25 of October, 2013 in Phnom Penh, Cambodia	34 participants (15 female and 19 male) from Cambodia (16), Laos (6), Thailand (8), and Vietnam (4),	9 (5 facilitators from the region and 4 from overseas)	Four members of the international team gave presentations at Kemarak University (Phnom Penh) to a group of 150 teachers.
CANP 3 Follow up	Meeting during ICMI Regional Conference EARCOME in 2015 (Philippines) A second CANP SEA meeting took place at the WALS-	15 Participants 30 participants including from Myanmar	4	Not known.

	APEC from 23-27 November 2015)	participated (Thailand (10), Cambodia (4), Laos (9), Vietnam (1), Myanmar (6)		
CANP 4	September 1 to12 2014 in Dar es Salaam, Tanzania	58	21	There were media engagement sessions and public lectures for the entire community.
CANP 4 Follow up	October 1, 2015 hosted by the University of Rwanda, College of Education (UR-CE)	13 (key members of the new network)	Not known.	Not known.
CANP 5	01 to 12 February, 2016 in Lima, Perú	33	21	53 Peruvian school teachers were invited for special 2-day programme on 8 - 9 February, 2016

Source: Reports about CANP, Authors calculation

Appendix d) Terms of Reference (ToR) Evaluation CANP (2015)

(Accepted by ICMI EC 2015)

CANP Review

The Issue

There have been four CANP Workshops spanning 6 years.

ICMI has been spending a lot of money funding the CANP project. The initial conception had an evaluative component built into each CANP that has really not happened in any formal way. Is it cost effective? What else, or what differently, could we do? Our experience so far has shown us that the different regions have responded differently to the CANP opportunity, and that individuals make a huge difference one way or the other.

We are receiving legitimate calls for funding for follow-up activities from each CANP. We need to decide on a sensible, adequate and sustainable response. With limited resources and other eligible regions, we need to decide how best to spend the available money to both ensure the money already spent has maximum effect, but also to meet global responsibilities. How best can the aims of CANP be met?

CANP Review Proposal

A proposal to review CANP has been presented to the ICMI EC and been accepted at the EC meeting in Macao in June 2015.

It was proposed to review of CANP as a whole (rather than individual evaluations of each CANP) for which a Review Committee of five people should be established, it was suggested to include Michèle Artigue and Bill Barton (as the originators and CANP Managers of the programmes in Mali and Cambodia), Angel Ruiz (as one of the CANP ICMI Liaisons), Ferdinando Arzarello (as ICMI President 2013-2013 and CANP ICMI Liaison), and Lena Koch (for her knowledge of all five CANPs, her international development experience, and her financial management experience). Additionally Abraham Arcavi as ICMI Secretary Genberal is invited as ex-officio of the Review Committee.

The following *Terms of Reference* were proposed:

- Evaluate the whole CANP programme for how well it meets the original aims and its other impacts.
- Evaluate the whole CANP programme for value for money and financial efficiency and sustainability.
- Review and update the aims, description and criteria documents for CANP.
- Make recommendations on how existing CANPs are further supported.
- Make recommendations on new CANPs, or other CANP activities.
- Lena Koch is offering to coordinate the process of the CANP review and use CANP and its evaluation/ review for her MBA masters thesis.

Review process (proposed by LK and accepted by review committee in September 2015):

- Involve as many participants, programme managers, IPC and organiser of CANPs in an ONLINE Survey (in the language the CANP was held in)
- Present first results from online survey to ICMI EC during ICMI EC Meeting in 2016
- Meet and discuss with the CANP 1-5 participants and other stakeholder during Discussion Group at ICME-13.
- Organize meeting of CANP review committee during ICME-13 in July 2016 in Hamburg

- Finalize the Report (summary of results of surveys and discussion rounds) and results/ proposal and send to ICMI EC (in 2017)

Appendix e) Time Frame of CANP 1-5 Evaluation

- Creation online surveys by 15.12.2015 (Lena Koch)
- Review of online survey by CANP Review Committee by 15.1.2016
- Translation into French/ Spanish: by 18.1 (Lena Koch))
- Draft of online survey 2 IPC and regional contacts: by 08.1.16 (Lena Koch)
- Review on online survey 2 IPC and regional contacts by review committee by 16.1.2016
- Email with invitation to participate in Survey 1 is sent to participants CANP 1-4 16.1.2015 (Lena Koch) (return by 1. April 2016
- Email with invitation to participate in Survey 2 is sent to IPC and regional contacts (Lena Koch) (only in English) return by 1. May 2016
- Meeting and discussion with Bill Barton, Ferdinando Arzarello and Lena Koch (in New Zealand in February 2016) about first results and their comments
- Survey (printed) is send to CANP 5 Programme Manager for distribution to the participants from CANP Peru (to be filled out during the workshop) in February 2016
- Survey answers CANP 5 is added into the Survey Monkey database (Lena Koch)
- Write up (Lena Koch) of results from interviews and survey between May – June 2016
- Presentation of first results (Lena Koch) of the online surveys at ICMI EC Meeting July 2016 in Berlin
- Meeting and discussion of CANP participants during ICME-13 in Hamburg in July 2016 (two 90 minute Sessions)
- Meeting CANP Review Committee during ICME 13 in July 2016 (no further results)
- Presentation of the draft (Lena Koch) of the CANP Evaluation Report to Review Committee May 6, 2017
- Comments by Review Committee until May 31, 2017
- Implementation of comments into report and final report to ICMI EC
- Report will be send to ICMI EC for the ICMI 2017 EC Board Meeting
- Presentation of results (Lena Koch) to ICMI EC during 2017 Board Meeting in Geneva
- After the decision by ICMI EC the five regional network members will be informed about the results and future implications.

Appendix f) Report of Discussion Group during ICME 13 in Hamburg

(sent by Lena Koch to Angelina Bijura in November 2016)

Title of DG: Sharing experiences about the Capacity and Network Projects initiated by ICMI

Organisers:
Alphonse Uworwabayeho, University of Rwanda-College of Education (could not be present)
Angelina Bijura, Veronica Sarungi and Peter Kajoro, Aga Khan University's Institute for Educational Development, East Africa Tanzania
Anjum Halai Aga Khan University's Institute for Educational Development, East Africa Tanzania, Local Chair CANP 4 (could not be present)

Summary Report:
Lena Koch

Short Summary CANP Discussion Group (DG)

The Capacity and Network Project (CANP) is a development project of the International Commission of Mathematical Instruction (ICMI) supported by the International Mathematical Union (IMU), UNESCO and the International Council of Scientific Unions (ICSU) as well as regional governments and institutions. The project is a response to Current Challenges in Basic Mathematics Education (UNESCO, 2011), which includes a call not just for mathematics education for all but for a mathematics education of quality for all. Five CANPs have been between 2011 and 2016. French West Africa (start in 2011), Central America and the Caribbean (started in 2012), South East Asia (started in 2013), East Africa (started in 2014) and Andean Region and Paraguay (started in 2016). Each program comprises 4-6 countries. Each CANP workshop combined plenary sessions (courses, synthesis) and group work (tutorials, workshops, discussion groups). Satellite activities to a wider audience such as public lectures were organised.

The Discussion Group "Sharing experiences about the Capacity and Network Projects initiated by ICMI" at ICME 13 was an opportunity for all organisers and participants to the five CANPs and ICMI officers to share their experience about challenges and opportunities in preparing for a CANP event so that they can suggest directions to future CANPs. The Discussions were based around the key questions: *What further steps can be taken to support mathematics education in developing countries? How can the 1-5 CANP regions and the five CANP networks as well as possible new CANP regions build synergies, be strengthened and get support?*

Structure:
Chair: Bill BARTON **Co-chair**: Angelina Bijura

Day 1: Tuesday, 16.30-18.00	Topic	Material / Working format / presenter
16:30-16:35	Aims and organization of the DG	Angelina Bijura
16:40-16:50	Welcome remarks	ICMI President Ferdinando Arzarello, Bill Barton, and Angelina Bijura
16:50-17:15	Findings from survey on CANPs	Lena Koch
17:15 – 17:50	Comments from representatives of each CANP: Sharing experiences about 1-5: Focus on impact of CANP on individuals as well as institutions/countries	Participants of CANP 1-5
17:50-18:00	Closing Day 1	Bill Barton

Day 1: Friday 16.30-18.00	Topic	Material / Working format / presenter
16:30 – 16:35	Aim of the session	Angelina Bijura
16:35 – 17:20	Interventions guided by the key question What further steps can be taken to support mathematics education in developing countries and support the existing five networks/ CANP regions and possible new CANP regions?	All participants
17:55 – 18:00	Closing	Bill Barton

Summary of notes from the DG CANP in Hamburg
The Discussions Group (DG) took place on Tuesday 26th and Friday 29th of July 2016 between 16.30 and 18.00. The group structured the workshop as follows: On the first day a presentation on the findings from the CANP review followed by short comments and presentations from each of CANP 1-5 Programme sharing experiences about 1-5 were presented to the DG participants. The discussion took place on the second day, focusing on: *What further steps can be taken to support mathematics education in developing countries and support the existing five networks/ CANP regions and possible new CANP regions?*

The first day started with a welcome by the chairs of the session Angelina Bijura and Bill Barton, followed by short words of welcome by Ferdinando Arzarello. As a basis for the discussion the first results of the CANP review[25] were presented by Lena Koch. The review shows that CANP 1-5 reached more than 25 developing countries in 5 different regions around the world with more than 200 participants who took part in the first two-week workshop and more than 400 additional people who were reached through outreach activities besides the initial workshops. Five Regional Networks were created and need further action and development. The Short-term effects were: Bonding of participants, five created established networks, creation of regional reports, and increased understanding of participants about importance and necessity of regional network and professional training. The Mid-term effects include: follow up activities were organized which also support capacity building and networking in the five regions. They included inter-country visits, one year CANP Follow Up Meetings and Conferences, meetings during other ICMI activities (e.g. during Regional Conferences, ICME, ICMI Study Conferences) and joint research activities. The long-term or

[25] The ICME EC had accepted in June 2015 a proposal to review CANP 1-5 as a whole (rather than individual evaluations of each CANP) for which a Review Committee of five people was established.

ultimate effects remain to be seen. The answers of the CANP survey with the CANP 1-5 organisers and participants show that CANP 1-5 contributed to improving the scientific capacity of the participants and supported network building. The visibility of ICMI is expected to increase with the growing of the regional networks. CANP is in line with ICMIs policies - one of the key basis aims of ICMI is to improve the quality of teaching and learning worldwide - and CANP is an important tool to reach this aim for the selected participating countries. There is also a clear feedback from the surveys and discussions that participating in CANP contributed to the participants scientific knowledge, that they found CANP useful for their job and that they are using the new tools and skills in the classroom. On the individual level CANP Participants mention that they are doing their PhD (or MA) in Math Education following ideas they got from CANP. Several participants mention that the participating the in CANP helped them to become better teachers, to improve teaching and practical activities done in the classroom and to have learners become more interested in mathematics, and to have a better understanding of the work relationship between teacher and student. Thanks to international, regional and local support and extensive fundraising the cost of CANP for ICMI were quite low and the survey and interviews show that regional and local funding is feasible, but it differs by region. The majority of the CANP participants would like to participate in joint research projects and follow up activities. They also would be interested to help organizing mathematics education events in their home institutions. The surveys show that CANP fulfilled aims for which it was created and that there is a general satisfaction of CANP by the participants who took the survey. Further details can be found in the review report to be published on the ICMI website in 2017.

Comments from representatives of each CANP: impact of CANP on individuals as well as institutions/countries were given by Kalifa/ Michele Artique (CANP 1), CANP 2: Angel Ruiz
CANP 3: Maitree Inprashita, CANP 4 Angelina Bjura, CANP 5: Yuriko Baldin.

On the second day many issues regarding CANP with approx. forty Discussion Group (DG) participants were discussed.

Key discussed topic was:
What further steps can be taken to support mathematics education in developing countries and support the existing five networks/ CANP regions and possible new CANP regions?
The following steps and issues were discussed:

Strengthen the cooperation between ICMI/ CANP networks with existing cooperation partners and networks:
Wandera Ogana (Kenya) suggested establishing a closer connecting between ICMI and CDC and connecting to existing mathematical bodies and organisations (for example AMMSI and African Mathematical Union in Africa). Furthermore links between the newly established networks with institutions like UNESCO; Jica and local ICSU offices should be strengthened.

After each CANP an assessment should be done about the impact of that CANP to participants and students and which other organisations should be involved in the new network. The CANP participants assessed that CANP 1-5 had a nice collaboration with various organisations that should be deepened. CANP 4 participants agreed that it was important to collaborate with organisations already existing in the region CANP is held or nearby countries..

Reach out to Policy Makers
Mama Foupouagini (Cameroon) suggested to keep collaborating with policy makers, they need to understand the importance of education. ICMI could consider to draft a document why CANP is important for countries which could help to get local support (this method was used for AIMS: the international support helped to seed up the local support.
Many participants agreed that it could become an activity of ICMI to reach out to politicians in developing countries.

Involve CANP participants in ICMI activities and in particular in ICMI research activities
Maitree Inprashita (Thailand) pointed to the importance of ICMI activities for CANP participants, in order to sustain CANP we need to involve CANP participants in other ICMI activities: e.g. EARCOME, ICME and other regional and international events. ICMI EC has a role to make sure that regional conference has participants from CANP countries. The participants need to know what to do next and how they can become part of the ICMI and mathematics education community. They need leadership/ a vision. During the CANP in Cambodia 2012 the participants did not assign roles in the CANP network, but they need to collaborate with regional partners (for Malaysia, Singapore) to strengthen the network and become more involved in (regional) research activities. CANP participants want to know what to do next and what options they have. They should link in the region and need models to follow. That links to the results from the CANP review, it showed that the CANP participants are interested to be involved in joint research projects. The question is: What possible beginning could there be: e.g. ICMI Regional Studies?

Support research activities in developing countries
It was discussed how to support CANP participants to do more research: A best-practice example is the participation of five CANP observers in the ICMI Study Conference in Macao (2015). The ICMI Study Conference was a great opportunity to experience firsthand mathematics education research. The CANP participants could see how mathematics education researchers work together, meet members of the international ICMI community as well as CANP participants. The Study Conference was not designed to them but showed them possible research topics. Many institutions worked together to bring five CANP participants to participate in the ICMI study conference in Macao. The selected five CANP participants did not have to go through the process sending in papers in the beginning, but they were asked to present a paper afterwards. It is a model that could be applied in the future for the next ICMI Study Conferences.

Create a database about existing networks and organisations in mathematics education worldwide
Before a CANP starts, the organisers could do more research what are they existing networks, what are the possibilities before a CANP program is set up. After the first two weeks workshop of a CANP program its important that the newly established network and all CANP participants have clear aims and a schedule when to meet next time and what to do in between.

It was suggested that ICMI assigns someone to create a database of organisations related to mathematics education to tap into the various developing regions and create a repository of networks and organisations (published on the ICMI website).

Summer Schools as a tool for regional development
A possible activity to strengthen the CANP regional networks could be the establishment of summer schools for early career scholars. Those could be organized with the help of the CANP regional networks.

Consider expanding CANP onto primary school level:
CANP 1-5 focused on secondary school but there is a huge need to support primary school education, this is a task to be considered by CANP participants and the new networks.

Importance of Regional Needs
A participant from CANP 5 Peru mentioned the importance of regional needs- in their case the work in ethno-mathematics was crucial for the participants from CANP 5 – within their region they have the need to strengthen their identity but also to connect to the international community. They are convinced that for the CANP 5 region (Andean Region and Paraguay) they can find financial support of institutions in their countries (e.g. Peru, Ministry of Education, national Council of Science (CONSITEC) and its possible that they find financial support and with this support they can continue the work of CANP 5.

Regional reports
Importance of Regional report was mentioned. Maybe for the future possible research topics should be included in the CANP regional reports.

Keeping the CANP Spirit Alive and Continue the Collaboration using new technologies
Speaking of the future it was discussed how to use social media and new technologies for cooperation and networking. In some regions *whats app (whats app groups),* or *Facebook* groups can help spread news and keep in contact. Mobile phones are used intensively in many developing countries. Members of the East African Mathematics Education Network for example create short videos for learning and distributed those videos via *whats app*. The CANP 2 Mathematics Education Network of Central America and the Caribbean network has an active *Facebook* page.

It is mentioned that not all CANP or ICME participants are aware of all ICMI activities and that in some cases the information does not flow to the roots. The ICMI leadership will discuss dissemination via the website and other channels to reach out to more people.

Key Results of the past five CANP – reflection from the DG participants:
- Five regional mathematics education networks have been established
- Academic friendships were formed
- CANP made participants aware to get involved in academic events and research activities
- Participants from the same "poor" regions could meet and the workshop excluded the "richer" countries. Then they could share experiences on the regional level.
- Follow up activities and coordinated activities took place and new activities and meetings are planned (e.g. in Peru a national colloquium about mathematics teaching was held in August 2016, impulse came from CANP, Follow up for CANP 5 will be held in Ecuador in 2017, There will be follow up meeting for CANP 2 in Cali, Colombia in 2017.

- Most participants were very happy to have been able to participate in CANP and would like to participate in follow up activities.

Future CANP regions/ involving more countries into the network
Participants from Mozambique and Cameroon expressed interest in participating in CANP activities.

Before the session is closed many participants mention their appreciation to the organisers of CANP and thank in particular the local chairs and program manager. The opportunity to meet colleagues from the region was a wonderful experience for them and they hope that the support from the ICMI community will be continued (e.g. through joint research projects, joint meetings etc.) and that the five CANP Regional Networks will grow and expend to benefit mathematics education, not only for the CANP regions but include even more developing countries and regions.

The session is closed by Bill Barton who thanks everyone for contributing to the discussion and urges everyone to continue to conversation.

As a result from the survey and the discussion group it can be concluded that CANP 1-5 has resulted into the creation of five regional networks for mathematics education. Those networks request a vision/ statement from ICMI what will/ should be done with each of them. What is the vision from ICMI how to proceed with those networks and will ICMI stay involved in the existing CANP networks? It is recommended that the newly established networks should cooperate with existing networks who are stakeholders in mathematics education: teachers, mathematics educators, mathematicians, policy makers from governments and other interested parties like UNESCO, and ICSU. The members of the newly established networks should also get involved in further ICMI activities to become a part of the ICMI community: for example through participating in the Regional Conferences, at ICMI Studies, ICMEs, or activities of the ICMI Affiliated Organisations and Study Groups. Then the networks can play a significant role in building synergies across disciplines and crossing geographical boundaries. It is recommended to use face-to-face meetings, joint research projects but also exchanging information via websites and blogs, social media (WhatsApp, Facebook, Twitter), email and other channels to keep the new networks active.

The results of this discussion group will be integrated in the final CANP 1-5 review report, which will be used as an input for the ICMI EC to decide how to proceed with the CANP programme series. With limited resources and other eligible regions, it is critical to decide how best to spend the available resources to both ensure the funds already spent has maximum effect, but also to meet global responsibilities. The presentation about the CANP review given at the DG will be published on the ICMI CANP website.

List of Participants of the ICME 13 CANP Discussion Group

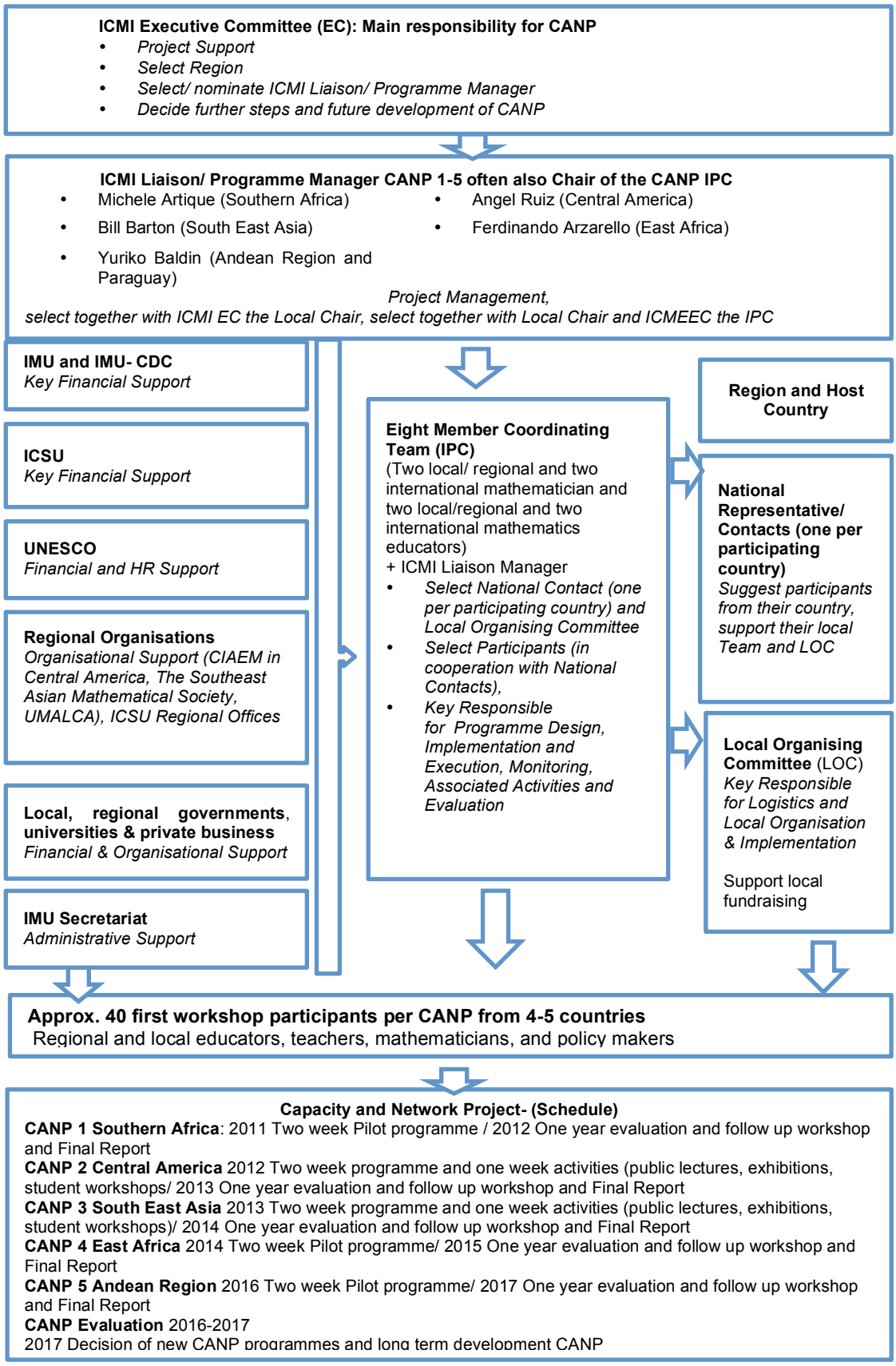
Last name	Given name	Home Country	Which CANP was participated/ involved?	Other role
Arnoux	Pierre	France	CANP1, CANP 3, CANP 4	
Artique	Michele	France	CANP 1, IPC CANP 5	
Arzarello	Ferdinando	Italy	CANP4, CANP 5	
Baldin	Yuriko	Brazil	CANP 5	
Bartolini Bussi	Mariolina	Italy		CANP supporter (helped organising participation of CANP participants in ICMI Study 24 Conference)
Barton	Bill	New Zealand	CANP 1-5	
Bijura	Angelina	Tanzania	CANP4	
Bunlang	Sunti	Thailand	Follows up CANP 3	
Changsri	Narumon	Thailand	CANP 3	
Cherinda	Marcos	Mozambique		
Chitera	Nancy	Malawi		Would like to participate in the next CANP
del Carmen Bonilla	Maria	Peru	CANP 5	
Diaz Chavez	Miguel	Mexico		
El Yacoubi	Nouzha	Morocco	CANP1	
Eneya	Levis	Malawi		
Fagilde	Sarifa	Mozambique		
Foupouagnigni	Mama	Cameroon		Hoping to participate in the next one
Grenier	Denise	France	CANP1	
Inprasitha	Maitree	Thailand	CANP 3	
Intaros	Pimpaka	Thailand	Follows up CANP 3	
Jaikla	Jitlada	Thailand	Follows up CANP 3	
Kanauan	Weerasuk	Thailand	Follows up CANP 3	
Kasoka	Dun Nkhoma	Malawi		
Kazunga	Cathrine	Zimbawe		Would like to participate in the next CANP
Koch	Lena	Germany	CANP-5	
Lin	Mongkolsery	Cambodia	CANP3	
Mamba	Florence	Malawi		Would like to participate in the next CANP
Mancera	Eduardo	Mexico	CANP1	IACME
Moonsri	Alisa	Thailand	Follows up CANP 3	

Mwadzaangati	Lisnet	Malawi		Would like to participate in the next CANP
Nasinsroy	Jatuporn	Thailand	Follow up CANP 3	
Njomgang Ngansop	Judith	Cameroon		
Ogana	Wandera	Kenya		CDC President
Osorio	Augusta	Peru		
Rakotondrajao	Fanja	Madagascar		
Ruiz	Angel	Costa Rica	CANP 2, CANP 5	
Sabino	Carlos	Peru	CANP 5	
Sangare	Mamadou	Mali	CANP1	
Sarungi	Veronica	Tanzania	CANP 4	
Scott	Patrick (Rick)	USA	CANP2 and CANP 5	
Thammanoonluk	Sukanya	Thailand	Follow up CANP 3	
Torres	Carlos	Peru	CANP 5	
Vallejo Vargas	Estela	Peru	CANP 5	
Zakaria Swai	Calvin	Tanzania		Would like to participate in the next CANP activity

Further involved stakeholder in CANP Evaluation Process

CANP 1	**CANP 2**	**CANP 3**	**CANP 4**	**CANP 5**
10 Participants	13 Participants	8 Participants	11 Participants	29 Participants
1 Member IPC	3 Members IPC	7 Members IPC	2 Members IPC and Local Chair Anjum Halai,	2 Members IPC and Local Chair Uldarico Malaspina,
Michele Artique, CANP Programme Manager, CANP 1-5 Review Committee Member	Angel Ruiz, CANP Programme Manager and Local Chair, CANP 1-5 Review Committee Member	Bill Barton, CANP Programme Manager, CANP 1-5 Review Committee Member	Ferdinando Arzarello, CANP Programme Manager, CANP 1-5 Review Committee Member	Yuriko Yamamoto Baldin, CANP Programme Manager
Abraham Arcavi	CANP 1-5 Review Committee Member	ICMI Secretary General		

Figure 11 CANP Organisational Process[28]



[28] This chart was developed by Lena Koch

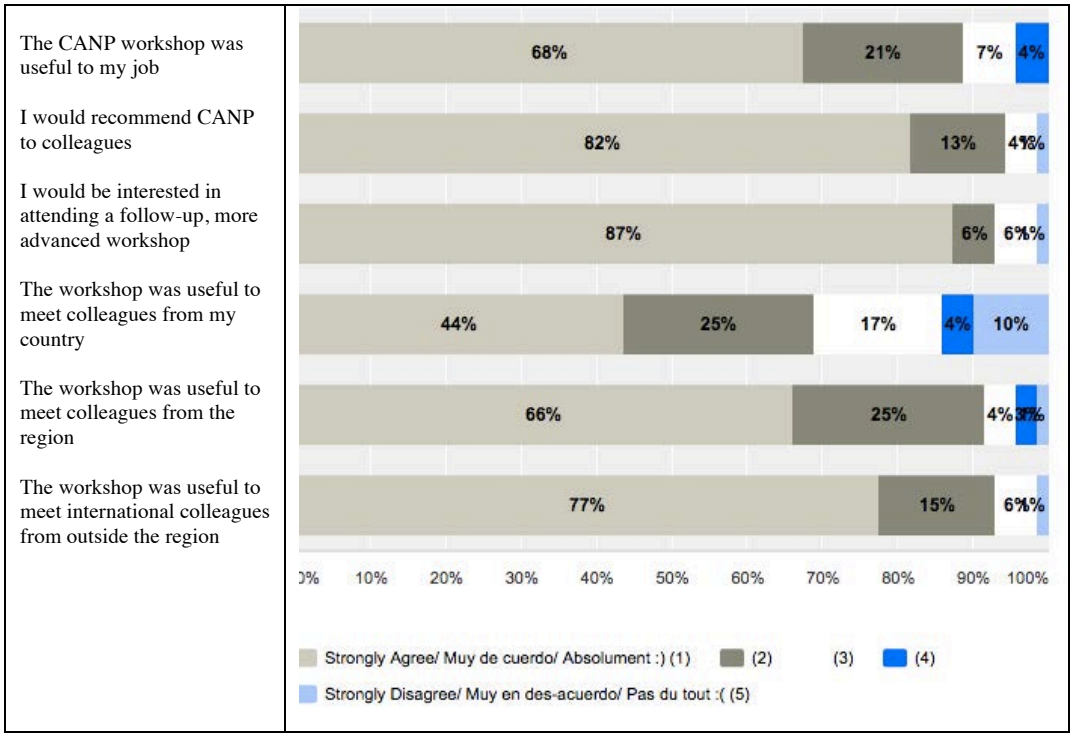
Appendix G Survey results
(selection: full results can be requested from the author)

Survey 1 Question 6:

Why did you participate in CANP? Please scale all items 1-5 (1= very much/ 5= not at all)

	Very much/Mucho/ Tout à fait (1)	(2)	(3)	(4)	Not at all/ absolutamente nada/ Pas du tout (5)	Total
To develop in a new thematic area or field	**39%** 26	**28%** 19	**19%** 13	**6%** 4	**7%** 5	67
To deepen my area of interest	**70%** 48	**17%** 12	**6%** 4	**6%** 4	**1%** 1	69
To get to know new teaching methods	**66%** 46	**17%** 12	**11%** 8	**4%** 3	**1%** 1	70
The meet colleagues from the region/ Para conocer gente en la zona/Afin de rencontrer des collègues de la région	**45%** 31	**22%** 15	**23%** 16	**4%** 3	**6%** 4	69
For professional development as a teacher/Por mi trayectoria profesional como profesor/Pour un développement professionnel en tant que professeur	**57%** 40	**23%** 16	**11%** 8	**4%** 3	**4%** 3	70
For professional development as a teacher educator/Por mi trayectoria profesional como preparador de profesoresPour un développement professionnel en tant qu'instructeur de profs	**53%** 37	**23%** 16	**17%** 12	**3%** 2	**4%** 3	70
For professional development researcher in math education/Por mi trayectoria profesional como investigador de la educación en matemáticas Pour un développement professionnel en tant que chercheur en formation de mathématiques	**53%** 36	**16%** 11	**18%** 12	**10%** 7	**3%** 2	68
To meet colleagues from outside the region/Para conocer gente de fuera de la zona/Afin de rencontrer des collègues au-delà de la région	**39%** 27	**29%** 20	**20%** 14	**7%** 5	**6%** 4	70
Chance to travel / Una oportunidad para viajar/ Afin de pouvoir voyager	**3%** 2	**7%** 5	**28%** 19	**19%** 13	**42%** 28	67
To improve my career profile/ Para mejorar mi curriculum/Afin d'améliorer mon profil professionnel	**21%** 15	**26%** 18	**20%** 14	**16%** 11	**17%** 12	70
To support cooperation in the region/ Para apoyar la cooperación en la zona/Afin de soutenir la coopération dans la région	**56%** 39	**31%** 22	**7%** 5	**3%** 2	**3%** 2	70
Because I was asked to attend / Porque me lo pidieron que lo hiciera/Parce qu'on m'a demandé d'y participer	**13%** 9	**12%** 8	**21%** 14	**15%** 10	**40%** 27	68

Survey 1 Question 9
In the following we list some statements regarding CANP. Please indicate To which extent you agree.



Survey 1, Question 11

Which methods/ ideas/ perspectives are you using?	
	Response Count: 37
answered question	**37**
skipped question	**34**
Number	**Response Text**
1	Méthodes participatives.
2	Jeux, objets traditionnels et artistiques
3	I was a presenter and use the contents I presented in my courses in Canada.
4	Making algebra alive, methods like Problem solving which was not clear to me before CANP4 The big idea I learnt during CANP4 is mathematics is NOT a dead subject it is ALIVE...
5	USE OF GEOGEBRA
6	Doing mathematics and reflection on the process,recreation maths through games and lesson study
7	Teaching methods like students based method
8	Games and puzzles, relating maths to real life, using IT to teach math.
9	- Game of Maths. - History of Maths.
10	The differs about education system in each country, national presentation, game, how to use calculator.
11	Lesson Study and Open Approach
12	Discourses in mathematics classroom
13	Connecting math education with living maths

14	The group also learned a work plan together, and reflect common practice.
15	Lesson Study and Open Approach, Problem Solving Approach, Research Ideas
16	les situations problèmes le travail en groupe l'intégration des tice (les logiciels tels que géogebra)
17	technological approach of teaching mathematics
18	Teaching Mathematics using ICT.
19	Resolución de problemas, modelación, aplicaciones, relaciones entre educación matemática y matemática, aspectos epistemológicos de la matemática y de la educación matemática
20	j'utilise beaucoup les vidéos sur l'espace, de même le logiciel géo gébra.
21	Méthodes participatives et collaboratives: partage des tâches et mutualisation des acquis.
22	TICE; Logique Algèbre
23	group work, improvisation, games,...
24	Specific Mathematics connections were very useful for curriculum design, specially now that our country is involved in a curriculum oriented to Mathematics competencies.
25	I am doing my PhD in Math Education following ideas that I get from the CANP
26	1. Me he estado interesando un poco más en conocer sobre la historia detrás de la matemática que enseño 2. El aprendizaje sobre competencias ha sido un importante componente que tengo presenta a la hora de analizar el currículum escolar. 3. Resolución de problemas. 4. Investigación de aula
27	Ciclos de Aprendizaje-
28	Aprender a ver con sentido, propiciado por Salvador Llinares.
29	Enfoque por resolución de problemas
30	Uso de recursos tecnológicos en cursos de geometría y cálculo. Estrategias matemático educativas o didáctico matemáticas.
31	Uso las tecnologías, la historia y uso de aplicaciones para motivar a mis estudiantes. He iniciado investigación en estrategias metodológicas en las clases de matemática para futuros profesores.
32	Uso e la historia de la matemática como recurso didáctico / Trabajo colaborativo / Desarrollo de una mirada profesional con los estudiantes de enseñanza de la matemática
33	Uso de tecnologías y de estrategias como el trabajo colaborativo en la enseñanza de la Matematica
34	Uso de la tecnología en la capacitación de docentes del nivel primario y las conexiones con otras áreas desde la matemática
35	teamwork, groups,prompting ... where i guide and advise learners to discover themselves the idea behind new topics/concepts that will help them in all day life problems.
36	Teaching mathematics through games and pazzles Maths and technology especially geogebra Maths and environment .etc
37	CONNECTING MATH WITH THE WORLD

Survey 1 Question 13

How CANP influenced your attitudes in teaching mathematics or in administration?	
Answer Options	**Response Count: 34**
answered question	**34**
skipped question	**37**
Number	**Response Text**
1	Les ateliers m'ont permis de découvrir d'avantage les richesses des nos cultures et le profit que nous pouvions en tirer. Les élèves sont plus disposer à apprendre en jouant ou en partant des activités rurales qu'ils ont l'habitude de faire.
2	By teaching it as the alive subject... Mathematics is life...
3	Gave me confidence to try geogebra in actual teaching
4	what i considered as challenges ,i use to encourage the learners to come up with solutions
5	It has helped me demystify mathematics to my learners thereby improving their level of interest and performance. It also assisted me complete writing my thesis for my MSc.
6	-
7	I have new way to teach about how to use calculator in math teaching, it's not just calculate as using in Thailand. I taught my students to make network.
8	Shift my way of teaching and learning in my job and let me better in affective dimension to my life.
9	it is usefull to share the experiment to the others. So that, I let my students have more chance to discourse in the Maths classroom.
10	I am more interested in connecting math education with living maths.
11	I applied the knowledge gained from Wrokshop used to teach classroom.
12	Collaboration and network can improve the educational situation in our region
13	l'utilisation de géogebra dans les démonstrations en géométrie. le changement de régistre dans la résolution des problèmes etc
14	I direct my students on how to learn and teach mathematics with new technology. eg the use of geogebra
15	très bien
16	Education is a fundamental tool of development of each country. The CANP enabled me to improve my teaching. It helped me improving practical activities done in class and in ICT lab. Learners are becoming more interested and more creative in Mathematics.
17	Me ha hecho profundizar la reflexión acerca de cómo debe formarse el profesorado que ha de enseñar matemáticas y me ayuda a trabajar en esta formación.
18	to have a better understanding of the work relationship between teacher and student
19	to be a better teacher
20	J'ai organisé le canp de 2012
21	i had used to link regional and our country interest with what we offer from lessons
22	I had the opportunity to involve a group of colleagues from my country which has been very valuable for curriculum design tasks. One of this persons is the head of the Mathematics area in the Ministry of Education and another is the head of the Mathematics education department of the largest public university in the country, for example; all others constantly participate in Mathematics education tasks of high impact in the country.
23	EL CANP me permitido ser un profesional con mayor sensibilidad sobre la historia, las dificultades de aprendizaje y la articulación de énfasis en esta disciplina, me ha ayudado a ser una persona más reflexiva sobre mi quehacer como docente y de esta manera estar en un aprendizaje continuo.
24	Ver la realidad de otros países que comparten los mismos problemas. La actualización y cada uno de los países comparte y divulgan lo que están realizando para ayudar en la enseñanza-aprendizaje de la matemática en los distintos niveles educativos
25	Generando nuevos recursos, materiales que le permitan a los futuros profesores reflexionar sobre su práctica, su conocimiento matemático y la manera de enseñarlo en las aulas de clase.

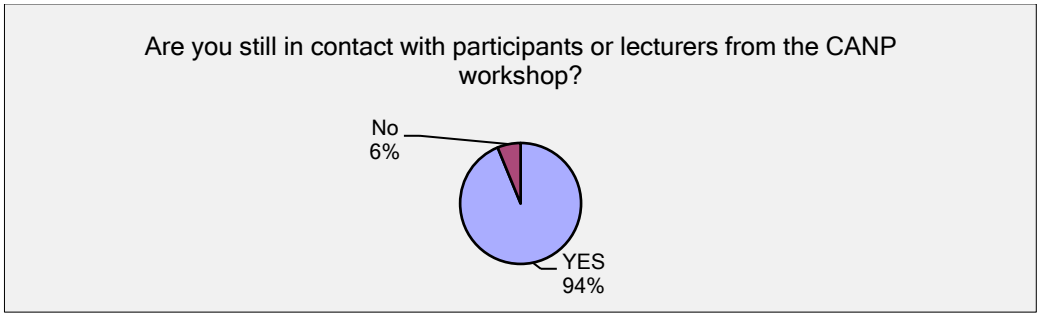
26	Integrando enfoque por resolución de problemas
27	Fortaleciendo nuestras prioridades en la formación de matemáticos y docentes de matemática.
28	El CANP me introdujo en el mundo de la investigación en educación matemática. Empece a leer más sobre el tema y a atreverme a realizar cambios en la forma de enseñar a mis estudiantes para profesores de matemática. Me hubiera gustado haber tenido la oportunidad de estar en un CANP siendo más joven.
29	Como formador de profesores, la teoría relacionada con el "professional noticing" o desarrollo de una mirada profesional, ha sido muy importante.
30	Al compartir con colegas y aprender más sobre el desarrollo de investigaciones en la enseñanza de la matemática
31	Soy mas receptiva e innovadora
32	the CANP helped in planing and choosing good areas of teaching what is applicable in real life of our learners.
33	First of all,after getting different skills from CANP, I like more my career of teaching and I enjoy it to day.
34	To date I do my best to link mathematical concepts/ principles to real life especially when I am writing textbooks for primary and secondary schools

Survey 1, Question 14

What were the major impacts of CANP for you and the way you function in your job?	
Answer Options	**Response Count 35**
answered question	**35**
skipped question	**36**
Number	**Response Text**
1	Les ateliers m'ont permis d'avoir une nouvelle technique pédagogique et d'être l'embassadeur de nos valeurs culturelles et celles des autres de temps en temps.
2	Change of altitude towards the subject Improvement of my teaching methods. Assessment of teaching and learning in classroom
3	Attending CANP 4 enabled me to convince the School in which I work to buy an overhead projector for use in class
4	I have a better insight on the learners behaviour and how to assist and involve them in problem solving
5	It made math very real and practical to me hence sharpening my skills in delivery as a teacher.
6	Major impact is networking, I want to be hub network in my University (Prince of Songkla University, in the south of Thailand).
7	I got new friends from our neighbour and bring to the network to work together. I got some ideas to make my class for a small research to understand the mathematics classroom.
8	I need to connect with my college in my country more
9	I have more colleagues in mathematics education field. We have shared teaching ideas.
10	Teaching techniques in Classroom.
11	I got the professional network in mathematics education in Sub Mekhong Region
12	le changement de méthode et technique d'enseignement, les contacts des formateurs de niveau supérieur
13	My approach to teaching mathematics changed and my interest in research on mathematics issues increased.
14	des nouvelles opportunités et relations
15	The CANP helped me and my students to be COMPETENT.

16	Tanto en mis clases como en mi labor investigativa ha tenido impacto.
17	it made me reflect of the mathematical education system in my country. It is necessary to invest more work in the optimization of math education in our countries.
18	using technology for selected problems
19	- Connaissances sur les structures, les programmes et les pratiques de formation d'enseignants en mathématiques de la sous-région Afrique de l'Ouest francophone. - Connaissances des problèmes communs à la sous-région ainsi que les problèmes spécifiques à chaque pays en formation des enseignants de mathématiques. - intégration des TICE dans la formation des enseignants de mathématiques; - Création d'un réseau de formateurs et de chercheurs en formation d'enseignants de mathématiques.
20	Travailler sur géogébra et organiser le canp de 2012
21	self-confidence in favor of delivering what we have
22	Through the CANP we were able to revive contact with Mathematicians of the region that then we invited to be professors in a MATH master degree program we created at the University.
23	I started to think about new topics in Math Education that are impacting that I am doing now.
24	Mejoramiento constante de las acciones que implemento, siendo un profesional metódico que cuestiona su quehacer y lo mejora. La reflexión constante se ha convertido en un hábito. El tema de competencias ha sido trascendental para aportar en procesos de mejoramiento de las Carreras que impartimos a través de las acreditaciones. Finalmente, el CANP me ha ayudado a comprender que, la matemática, la matemática aplicada y le educación matemática no son áreas completamente divorciadas ni compiten entre sí, sino que la articulación y las zonas ce confluencia son mayores de lo que uno imagina, por tanto, el trabajo diversificado y conjunto, es posible, solo se requiere la apertura y voluntad del profesional.
25	Seguimos realizando capacitaciones en los maestros y profesores, es uno de los puntos que compartimos en la conferencia por Panamá.
26	Me ha ofrecido otros marcos de referencia para producir materiales y, sobre todo, líneas de investigación y trabajo con futuros profesores.
27	Tomar conciencia de los métodos actualizados en la enseñanza de esta materia
28	En el mejoramiento de la visión regional de la educación matemática y las mejores alternativas de acción para el mejoramiento de la calidad matemático educativa.
29	El CANP fue decisivo al reconocer en mi la necesidad de leer y estudiar sobre educación matemática y a reconocer que aunque soy matemática pura, en realidad soy docente y como tal tengo una responsabilidad de enseñar y hacerlo bien, y eso requiere esfuerzo, trabajo, observación.
30	Me ha reforzado algunos conceptos matemáticos.
31	mejorar el rigor matematico en la enseñanza
32	Soy más diligente
33	irrespective of our country's education policy, i found team spilit and group working as fruitful of delivery from CANP
34	I said in previous questions. The first one, CANP taught me to connect maths with other subjects. The second to understand maths through nature. It encouraged me to update my knowledge through collaboration and making research.
35	As head of department in charge of teacher training colleges i am organizing training for teachers in active teaching methods. We are also reviewing curriculum towards competence based curriculum.

Survey 1 Question 27



Survey 1 Question 29

How often (are you in contact with participants or lecturers from CANP)?		
Answer Options	**Response Percent**	**Response Count**
Every month	51,6%	16
Every six month	29,0%	9
Once a year	19,4%	6
	answered question	**31**
	skipped question	**40**

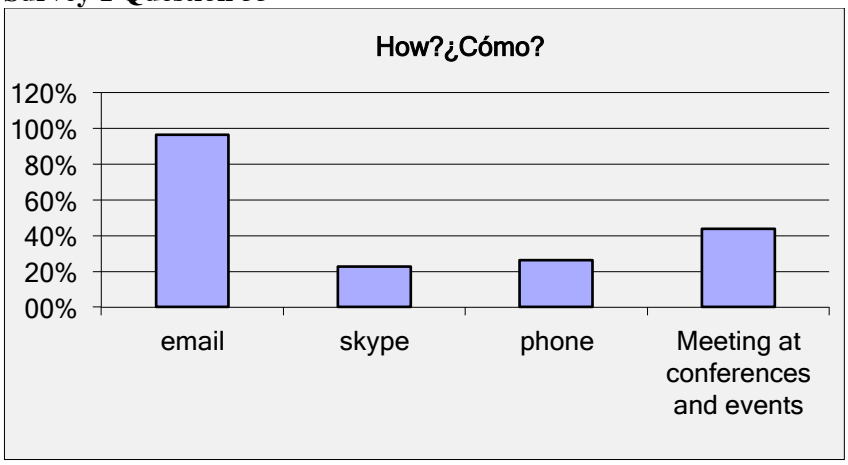
Survey 1 Question 30

With how many (are you in contact)?		
Answer Options	**Response Percent**	**Response Count**
1-5	67,7%	21
more than 5	22,6%	7
more than10	9,7%	3
	answered question	**31**
	skipped question	**40**

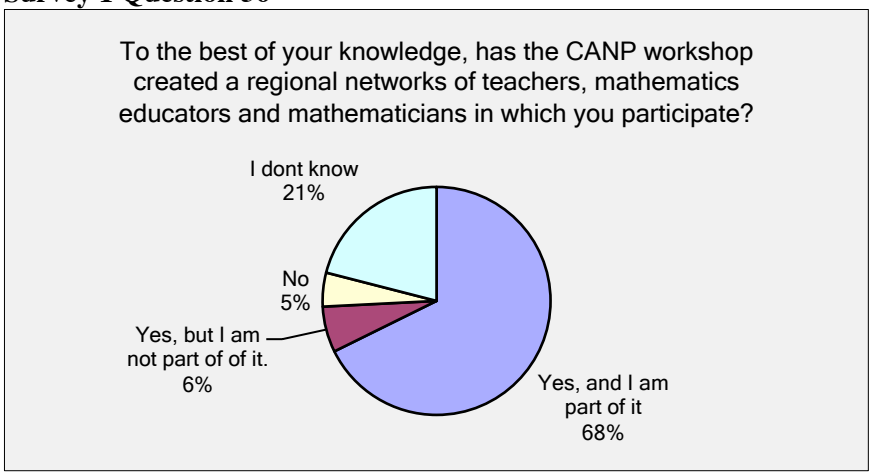
Survey 1 Question 32

From the region?		
Answer Options	**Response Percent**	**Response Count**
Yes	91,1%	51
No	8,9%	5
	answered question	**56**
	skipped question	**15**

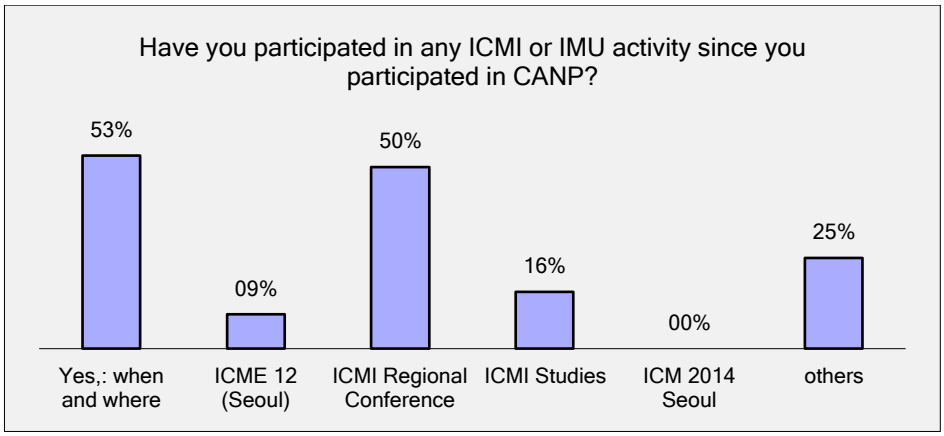
Survey 1 Question 33



Survey 1 Question 36



Survey 1 Questions 42



answered question	**32**
skipped question	**39**

Survey 1 Question 43

What did you most appreciate/enjoy/ think was best about the CANP workshop? (Please list two strengths)	
	Response Count 36
answered question	**36**
skipped question	**35**
Number	**Response Text**
1	échange avec les collègues sur la didactique des maths
2	Qualité des thèmes et qualité des participants
3	Good ambience among the participants.
4	Everything was quiet OK...
5	Application of mathematics to real life and comparing challenges faced and solutions adopted
6	the application of mathematics in real life
7	Sharing Mathematics for planet Earth and the mathematics puzzles and games.
8	1. Meeting international colleagues. 2. Exchange new method, new thought about teaching in century 21.
9	Friendship for young researchers. Guideline for improve teaching and learning Mathematics.
10	develop the professional job Improve the confidence
11	1. Good organization 2. Good content.
12	Exchange knowledge with education.
13	Friendship in the region and how to make the network, How to improve mathematics teaching and learning
14	les ateliers les contacts
15	the content of the conference was relevant to my profession and timely The organisation and lecturers were excellent
16	exposés et rencontres
17	The Organisation
18	La calidad académica y el intercambio con colegas.
19	Learning about the student-teacher relationship. Collaboration with researchers and math educators, in my country, Latin America and worldwide.
20	Presentation and workshop - Patrick Scott and Luis Radford
21	workshop of Louis Radford.
22	ateliers de formation des enseignants, utilisation des TICE...
23	- Le partage d'expériences dans le domaine de la formation d'enseignants de mathématiques; - La formation de réseau de formateurs et de chercheurs en didactique de mathématiques.
24	La qualité des débats et la collaboration
25	different methods, technology
26	The Mathematics courses were of high level and the professors and activities were excellent The possibility of making networks with Mathematics educators that face quasi-common problematic situations and challenges in the struggle to improve Mathematics Teaching and Learning
27	The lectures. New ideas that I learned there and that I have been able to explore later.
28	Los expositores fueron de muy buena calidad La logística del evento

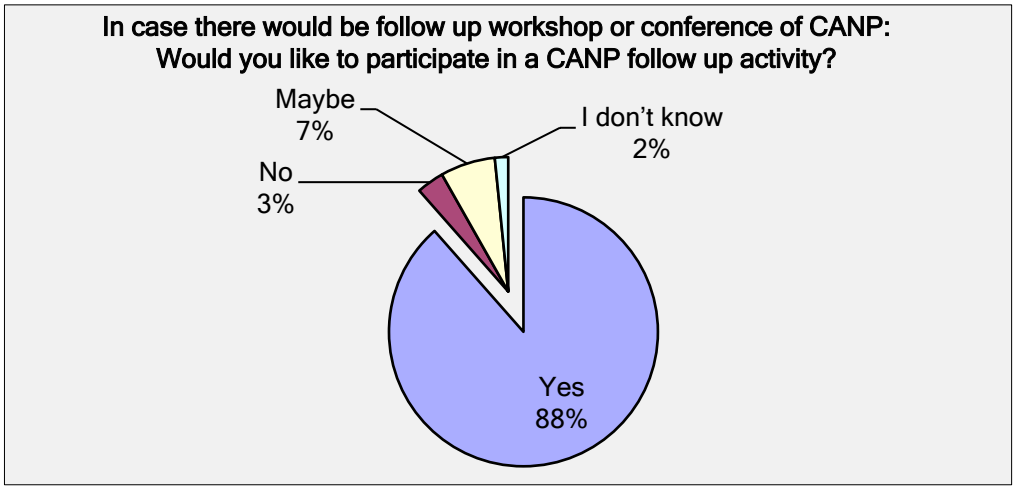
29	Interactuar con colegas, conocer la realidad de la formación matemática en otros países.
30	Intercambio con profesionales de otros países.
31	Las conferencias internacionales Los colegas de otros países y saber en lo que investigan
32	Alto nivel de los temas tratados. No se perdió tiempo, fue un horario intense de aproximadamente 12 horas diario
33	La experiencia de los expositores. El nivel de las conferencias y talleres
34	La calidad de los conferencistas
35	Organisation Topics to discuss Facilitators and lecturers Etc
36	workshops and lectures

Survey 1 Question 44

Please list two weaknesses of CANP/ Por favor indica dos cosas que no te gustaron del CANP/ S'il vous plaît, indiquez deux points faibles du CANP	
Answer Options	**Response Count: 31**
answered question	**31**
skipped question	**40**
Number	**Response Text**
1	manque de suivi non périodicité
2	It was difficult for many people to get funding to attend it.
3	Time arrangement for work was not enough. We had a very good program with some Professor who accepted to extent time out of the arranged time
4	Some areas required more time than what was assigned
5	the time for workshops was inadequate for the activities
6	Planning social events There was not enough time for interaction to build the networks.
7	continuous event and supporting leader in each country
8	None
9	not long time not in the classroom
10	There are different offical languages in region and some participants are not very good at English / common language.
11	Add in the discussions in each country, prior to sharing with regional groups.
12	Some participants can not continue to work as a member of network, There are limitation in supporting to involve the CANP member to join the follow up meeting or activity.
13	financement insuffisant et les interruption de longue durée
14	the time was short to cover the topics in details.
15	nombre de thèmes faible, suivi
16	Short time
17	No hubo nada que me causara molestia o disgusto.
18	je ne sais plus, cela date de longtemps
19	- la barrière de la langue de travail;

	- les difficultés liées à la réalisation des projets issus d'un CNAP
20	La période et on a beaucoup travaillé
21	no follow up to the onward of new decision and advices from CANP
22	I did not find any weakness
23	A few participants were not math educators.
24	Las actividades de seguimiento posterior al evento No a todos los que participamos se nos incorporó en el trabajo de los informes
25	deberían haber acciones más contundentes pos-CANP
26	-
27	El horario, no pude participar de todo dado que tenía que ir a dar clases.
28	el espacio físico muy pequeño. Faltó más tiempo para socializar con las demás personas.
29	algunas conferencias no tenían una aplicación práctica en la enseñanza de la educación secundaria
30	No certificant given to participants.
31	i don't see any weakness but challenges: language barrier for discussions. some participants especially from Rwanda were facing problems to express themselves in English. So their contribution was not really as i would like to see.

Survey 1 Question 47

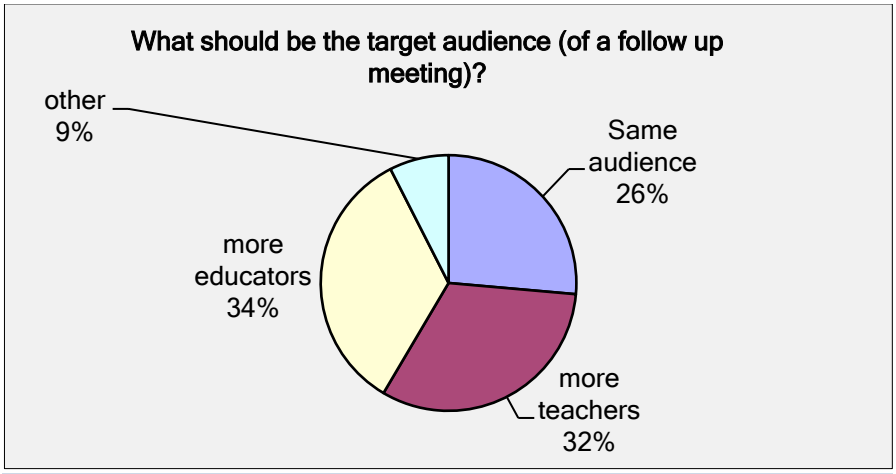


answered question	**61**
skipped question	**10**

Survey 1 Question 48

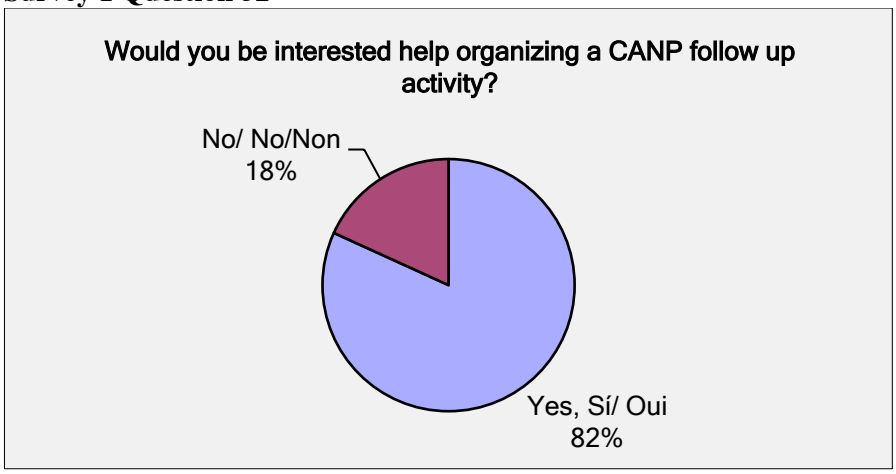
What should a CANP follow up be about? (Topics)	
answered question	**27**
skipped question	**44**
Number	**Response Text**
1	Quel enseignement des mathématiques pour la performance des apprenants et le développement de l'Afrique ?
2	Ideas, techniques, activities, and materials to teach specific content, and that can be used in the African context (overcrowded classes, lack of resources and budget...).
3	Finding out to see if teachers and teacher educators are implementing what they have learnt
4	COMPARING REGIONAL IMPACT AND IMPROVEMENT
5	Integers: theory and practice
6	21th century learning skills
7	Improve our teaching and learning and mathematics classroom.
8	Should we use discourse in teaching Maths
9	Knowledge application in practice.
10	Research activity, Conference, Workshop on how to implement some innovation in teaching and learning mathematics (concrete action).
11	les difficultés des apprenants en analyse
12	new topics in mathematics and an update on what has been done since the last conference or meeting.
13	Analizar el impacto que este tipo de eventos ha producido en los diversos países participantes-
14	Assessment of the work of the network
15	teacher training
16	-L'impact des éditions CNAP dans la région ou la sous-région - L'état des lieux sur la réalisation des projets issus des éditions CNAP
17	Enseignement des mathématiques et evaluation
18	new world problem solution
19	CANP should keep the Mathematics courses, Mathematics education research experiences and networking opportunities
20	How to create a network of researchers
21	Cualquier tema relacionado con Didáctica de la Matemática en cualquier énfasis, sería interesante, así como en investigación en este campo.
22	Acciones realizadas e impacto de ellas en la formación de profesores.
23	Metodología
24	Sobre temas de investigación en lo que trabaja cada uno y como colaborarnos unos a otros
25	Educación Matemática: Formación de formadores
26	Estrategias metodológicas. Resolución de problemas
27	Innovación tecnológica en la enseñanza de la matemática y modelaje

Survey 2 Question 49

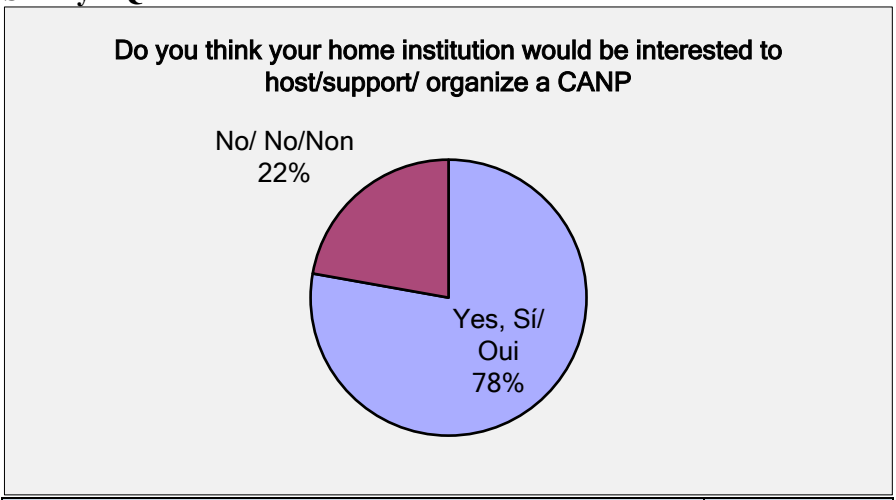


answered question	**53**
skipped question	**18**

Survey 1 Question 52

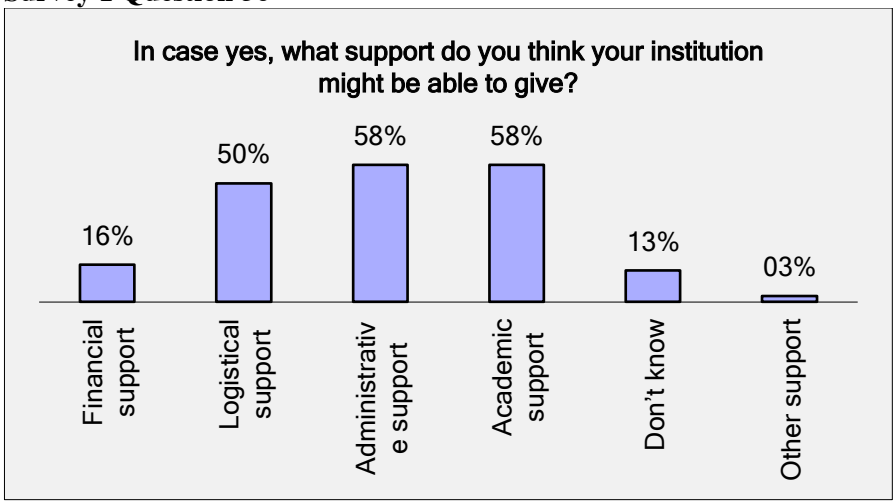


Survey 1 Question 55



answered question	**45**
skipped question	**26**

Survey 1 Question 56



answered question	**38**
skipped question	**33**