



STEMI Community of Practice Conference
2021 Conference Highlights Report



Theme:

STRENGTHENING THE IMPACT OF OLYMPIADS AND COMPETITIONS THROUGH COLLABORATIONS, PARTNERSHIPS AND COOPERATIVE OPPORTUNITIES

Contents

1. Executive Summary	3
2. Objectives of the Conference	4
2.1 Contemplated impact of STEMI Olympiads and competitions	4
2.2 The reach objective of STEMI Olympiads and competitions	4
2.3 Collaborations, partnerships and cooperative opportunities necessary for successful STEMI Olympiads and competitions	4
3. Conference Growth	4
4. Review and Editorial Process	5
4.1. Call for papers and proposal submissions	5
4.2. Screening of submissions	5
4.3. Pre-conference review	7
4.4. Post-conference review	7
5. Key Learnings from the Conference	7
5.1 Opening and keynote addresses	8
5.2 The conference proceedings	9
6. Conference Feedback	11
6.1 Conference objectives	17
6.2 Mode of conference	19
7. Conference Resolutions	19
7.1 Digital platforms	19
7.2 Development and training	20
7.3 Collaborations	20
7.4 Access	20
7.5 Advocacy	21
8. Challenges	21
9. Emerging Matters and Issues	22
9.1 Development of a Transformation Charter for STEMI Olympiads and related competitions:	22
9.2 Emerging concepts	22
10. Appendices	22
10.1 Video recordings and presentation	22
10.2 Monitoring and evaluation report	22

1. Executive Summary

The STEMI Community of Practice (CoP) Conference is a biennial conference that is dedicated to the advancement of the science, technology, engineering, mathematics, and innovation (STEMI) Olympiads and related competitions in South Africa by creating a community of practice where best practices are shared and benchmarked.

The fifth CoP conference was held from 20 to 23 July 2021 under the theme: “Strengthening the Impact of Olympiads and competitions through Collaborations, Partnerships and Cooperative Opportunities”. This is the first time that the STEMI CoP conference was hosted online.

Theme: “Strengthening the impact of Olympiads and competitions through Collaborations, Partnerships and Cooperative Opportunities”

The conference was well attended with 948 delegates from a number of institutions and organisations, including schools, science centres, provincial departments of education, government departments, science councils, Department of Innovation (DSI) entities, higher education institutions, and non-governmental organisations (NGOs).

Eleven academic and non-academic papers were presented under the following sub-themes:

- Contemplated impact of STEMI Olympiads and competitions
- The reach objective of STEMI Olympiads and competitions
- Collaborations, partnerships and cooperative opportunities necessary for successful STEMI Olympiads and competitions

The conference consisted of presentations of academic and non-academic papers, panel discussions, workshops and other forms of engagements. The presentations and discussions covered a range of topics, including issues around the development of science communication amongst learners through cooperative learning; issues around cyber security; and STEMI Olympiads and related competitions, such as coding and robotics, mathematics and project-based Olympiads and competitions. The drive towards digitalising some of the Olympiads and competitions also featured, as it had in previous engagements within the STEMI CoP.

From the feedback, one can conclude that the conference was exceptionally well received. Most delegates were from Gauteng, followed by the Western Cape. There is still disparity in terms of gender representation, and the majority of participants were male. This is a challenge that NRF-SAASTA need to address. The majority of participants were from government departments, followed by the higher education institutions (HEIs). Most participants indicated that the conference was engaging and created a good platform for sharing best practices, and that their expectations were met.

2. Objectives of the Conference

The objectives of the STEMI CoP based on its expected long-term outcomes are:

- To positively contribute towards a STEMI-driven culture
- To create a platform for collaborative problem-solving
- To act as a catalyst between people and organisations
- To facilitate the development of tools to improve the connection between science and society
- To assist in transforming innovative ideas and actions into benchmarked practices

The 2021 STEMI CoP Conference had three main objectives:

2.1 Contemplated impact of STEMI Olympiads and competitions

- Unpacking of the existing impact of Olympiads and competitions
- The potential impact of Olympiads and competitions

2.2 The reach objective of STEMI Olympiads and competitions

- Unpacking the present footprint of Olympiads and competitions
- The potential for expansion and participation of unreached areas, communities and schools

2.3 Collaborations, partnerships and cooperative opportunities necessary for successful STEMI Olympiads and competitions

- Unpacking the possibilities for working together between various stakeholder groups to advance the Olympiads and competitions

3. Conference Growth

The STEMI CoP has been growing since its inception in 2016. The conference had been running on an annual basis until 2019. From 2019 onwards, the conference has been running on a biennial basis. The highest growth of participants was noticed in 2021 and this could be due to hosting the conference online.

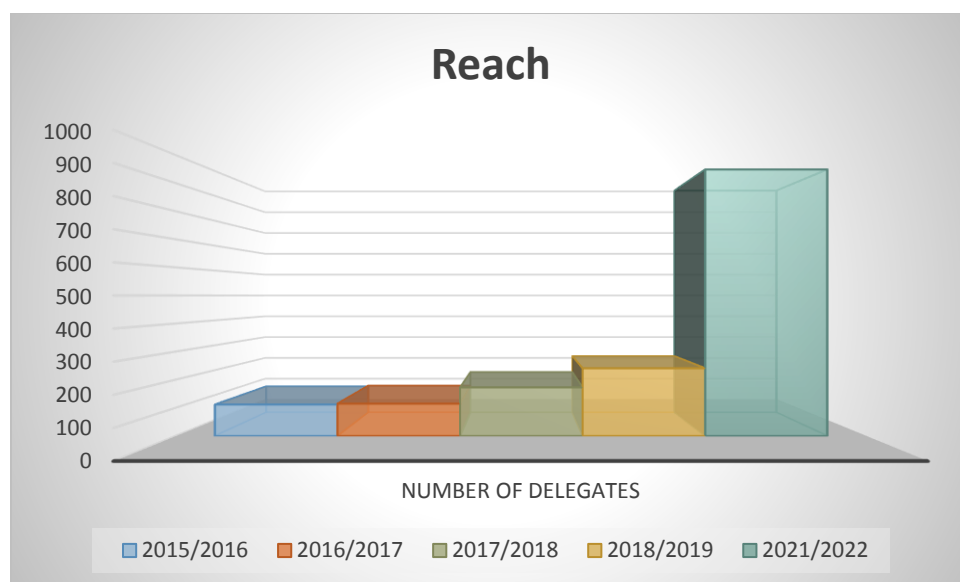


Figure 1: The growth of STEMI CoP Conference since 2016

4. Review and Editorial Process

4.1. Call for papers and proposal submissions

Date published and distributed: 19 December 2019

Closing date for submissions: 30 October 2020

Number of submissions: A total of 31 proposals were received

Categories	Number of Submissions
Academic	05
Non-Academic	15
Demonstration	11

4.2. Screening of submissions

During the screening process of proposals, one academic submission was re-categorised and was assessed as a non-academic proposal. One submission (non-academic) did not meet the requirements and was subsequently omitted from pre-conference review process.

The following proposals were accepted:

Title of the Paper	Name of the author(s)	Category
A comparative analysis of approaches to the assessment of problem-solving activities	Dr A Stott (University of Free State)	Academic
The response of low quintile South African learners to a problem-based programme for developing skills relevant to the Expo for Young Scientists competition;	Dr C Long (University of Johannesburg)	Academic
An exploratory analysis of the potential for the use of MOOCs in support of STEM engagement	Dr P Gouws (UNISA) Prof H Lotriet (UNISA) Dr M Katumba (UNISA)	Academic
How mathematical challenges can improve non-routine problem solving in learners from lower quintile schools.	Ms M Trichardt (MG Analytics)	Non-Academic
Beyond the rhetoric: Rethinking reach and access of Olympiads and competitions for rural learners	Ms K Naidoo (Eskom Expo for Young Scientists) Ms N Dookie (Eskom Expo for Young Scientists) Ms D Mlambo (Christoph Meyer Science and Mathematics Centre)	Non-Academic
Exploring gender and robotics - A case study of the I-SET Robotics, a community engagement project	Dr T Dirsuweit (UNISA) Dr P Gouws (UNISA)	Non-Academic
Do STEMI Olympiads and competitions enhance inquiry learning in the curriculum and prepare learners with C21 skills?	Mr L Manas (Eskom Expo for Young Scientists) Mr D Haripersad (Western Cape Education Department)	Non-Academic
Extending the reach of STEMI Olympiads and competitions through systemic interventions: Reflecting on the collaboration between the North West Provincial Department of Education and Eskom Expo for Young Scientists	Ms M Moloedi (Eskom Expo for Young Scientists) Ms S Mekgwe (North West Department of Education)	Non-Academic
Preparing learners for STEMI competitions: A case study of a collaborative online approach	Dr T Reinhardt (University of Kwa-Zulu Natal) Ms N Dookie (Eskom Expo for Young Scientists)	Non-Academic
Using environmental education to prepare learners for STEMI Olympiads and competitions in a transformational manner	Mr A Schlemmer (Eskom Expo for Young Scientists) Ms CL Cloete (Wildlife & Environment Society of South Africa)	Non-Academic
Developing a language of science through cooperative learning in a rural grade 11 Life Science classroom	Mr A Obilana (PRAKIS Educational Services)	Non-Academic
Collaboration is more than working together towards the same goals.	Mr A Schlemmer (Eskom Expo for Young Scientists) Mr F Mashate (Scifest)	Non-Academic
The response of low quintile South African learners to a problem-based programme for developing skills relevant to the Expo for Young Scientists competition	Dr A Stott (University of Free State)	Non-Academic
The role of print and digital media in transforming Olympiads and competitions: A report on the significance of the reach by Eskom Expo for Young Scientists' activities	Mr I Marume (Eskom Expo for Young Scientists) Mr JeVanne Gibbs (Eskom Expo for Young Scientists)	Demonstration

Cyber safety awareness for teachers	Prof E Kritzinger (UNISA)	Demonstration
GeoGebra Classroom for post-COVID mathematics learner support over distance	Prof W Olivier (Nelson Mandela University)	Demonstration
When mathematics meets art	Ms C Steyn (Nelson Mandela University) Prof W Olivier (Nelson Mandela University)	Demonstration
A framework for designing and communicating experimental investigations for the Expo for Young Scientists competition	Dr A Stott (University of Free State)	Demonstration
Rural robotics clubs are possible.	Mr F Spies (Split Second Science)	Demonstration
Toys from trash - using online platforms to prepare learners for competitions	Dr T Reinhardt (UKZN – Science and Technology Education Centre) Mr C McCartney (Eskom Expo for Young Scientist)	Demonstration

Table 1: 2021 STEMI CoP Presentations

4.3. Pre-conference review

Twenty-nine submissions were subjected to a double-blind review process. A panel of reviewers, which consisted of independent experts from various institutions with different expertise in STEMI fields and with full involvement in science engagement activities (particularly in science education), conducted the process. The reviewers were provided with a detailed review guideline to conduct the review. All reviews were consolidated by the editorial team, which was led by the conference editor to provide authors with feedback based on their submission. Twenty submissions were recommended to be presented at the conference and nine were declined.

4.4. Post-conference review

Similarly to the pre-conference review, the post-conference review was also a double-blind peer review, but the process differed slightly as it comprised the review of full-length academic articles. Only one article titled, *An exploratory analysis of the potential for the use of MOOCs in support of engagement*, was subjected to this process.

5. Key Learnings from the Conference

The following outlines the key learnings from the conference plenary sessions, presentations, and breakaway sessions.

5.1 Opening and keynote addresses

In his background talk about the Olympiads and competitions movement in South Africa, Mr Moloko Matlala from SAASTA indicated that the conference needs to focus on four critical issues: digitisation and digital literacy; participation from more schools; enhancement of soft skills; and sustainability.

Dr Beverley Damonse, NRF Group Executive of Science Engagement and Corporate Relations, indicated that the NRF aims to strengthen science and promote a scientifically-literate and practically-engaged society. The development of and support to talented young people is key.

Deputy Minister of Higher Education, Science and Technology, Buti Manamela, in his official opening address, focused on the critical importance of getting more young people engaged and interested in STEM. The whole country must be considered, including rural and disadvantaged areas and provinces. He also emphasised the need for professional bodies to become more engaged in supporting learning.

In his keynote address, Dr Kristof Fenyvesi from the University of Jyväskylä in Finland, emphasised an integrated approach and used the term science, technology, engineering, **arts** and mathematics (STEAM). This doesn't emphasise arts such as the fine arts of drawing, painting or sculpting, but rather artistic endeavours in the arts in general.

This approach has an exciting and potentially wide impact. He has worked in the Western and Eastern Cape and his talk drew on South African examples of young people, their ideas and insights. There are growth possibilities for South African education and used words such as 'procreativity', 'pro-ecologies' and 'prosociality', which together mean the attitude of everything for the society. The way in which we learn needs to be integrated and cross-supportive. The cooperative core learning is central.

A second keynote was delivered by Mr Abri Hoffman on behalf of Dr Mmaki Jantjies, a former Professor at University of Western Cape and now head of innovation and transformation at Telkom. Her talk was entitled: "The role of youth in technology: reshaping our digital future". There are gaps in the use of technology in schools and factors of affordability and training are generally known. Lack of access to mobile devices and WIFI, lack of technology skills, and lack of knowledge of how to support learners are further concerns. The teachers need to drive innovation, as technology does not drive innovation.

Director of Science Promotion, Mr Isaac Ramovha, highlighted the importance of transformation and inclusivity in STEMI Olympiads and competitions. There is a need for a common approach to inclusivity. Transformation is about changing the nature of the way things are currently done and including previously excluded communities. Under the present conditions (COVID-19), we have resorted to digital solutions. Yet, as many young people do not have access to these advantages, their learning suffers and the situation worsens.

Three levers identified:

1. Increase participation of learners; increase awareness of the role of STEMI Olympiads and competitions – so that more young people see the benefits of these activities.
2. Broaden the inclusion of quintiles 1 to 3 schools – fast track bridging the gap between advantaged and disadvantaged young people.
3. Organise the activities focusing on the existing school district boundaries to extend the influence and impact.

There is a need to acknowledge the language diversity and consider this in drawing more people into the STEMI CoP.

The DSI will need to take the lead in being the champions of transformation and inclusivity. In this regard, a new Transformation Charter for STEMI Olympiads and competitions needs to be adopted and reported upon to see if it is working.

5.2 The conference proceedings

The proceedings of the conference were based on the three sub-themes. A summarised version of the proceedings is outlined below:

5.2.1 Contemplated impact of STEMI Olympiads and competitions

- Olympiads and competitions can contribute to improving the confidence of learners and, ultimately, their academic ability.
- Various skills can be developed through Olympiads and competitions, especially soft skills.
- Teachers can increase their confidence in teaching STEM subjects by involving themselves in Olympiads and competitions.
- The training provided through Olympiads and competitions should be South African Council of Educators accredited.
- Olympiads and competitions need to be developmental.
- Olympiads and competitions can go beyond the formal curriculum, to stimulate, grow interest, engage and enlighten learners so that they want to explore more than what is offered in the classroom.
- An aspect of fun in the activities needs to be considered.

5.2.2 The reach objective of STEMI Olympiads and competitions

- The language barrier is real.
- The use of community structures can assist in reaching rural learners.
- There is a need to engage more than just the top performers.

- There can be a multi-level approach from school, circuit, district, region, province and national levels.
- With a structured support programme, e.g. coaching and mentoring, participants can be developed from the basic/starter level.
- Competitions should be used for developing learners, even if they do not win. The lack of winning is preventing participation. Opportunities should be opened up to all learners to develop various skills.
- Subject advisors should be capacitated to enable them to provide support to teachers who are keen and willing.
- Resources should be increased to support the rural school/teacher/learner. Resources should be provided in a more equitable way across the schooling system.
- Schools can give recognition to learners and teachers for participation.
- Science clubs can be very useful in getting teachers and members of the community involved in assisting the learners. Science clubs can host/organise mini competitions by starting a local league.
- The content should be more inclusive – the guides should be translated into local languages, - partnering with local universities to assist.
- Libraries can be used to assist with community-driven programmes e.g. access to internet.
- The benefits for teachers in facilitating participation of learners must be communicated well, so that teachers can be aware of such benefits.
- Accessibility can be expanded by translation into sign language and the involvement of learners and schools for special needs.
- The use of a calendar of events drawn up with the Provincial Education Departments will assist in increasing participation.
- Targeted interventions will be far more effective than broad, unfocused activities. Special emphasis or targets can be placed on girls and disadvantaged groups.
- Partnerships with professional bodies are crucial for support and development.
- School management teams have a role in advancing the Olympiads and competitions objectives.

5.2.3 Collaborations, partnerships and cooperative opportunities necessary for successful STEMI Olympiads and competitions

- There are many stakeholders with various programmes.
- There is a need to work together and a national strategy/plan will assist in boosting collaborations.
- Organisations feel isolated in spaces where there are already others in partnerships.

- There is a need to improve the university–school relationship. Training can be provided by universities, especially those with science centres. An improved ‘open-door’ policy between universities and school should be developed.
- There is a gap in the involvement of local businesses. These can become involved with local schools in different ways – funding may be in the form of cash or kind.

6. Conference Feedback

The following figure outlines the country/province of the delegates who attended the conference. The figure is based on information provided during the registration. 642 delegates indicated the province/country from which they were joining, and 306 delegates did not specify the province/country from which they were joining.

Croatia	1
East Java	1
Eastern Cape	73
England	1
Finland	1
Free State	37
Gauteng	188
Kenya	1
KwaZulu-Natal	67
Limpopo	70
Mpumalanga	58
Namibia	2
Nigeria	2
North West	21
Northern Cape	28
Western Cape	90
Zimbabwe	1

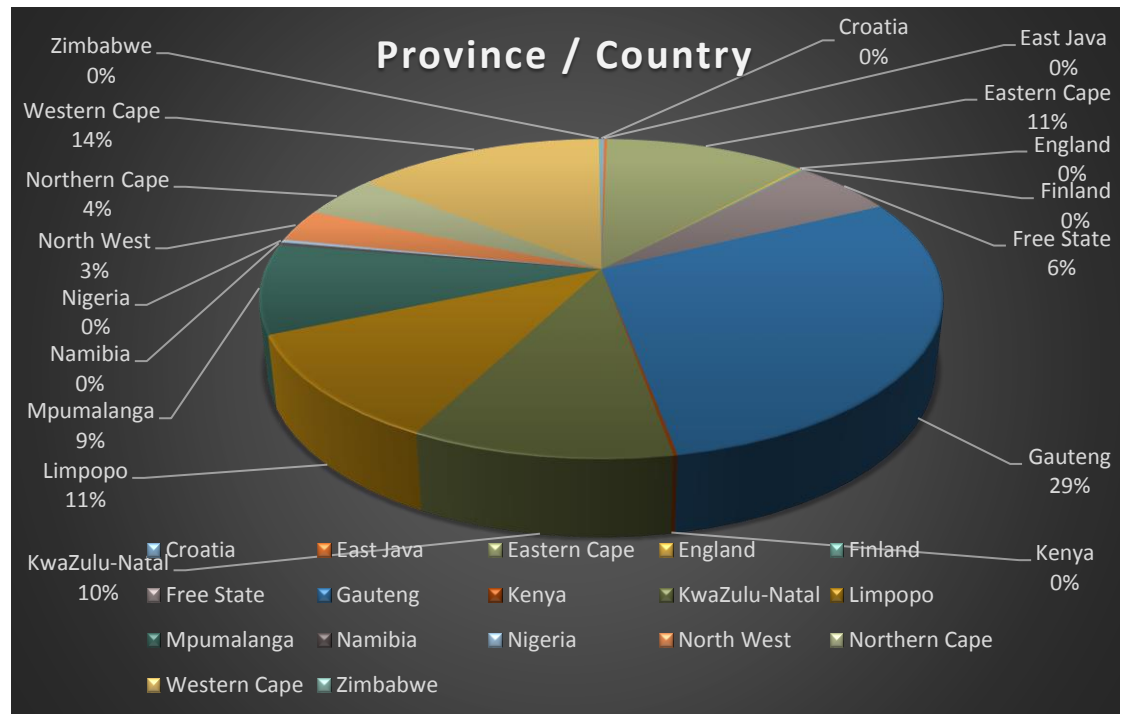


Figure 2: The number of participants per province in South Africa and beyond: 2021 STEMI CoP

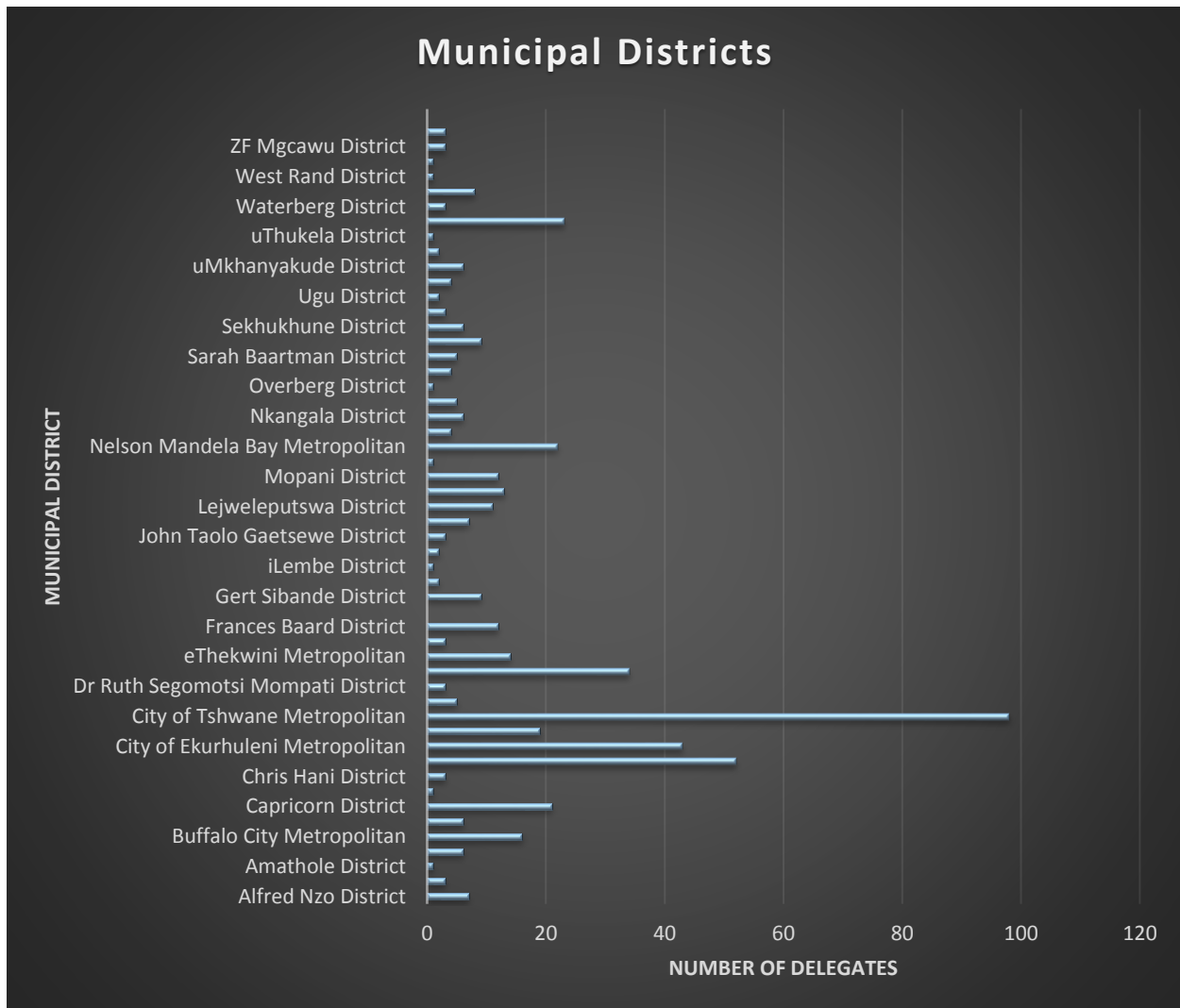


Figure 3: The number of participants per municipal district in South Africa: 2021 STEMI CoP

Table 3 below outline the different sectors that participated in 2021 STEMI CoP conference

SECTOR	Higher Education Institutions	Government Departments	Olympiads Competitions Organisers (ASTE MI)	Science Centres	Science Councils and National facilities
NUMBER	25	4	14	18	16
ORGANISATIONS					

Other sectors that participated in the conference included non-governmental organisations, associations, private companies, professional bodies, teacher unions, IT and communications sectors and etc.

Below is a table with the names of the organisations and institutions delegates registered from:

7570 Robotics	Kabba College of Agriculture, Ahmadu Bello University	Rosmead Central Primary School
ABSA Collections	Katlehong Engineering School of Specialisation	Ruabohlale Secondary School
Academy of Science of South Africa (ASSAF)	Kgalatlou Technical High School	SAMO
Academy Private School	Kgwaditiba Primary school	SAMS
Aduro Holdings	Khulumani Primary School	SAROC
African Angels School	Kimberley Boys High School	Sci-Bono Discovery Centre
African Institute for Mathematical Science	Kindness of Trading and Projects	STEC@UKZN
African Youth Ignited 4ir	King David Linksfield Primary School	Science Centre Kenya
Agricultural Research Council	Kobe Primary School	Science Stars
Alex Mampana Primary	Kwambonambi Primary School	Sci-Enza, University of Pretoria
AMESA	KwaZulu-Natal Museum	Scifest Africa
AMSA Science Centre	Laerskool Alma	Seetla Primary School
Anton Lembede Mathematics, Science and Technology Academy	Laerskool Bloemfontein	Segwaelane Primary School
ArcelorMittal Foundation NPC	Laerskool Witpoort	Sekampaneng Primary School
ArcelorMittal Foundation Saldanha Science Centre	Lasec Education	Seyisi Primary School
ArcelorMittal Science Centre Newcastle	Lebeko High School	Shark Spotters
Are-Itshokeng Primary School	Lejweleputswa Education District	Sifunindlela Primary School
Ashton International College Ballito	Lerato Primary School	Sinako High School
ASSET	Leseding Technical.Secundary.School	Siphamandla Primary School
Association for Educational Transformation	Letsibogo Primary School	Sithokozile Secondary School
BCR community radio	Liberty Community School	Sivumelene Secondary School
Bedfordview High school	Libhaba Primary school	SKA
Berlin High School	Limpopo Fablab	SMD Technologies
Bhovungane Senior Primary School	Living Maths	SMPN 1 Karangploso
Bohlabela District	LTL Robotics	Socio Economic Development Company
Boitekong Primary School	Mabule Primary School	Sol Plaatje University
Boitjhorisong resource centre	Mabushe High School	Solidariteit Skoleondersteuningsentrum (SOS)
Bokamoso Science and Technology Education Centre (BOSTEC)	Madibatlou School	Solomon Mahlangu Senior Secondary.School

Bokantsho Primary School	Madibaz Radio	Solvista Secondary School
Bokgoni Technical Secondary School	Magangeni Primary School	Soqhayisa Senior Secondary School
Bonwa_ Udi Primary	Makhathini Primary School	Sotobe Ally Investments
Botsebotse Secondary School	Malemati Primary School	South African Council for Project and Construction Management Professions
BSG and Technologies	Maloti Secondary School	South African Democratic Teachers Union (SADTU)
Calvin College	Mamabolo Primary School	South African Institute for Aquatic Biodiversity (SAIAB)
Camalaxa Secondary School	Mamoratwa Middle School	South African Institute of Physics (SAIP)
Cape Peninsula University of Technology	Mandela Bay Development Agency	South African Mathematics Foundation (SAMF)
Cape Town Science Centre	Mangosuthu University of Technology	South African National Botanic Institute (SANBI)
Cape Town Studies and Tours	Mankuroane Technical & Commercial Combined School	South African National Space Agency (SANSA)
Cape Winelands Education Department	Mapala Combined School	South African Nuclear Energy Corporation (NECSA)
Capricorn Expo Region	Maqamela Primary School	South African Science Olympiad
Carleton Jones	Marematlou Training Institute	Southern African Radiation Protection Association (SARPA)
Cedar House School	Mariadze Primary School	Sozama Secondary School
Centenary Secondary School	Masia Maths and Sciences Academy	Split Second Science Education Foundation
Central University of Technology	Matena Trading and Projects 42 cc	St Andrews School for Girls
Charlotte Maxeke School	Maths & Science Leadership Academy	St Barnabas School of Specialisation
Christoph Meyer Maths and Science Centre	Matshana Primary School	St Enda Secondary School
CodeABot Robotics and Coding Centre	Mbekweni Primary School	St John R.C Primary School
CodeMakers - SuperScientists	Mbuduma Secondary School	St Johns Road Primary School
Cophetsheni Primary School	MC Weiler Full Service School	St Mary DSG Pretoria
Cornwall Hill College	Mehleketo Primary School	St Paul Primary School
Council for Scientific and Industrial Research (CSIR)	Merrifield College	St Stithians College
CTU Training Solutions	Metro South Education District	Stanza Bopape Secondary School
Curro	MG Analytics	Stephen Nkomo Primary School
Curro Langebaan	Midstream MindStorms	Steps Academy
Dale College Boys High	Mjindi Secondary School	SUBS Robotics Hub
Delta Primary School	Mkhephuli Secondary School	Tharabollo Secondary School
Department of Basic Education	mLab	Thomas Nhlapo Primary School

Department of Infrastructure Development	Mogologolo Primary School	Thomas Ntaba Secondary School
Department of Science and Innovation	Moipone Science Academy	Thuma Mina Teaching (WCED)
Department of Water and Sanitation	Mount Frere Senior Secondary School	Thusong Technologies
Digititan	Mpephose Secondary School	Tshireletso Secondary School
Dlomdlomo	Mphokaneng Primary School	Tshirologang Primary School
DSEDC	MSED	Tshituni Primary School
DSG Junior	Mulilo Maths Program	Tsholetsega Primary School
Duimpie Preprimay/Laerskool Bfn	Muyexe Primary School	Tshutshutshu Secondary School
Durban University of Technology	MyTutor.chat	Tshwane Christian School
Edge Training	Nabio Consulting	Tshwane University of Technology
Education and Teacher Training Agency	Nagari Primary School	University of Fort Hare
Educational institution - Roshnee Sec.	Nakedi-Kobe	Ugu TLS-FET
Ekudubekeni High School	NAPTOSA	UJ Metropolitan Academy
Emang Mmogo High School	National Research Foundation (NRF)	Umbonje High School
Emmanuel	Nchafatso Primary School	UMkhanyakude Science and Maths Centre
Eskom Expo For Young Scientists	Ncotshane Primary School	Umtata High School
Eunice High School	Ncweng Primary School	Umzimvelo Secondary School
FIRST South Africa	Nelson Mandela Provincial Teacher Development Institute	Unite Siyafunda
Florapark Comprehensive Primary School	Nelson Mandela University	University of Botswana
Franciscan Matric Project	Nelsville Combined School	University of Cape Town
Free State Empowerment & Investments	Ngema Primary School	University of East Anglia
Gamble Street Secondary School	Ngubezulu Primary.School	University of Johannesburg
Gateway	Nhlengelo Primary School	University of Jyväskylä
Gavaza Primary School	Nkangala FET Curriculum	University of KwaZulu-Natal
Gekombineerde Skool Ogies	NkaThuto Edu Propeller	University of Limpopo
Gene Louw Primary School	Nkomazi Mathematics and Science Centre	University of Limpopo Science Centre
Giyani Science Centre	Nomsa Mapongwana Primary School	University of Mpumalanga
Golden Future Project	Nonoti Primary School	University of Pretoria
Golden Grove Primary School	North West University	University of South Africa
Govan Mbeki Mathematics Development Centre (GMMDC) at Nelson Mandela University	Northern Cape Innovation Forum (Sol Plaatje University)	University of Stellenbosch

Government department	Noxolo Primary School	University of the Free State
Grahamstown Foundation/Scifest Africa	NRF-iThemba LABS	University of The Witwatersrand
Greater Tzaneen Community Foundation	NRF-SAAO	University of Venda
Groblerstroom High School	NRF-SAASTA	University of Zululand Science Centre
Hazendal Primary School	NRF-SAEON	Uolands
Hazyview Comprehensive	NRF-SARAO	Vaal University of Technology
HLS Oakdale / RSFD Eden Karoo	Nsikayethu Comprehensive School	Vaaltar FM
Hoerskool Bultfontein	Nuclear Industry Association of South Africa	Vergenoegd Primary School
Hoerskool Diamantveld	Number Sense	Villa Liza Secondary school
Hoerskool President High School	O.R.Tambo MST Academy	Vongani Primary School
hopeville Primary School	Olehile Manchwe Intermediate School	Vuleka SSB High School
Hz	Palabora Foundation	Vuswani Science Resource Centre
Huguenot High School	Pampierstad High School	Wallacedene Primary School
ICT SMME Chamber	Panorama Primary School	Walter Sisulu Enviromental Centre
Ifalethu Primary School	Papong Primary School	Warrenton Public Primary School
Ikgomotseng Primary School	PAX	Waverley Girls High School
IMT	Penreach Shalamuka STEAM Center	Western Cape Sport School
Independent Community Authority of South Africa (ICASA)	Percy Mdala High School	Willowrdige High School
Independent Mathematics Coach	Prakis Educational Services	Woodhill College
Infinity	Primary Science Programme	Woodview Primary School
Infinity Destiny	Pudulogo Primary School	World Robot Olympiad
Inkomati-Usuthu CMA	QuantumCrayon	WRC-GEP(Unisa iNANO-WS)
Institute Status Acres Secondary School	Radio Riverside	Ximixoni Primary School
I-SET	Rasebilu primary school	Zamazisa Primary School
Ithembelihle Technical High School	Ratshisase Secondary School	ZANCI JSS
Jan van Riebeeck High School	Reachout	Zingisa Comprehensive High School
JeppeHigh Preparatory	Realogile High School	Zola Business High School
JNF Walter Sisulu Environmental Centre	Refentse Primary School	Zwelethemba High School
Johannesburg City Parks and Zoo	Reitlamile Intermediate School	
Johannesburg Polytech Institute	Renewable Energy Empowerment Services Company	

Johnson Nqonqoza Secondary School	Ricketts
-----------------------------------	----------

Table 4: Institutions and organisations who participated in the 2021 STEMI Conference

6.1 Conference Objectives

In the following **figure 4** are the responses of participants regarding whether or not they were aware of the conference objectives. 83.33% of the participants indicated that they were aware and only 16.67% were not aware.

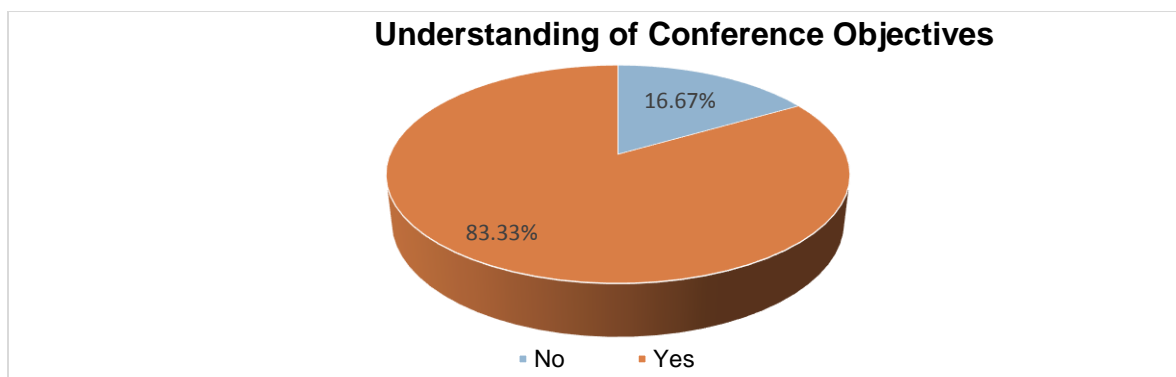


Figure 4: Understanding of Conference Objectives

Participants were also asked to consider each objective presented and indicate whether the conference addressed the objective appropriately. **Figure 5** below presents a positive response of participants understanding the objectives and that the conference addressed the objectives.

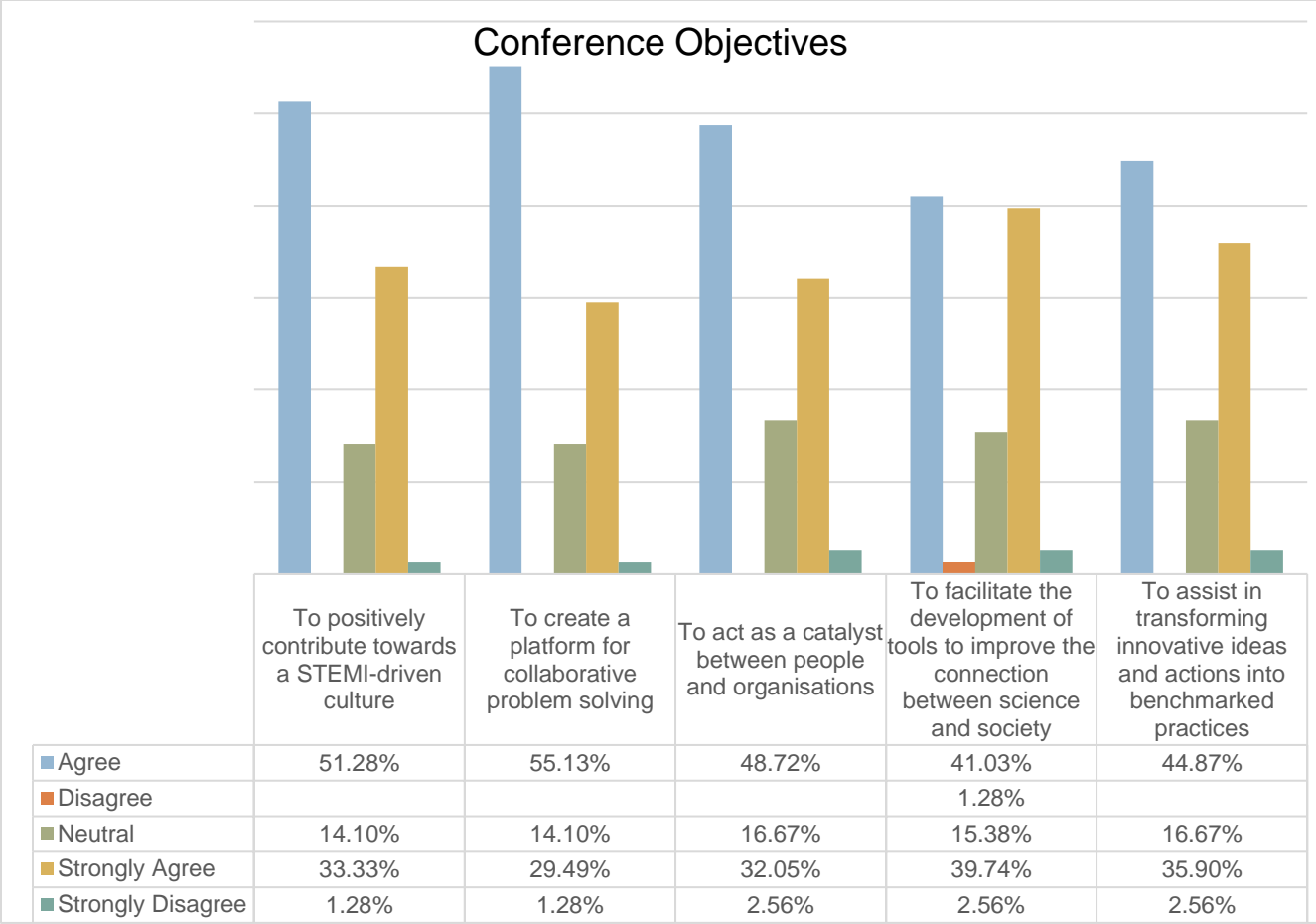


Figure 5: Conference Objectives

The above **figure 5** further indicates that 51.28% of participants consider the conference to have contributed positively towards a STEMI-driven culture and 33.33% strongly supported this statement. Under the objective to create a platform for collaborative problem solving, 55.13% positively supported the fact that the conference had addressed the objective and 29.49% strongly supported the statement. Under the objective to act as a catalyst between people and organisations, 48.72% positively supported the fact that the conference had addressed the objective and 32.05% strongly supported the statement. Under the objective to facilitate the development of tools to improve the connection between science and society, 41.03% positively supported the fact that the conference had addressed the objective and 39.74% strongly supported the statement. The last objective, namely to assist in transforming innovative ideas and actions into benchmarked practice, had a positive rating of 44.87% and a strongly agree rate of 35.90%. Overall, it was found that the majority of the respondents agreed that the conference addressed its overarching objectives.

6.2 Mode of Conference

The 2021 STEMI CoP conference was the first virtual conference, so participants were asked their preferences for future conferences. The below **figure 6** indicates 51.39% preference of hybrid attendance (combination of face-to-face and virtual) followed by 25% virtual preference and a 23.61% face-to-face preference.

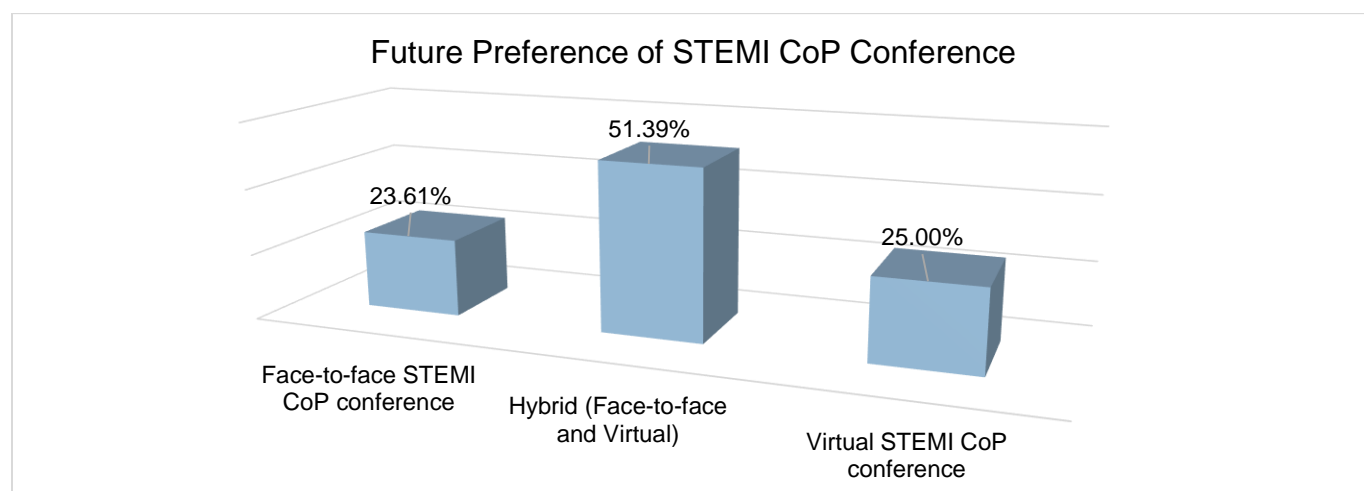


Figure 6: Future preference of STEMI CoP Conference

7. Conference Resolutions

The STEMI Development and Support Framework for STEMI Olympiads and related competitions was adopted.

Key issues that emerged:

7.1 Digital Platforms

- 7.1.1 A coordinated approach is required.
- 7.1.2 ASTEMI and all stakeholders across the CoP should seek for ZERO rating of online platforms.
- 7.1.3 ASTEMI members and CoP members, with support of SAASTA, should start using digital media to improve the visibility of Olympiads and competitions.
- 7.1.4 Technology and partners should be used to overcome the language barrier, and technology should be used to expand the participation of learners, including those with disabilities.

7.2 Development and Training

- 7.2.1 Department of Basic Education (DBE) should be engaged to explore the concept of credits given for participation in an integrated approach, e.g. a debate can count in the English/Language subject; arts in Maths etc. - examples of such must be prepared for 2022 and reported on in 2023.
- 7.2.1 Parallel workshops on science communication and educator development on artificial intelligence/robotics should be included in the conference.
- 7.2.2 All training for teachers should be SACE accredited.

7.3 Collaborations

- 7.3.1 Partnerships are needed within the university sector between teachers-in-training, the affiliated science centres, NGOs/NPOs for early exposure and preparation for the field of teaching.
- 7.3.2 Partnership are needed across all levels, with emphasis on grassroots-level, school-level, local and district level.
- 7.3.3 Collaborations are needed with NGOs, private, industry, DBE, Higher Education Institutions, science centres, and professional bodies.
- 7.3.4 Collaborations should be strengthened with DBE – have a circular from DBE to provincial education departments, and integrate activities in school calendar.

7.4 Access

- 7.4.1 ASTEMI members should explore changing the selection criteria, moving towards entry for all learners.
- 7.4.2 Emphasis on Olympiads and competitions starting from early age is needed.
- 7.4.3 Science centres have a role in creating more access, especially at local level.
- 7.4.4 More girl learners should be reached, and more females used in STEM as role models.
- 7.4.5 No learner must be left behind. There is a need to be more inclusive, and not only focus on top performers. Olympiads and competitions should be offered in local languages, brail, and sign language.
- 7.4.6 Bridge the digital divide.

7.5 Advocacy

- 7.5.1 Visibility, advocacy and sharing of information is key.
- 7.5.2 STEMI CoP should start communicating the benefits of participation in Olympiads to teachers, school management teams and provincial officials.
- 7.5.3 Olympiads and competitions contribute in building confidence in both learners and educators, and have impact.
- 7.5.4 Olympiads and competitions contribute to exposure to different types of career options.
- 7.5.5 Olympiads and competitions contribute to the development of soft skills.

8. Challenges

The following challenges were raised:

- Buy-in of School Management Teams and teachers.
- Olympiads and competitions seem to be an additional load to educators.
- Participation fees.
- Lack of resources.
- Digital skills.
- Sustainability – school ownership.
- Effective usage of media

9. Emerging Matters and Issues

9.1 A Transformation Charter for STEMI Olympiads and related Competitions:

- DSI to lead the development of a Transformation Charter for STEMI Olympiads and related competitions, as part of the science engagement transformation charter. Update to be provided to the 2023 CoP Conference.
- Engage DBE to explore the concept of **Credits given for participation** in selected STEMI Olympiads and competitions towards the final year mark in relevant STEM subjects, perhaps in the same way it happens with subjects that have Practical Assessment Tasks (PAT). Examples of such must be prepared for 2022 and reported on in 2023.
- STEMI CoP need to start **communicating the benefits of participation** in Olympiads and related competitions to teachers, school management teams and provincial officials. Research reported at the conference could be used in such efforts, however appropriate forms of communication needs to be explored by ASTEMI members from the end of the 2021 academic year.
- ASTEMI members explore the possibility of changing the selection criteria by **moving to entry for all learners**, which could be realised by offering local events and easier first rounds to engage a wider audience by the next conference.
- Strive to have all training for teachers on STEMI Olympiads and related competitions to be **SACE accredited** in order to make them attractive to teachers.
- ASTEMI members and CoP members, with support of SAASTA to start **using Media platforms to improve the visibility of Olympiads and related competitions** by the beginning of 2022 academic year.
- **Partnerships** needed within the university sector between teachers-in-training, the science centres affiliated, NGOs/ NPOs for early exposure and preparation for the field of teaching.
- A coordinated approach is needed for ASTEMI and all stakeholders across the CoP to access the **ZERO rated internet platforms**.

9.2 Emerging concepts

The issue of soft skills and skills for the future of work emerged during the conference and this may need further discussion.

10. Appendices

10.1 Video recordings and presentation

10.2 Monitoring and evaluation report

For any enquiries, please contact

Moloko Matlala

Manager: Science Education
South African Agency for Science & Technology
Advancement
+2712 392 9366

ME.Matlala@saasta.nrf.ac.za



Bersan Lesch

Deputy Director: Science Promotion
Department of Science and Technology
+2712 843 6850

bersan.lesch@dst.gov.za



science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA