TROP ICSU: Trans-disciplinary Research Oriented Pedagogy for Improving Climate Studies and Understanding (https://tropicsu.org)

Report on the TROP ICSU Workshop for Teachers at Pretoria, South Africa,

organized in collaboration with

The International Science Council - Regional Office for Africa (ISC ROA) (2-3 April 2019)

Workshop Title:	A Faculty Development Program cum Workshop on CLIMATE ACROSS THE CURRICULUM: EDUCATIONAL RESOURCES FOR TEACHERS
Date:	April 2-3, 2019
Venue:	The Regency Apartment Hotel Menlyn, Pretoria, South Africa
Facilitator(s) from the TROP ICSU Team:	Ms. Anita Nagarajan
Facilitator(s) from ISC ROA:	Dr. Richard Glover, Dr. Daniel Nyanganyura
Team of Coordinators/Helpers from the International Science Council – Regional Office for Africa:	Mr. Bongani Mahlalela, Ms. Nomasomi Gasa
Number of Participants:	29
Disciplines/Subjects Taught by Participants:	Anthropology, Biological Sciences, Environmental Sciences, Finance and Investment, Medical Geology, Medical Imaging, Public Health Medicine, Sociology, Theology, Climate Change A detailed listing of the disciplines is provided in Appendix I: Disciplines/Subjects Taught by the Participants.

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Summary of the Workshop

A **two-day workshop for university lecturers and professors** was conducted in collaboration with the International Science Council – Regional Office for Africa (ISC ROA) at Pretoria, South Africa, on April 2 and 3, 2019. The workshop was attended by 29 participants, including lecturers and professors from universities in Pretoria and Johannesburg. A representative from the Young Earth System Scientists (YESS) community also participated in the workshop.

TROP ICSU is grateful for the tremendous support and help from ISC ROA in planning and organizing all the logistics and arrangements.

The objective of the workshop was *to introduce the participants to digital teaching resources for teaching topics in the Sciences, Mathematics, Social Sciences, and Humanities using climate-related examples, case studies, and activities*. In addition, participants would be invited *to review the educational resources of the TROP ICSU project and to provide their feedback on the appropriateness and ease-of-use of the teaching tools and lesson plans*.

Group Photo: Workshop for University Lecturers and Professors, Pretoria, South Africa

The workshop commenced with an introduction to the International Science Council – Regional Office for Africa (ISC ROA) by Dr. Daniel Nyanganyura, Regional Director of ISC ROA. A round of brief introductions by all participants was also on the agenda. Lecturers and professors from the University of Johannesburg, the University of the Witwatersrand, Sefako Makgatho Health Sciences University, the University of Pretoria, the University of South Africa (UNISA), and Tshwane University of Technology (TUT) attended the workshop. Then, participants attended a few plenary sessions for an overview of the TROP ICSU project and its teaching resources. Over the next one and a half days, the teachers/educators worked in groups to carry out hands-on, interactive activities by using various teaching tools and lesson plans from the TROP ICSU website. They reviewed the teaching resources

from the pedagogical and ease-of-use perspectives and provided feedback (via online review forms) to help in further enhancing the quality and effectiveness of the content. Further, participants worked in groups to develop new transdisciplinary and multidisciplinary lesson plan ideas to teach topics in various disciplines using climate-related and climate change-related examples. In these activities, participants engaged in peer-to-peer discussions and exchanged ideas that could be used across disciplines. Group representatives presented the new lesson plan frameworks and ideas and discussed plans for the adoption of these new lesson plans in the classroom. The workshop concluded with a brief discussion on continued engagement and collaboration with the TROP ICSU project.

TROP ICSU had also invited a member of its partner organization, the YESS community, to participate in the workshop. The YESS representative from the University of Cape Town provided an overview of climate-related and climate change-related resources that would be useful in the South African context.

Plenary Session at the Workshop for Teachers, Pretoria, South Africa

Overall, the participants were keen on exploring ways to integrate climate science/climate change-related topics in their existing curriculum. They provided critical feedback on the existing teaching resources from the pedagogy perspective. Further, they actively participated in the creation of new lesson plans and specifically, in the generation of multidisciplinary ideas that are relevant and specific to South Africa. Each group created a framework for one new lesson plan, and participants discussed steps for adopting the lesson plan in their teaching. Peer-to-peer discussions in groups enabled an exchange of ideas across disciplines and the development of new lesson plans.

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Group Activity at the Workshop for Teachers, Pretoria, South Africa

Group Activity at the Workshop for Teachers, Pretoria, South Africa

Summary of the feedback received on the lesson plans from the TROP ICSU website

Explaining the topic(s) in the discipline: Approximately **92%** of the responses from the participants stated that the reviewed lesson plan was **very effective or moderately effective** in explaining the topic in the discipline.

Integrating the discipline topic(s) with climate science: Approximately **77%** of the responses from the participants indicated that the reviewed lesson plan was **very effective or moderately effective** in integrating the discipline topic(s) with climate science.

Using the lesson plan in the classroom: 100% of the responses from the participants indicated that they **would use the lesson plan in their classroom as is or with some modifications**.

Detailed results for the lesson plan reviews are provided in Appendix II: Review of Lesson Plans by Participants.

Summary of the feedback received on the teaching tools curated on the TROP ICSU website

Explaining the topic(s) in the discipline: Approximately **87%** of the respondents thought that the reviewed tool was **very effective or moderately effective** in explaining the topic(s) in the discipline.

Describing the tool: Approximately **93%** of the responses stated that the **tool description adequately shows how the discipline topic can be taught using a climate-related example, activity, or case study**.

Using the tool in the classroom: 100% of the respondents indicated that they **would use the reviewed tool in their classroom as is or with some modifications**.

Detailed results for the teaching tool reviews are provided in Appendix III: Review of Teaching Tools by Participants.

Details of the Workshop

Agenda and Overall Organization

The agenda of the two-day workshop was as follows:

- **Day 1:**
  Introductions of the participants: Brief introductions including name; institution/organization affiliation; and disciplines/areas of specialization, expertise, teaching, and research

  Presentation by the International Science Council – Regional Office for Africa (ISC ROA): Welcome remarks; introduction to ISC ROA and its work; objectives of the workshop

  Presentations by the TROP ICSU team: Welcome remarks; introduction to the TROP ICSU project, overview and demonstration of teaching resources (teaching tools and lesson plans) by using examples from each discipline

  Group-based activity by the participants (groups organized by discipline): Review of discipline-specific teaching resources available on the TROP ICSU website (one lesson plan and one teaching tool per group); providing feedback on teaching resources through online review forms

  Open discussion on the review of teaching resources

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Group Activity at the Workshop for Teachers, Pretoria, South Africa

- **Day 2:**
  Introduction to the components of a lesson plan

  Presentation by YESS community representative: Introduction to and overview of resources and tools related to climate change, including examples specific to South Africa

  Group-based activity by the participants (groups organized by discipline): Creation of a new lesson plan based on an idea that integrates a climate topic with their regular teaching

  Presentation of new lesson plans by participants: Brief summary of the lesson plan topic and tools/resources by each group

  Open discussions with participants: Feedback on the workshop and discussions on long-term engagement of participants with TROP ICSU

  Closing remarks

Development of Lesson Plan Ideas at the Workshop for Teachers, Pretoria, South Africa

Presentation of a Lesson Plan Idea at the Workshop for Teachers, Pretoria, South Africa

Participant Feedback and Suggestions on Existing Teaching Resources

- Make it contextually relevant
- Use flipped classroom method where appropriate
- Align all materials to the same case study

Ideas for New Lesson Plans

Some of the new lesson plan ideas and frameworks created by the participants were on the following topics:

- Municipal Solid Waste and Climate Change (Environmental Engineering Science)
- Commercial Forestry and Climate Change (Environmental Sciences, Agriculture, Forestry)
- Climate Change and Biodiversity, specific to the South African context (Biological Sciences)
- Climate Change and Food Security, Climate Change and Agriculture, with examples specific to South Africa (Social Sciences, Environmental Science, Agriculture)

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Key Takeaways and Learnings from the Workshops

- From observations during the workshop, the key learnings for the teachers were: the idea of using teaching resources that integrate topics in climate science or climate change with topics in their discipline and the concept of creating new lesson plans that could be used across disciplines.

- Participants found the hands-on, interactive group sessions to be very useful and engaging.

- Peer discussions in groups helped in the exchange of ideas and enhanced participants' learning.

- Participants sought contextually relevant examples (South Africa) for their teaching; some of the lesson plan ideas generated during the workshop incorporated such examples.

- Many participants thought that it would be more useful if the learning outcomes were placed at the start of a lesson plan.

- Teachers recommended the addition of new disciplines (such as Health Sciences, Medicines, Computer Science, and Law)

- A participant recommended the implementation of a more granular and appropriate classification of disciplines under the Social Sciences.

- Some feedback from participants:
  "*Thank you for exposing me to a new topic and allowing the opportunity to network and work with colleagues in other domains.*"

  "Great workshop, thank you. Some suggestions will be e-mailed separately."

  "[Include] video clips relevant to specific topics"

  "The resources shown in this workshop make it easy to include climate change in our curriculum. The workshop has been an eye-opener. It exposed us to many resources."

Next Steps

- Engagement by Team TROP ICSU with the participants to further enhance/refine the lesson plan ideas created during the workshop

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- Modification of existing teaching resources (content and layout) based on analysis of feedback from participants

- Addition of region-specific (South Africa, Africa) case studies, activities, and resources by using the ideas generated during the workshop

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Appendix I: *Disciplines/Subjects Taught by the Participants*

Anthropology; Biological Sciences; Biology Education; Engineering; Environmental Geology; Environmental Health Science; Environmental Sciences; Food Security and Environmental Management; Finance and Investment; Geography; ICT; Law; Life Sciences; Medical Geology; Medical Imaging; Public Health Medicine; Sociology; Systems Analysis and Climate Change; Theology

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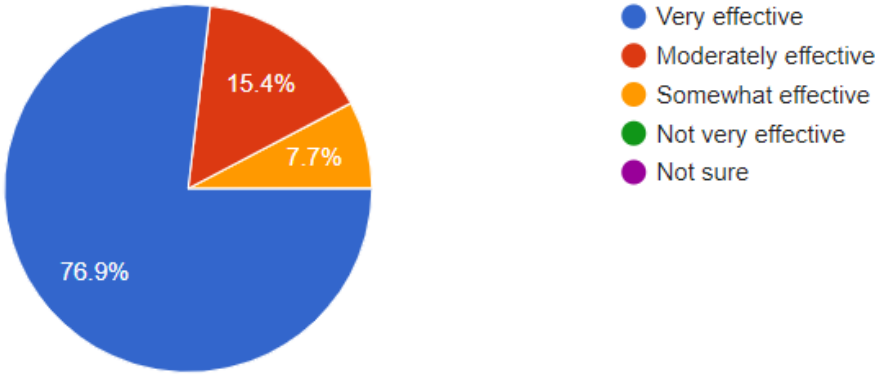
Appendix II: *Review of Lesson Plans by Participants*

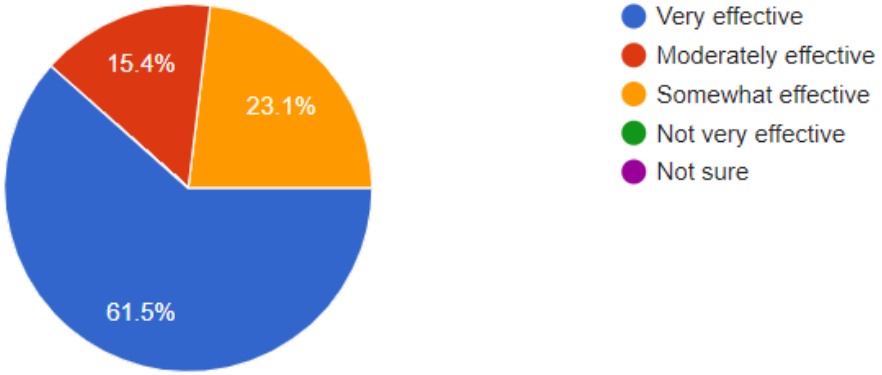
2. In your opinion, how effective is this lesson plan in explaining the topic(s) in the discipline?

13 responses



3. In your opinion, how effective is this lesson plan in integrating the discipline topic(s) with climate science?

13 responses



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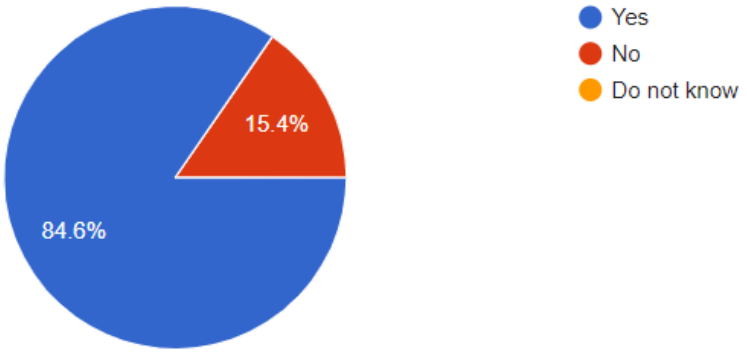
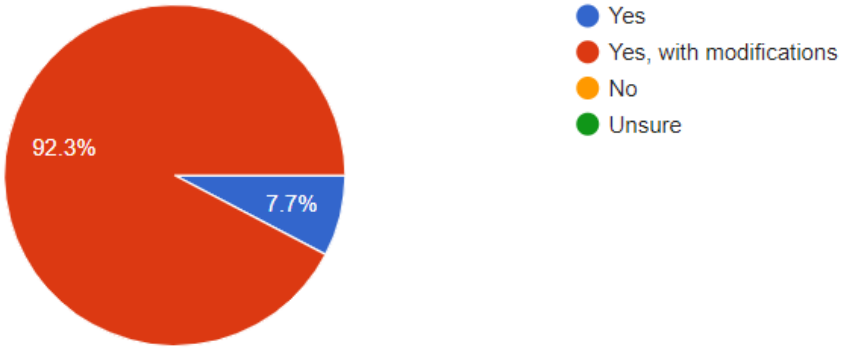
7. Do you think that your students will become more aware of climate change if you use this lesson plan in your classroom?

13 responses



8. Would you use this lesson plan in your classroom for your students?

13 responses



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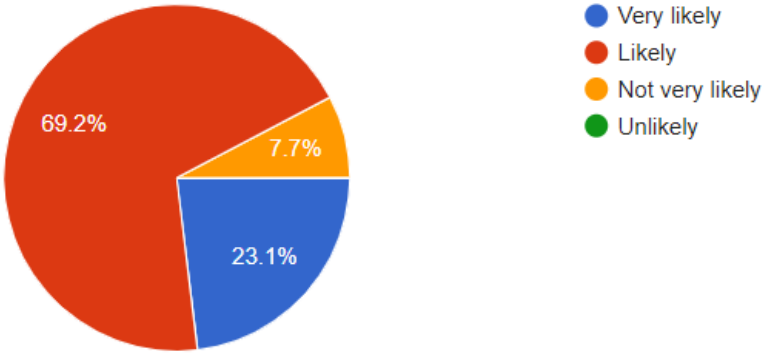
10. How likely are you to develop your own lesson plan that can enhance the understanding of a core topic in your discipline using a climate-related example, activity, or case study?

13 responses



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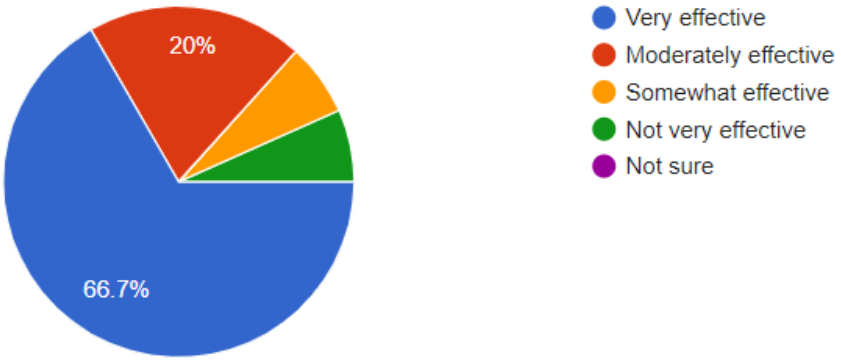
Appendix III: *Review of Teaching Tools by Participants*

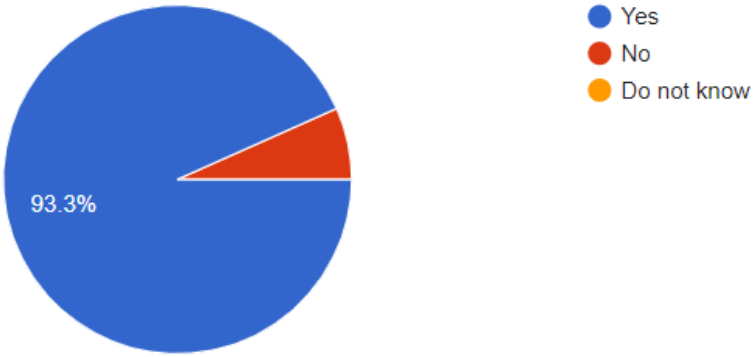
2. In your opinion, how effective is this teaching tool in explaining the topic(s) in the discipline?

15 responses



4. Does the tool description adequately show how the discipline topic can be taught using a climate-related example, activity, or case study?

15 responses



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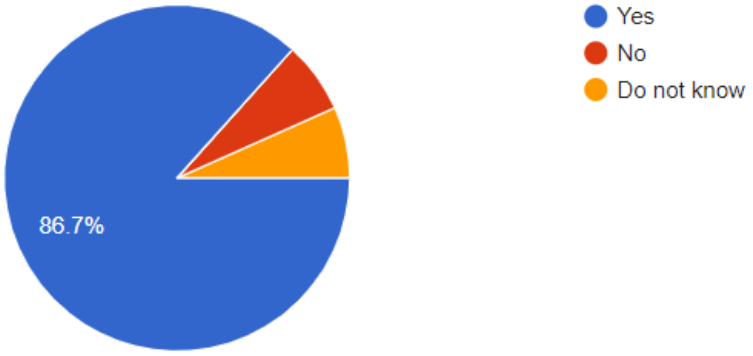
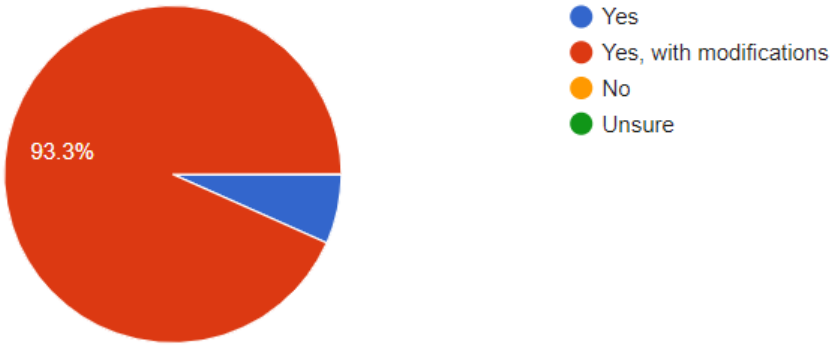
5. Do you think that your students will become more aware of climate change if you use this teaching tool in your classroom?

15 responses



6. Would you use this teaching tool in your classroom for your students?

15 responses



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