

**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 Tirupati, India,**

**organized in collaboration with**

**The Indian Institute of Technology Tirupati (IIT Tirupati), India  
(27 April 2019)**

<b>Workshop Title:</b>	A Faculty Development Program cum Workshop on CLIMATE ACROSS THE CURRICULUM: EDUCATIONAL RESOURCES FOR TEACHERS
<b>Date:</b>	April 27, 2019
<b>Venue:</b>	Indian Institute of Technology Tirupati (IIT Tirupati), India
<b>Facilitators from the TROP ICSU Team:</b>	Dr. Rahul Chopra, Ms. Anita Nagarajan
<b>Facilitators and Organizing Team from IIT Tirupati:</b>	Dr. Suresh Jain, Dr. Roshan Srivastav, Dr. Chandra Sekhar Bahinipati
<b>Team of Coordinators/Helpers:</b>	Team of volunteers from the Indian Institute of Technology Tirupati (IIT Tirupati), India
<b>Number of Participants:</b>	42
<b>Disciplines/Subjects Taught by Participants:</b>	Biomedical Instrumentation, Human Anatomy and Physiology; Building Materials and Construction; Chemistry; Computer Applications; Data Science, Data Mining; Concrete Technology; Economics; Electrical and Electronics Engineering; Engineering Physics; Engineering Mechanics; English; Environmental Engineering; Geology; Mathematics; Neural Engineering; Transportation Engineering; Water Resources Engineering; and others  A detailed listing of the disciplines is provided in <a href="#">Appendix I: Disciplines/Subjects Taught by the Participants</a> .

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## Summary of the Workshop

A **1-day workshop for undergraduate-level teachers** was conducted in collaboration with the Indian Institute of Technology (IIT) Tirupati at Tirupati, India, on April 27, 2019. The workshop was attended by 42 participants teaching various disciplines.

TROP ICSU is grateful for the tremendous support and help from IIT Tirupati in planning and organizing the workshop.

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, IIT Tirupati, India

The workshop commenced with welcome remarks from Prof. K. Satyanarayana, Director of IIT Tirupati. Dr. Suresh Jain, Associate Professor, IIT Tirupati, also addressed the audience comprising undergraduate-level lecturers and professors with expertise and experience in a wide range of disciplines. Then, the TROP ICSU team provided an [overview of the TROP ICSU project](#) and its teaching resources. In the second half of the day, 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 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 for effective teaching using relevant examples. Group representatives presented the new lesson plan frameworks and ideas. The workshop concluded with a brief discussion on continued engagement and collaboration with the TROP ICSU project.



Plenary Sessions at the Workshop for Teachers, IIT Tirupati, India

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 discussion and creation of new lesson plan frameworks. Each group created a framework for one new lesson plan, and group representatives presented their ideas.



Group Activity at the Workshop for Teachers, IIT Tirupati, India



Group Activity at the Workshop for Teachers, IIT Tirupati, India

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

**Explaining the topic(s) in the discipline:** 100% 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 **92%** 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 **89%** 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 **92%** 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 one-day workshop was as follows:

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

Welcome address and opening speech by the Indian Institute of Technology (IIT) Tirupati: Welcome remarks by Prof. K. Satyanarayana, Director of IIT Tirupati; introduction to IIT Tirupati; objectives of the workshop  
Welcome remarks by Dr. Suresh Jain, Associate Professor, IIT Tirupati

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

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 discussion on the review of teaching resources, overall feedback on the workshop, discussion on long-term engagement of participants with TROP ICSU

Closing remarks



Group Activity at the Workshop for Teachers, IIT Tirupati, India



Presentations and Open Discussion at the Workshop for Teachers, IIT Tirupati, India



Presentations and Open Discussion at the Workshop for Teachers, IIT Tirupati, India

### Participant Feedback and Suggestions on Existing Teaching Resources

- Add teaching resources for the Engineering disciplines
- Include teaching resources for Computer Science
- Organize and host webinars for dissemination of the project and its resources



## Ideas for New Lesson Plans

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

- Developing Language Skills through Climate-related Resources (English) (Identifying idioms and phrases, collocation, tags, connectives, etc.)
- Impact of Climate Change on Various Diseases in Humans: Study and Analysis using various Datasets and Tools (Computer Science and Engineering)
- Rise in CO<sub>2</sub> levels and Climate Change (Chemistry, Environmental Sciences, Earth Sciences)
- Renewable Sources of Energy: Solar Energy (Physics)
- Analysis and Interpretation of Climate Data by using Data Mining (Computer Science)
- Environmental Impacts of Combustion (Chemistry)
- Descriptive Statistics for Rainfall Data by using R-programming (Statistics)
- Particulate Matter and Climate (Civil Engineering)
- The Hydrological Cycle (Chemistry, Environmental Sciences, Earth Sciences, Water Resources)

## 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 (Tirupati, South India, India) for their teaching; some of the lesson plan ideas generated during the workshop incorporated such examples.

- Teachers recommended the addition of new disciplines (such as Computer Science and various disciplines in Engineering).
- Some participants suggested holding a 2-day workshop instead of a 1-day event in order to explore the resources in more detail and to develop more complete lesson plans.
- Some feedback from participants:

*"Innovative and Modern Methods for teaching"*

*"Please conduct Webinars"*

*"Better to continue the duration to one more day for better results"*

*"Computer Science Courses related specific tools like R-Tool, Orange, WEKA and etc. can be used"*

*"It's great work and it is also better to add Engineering branches also"*

*"Available resources are quite good"*

#### Next Steps

- Engagement by Team TROP ICSU with the participants to further enhance/refine the lesson plan ideas created during the workshop
- Modification of existing teaching resources (content and layout) based on analysis of feedback from participants
- Addition of region-specific (India) case studies, activities, and resources by using the ideas generated during the workshop

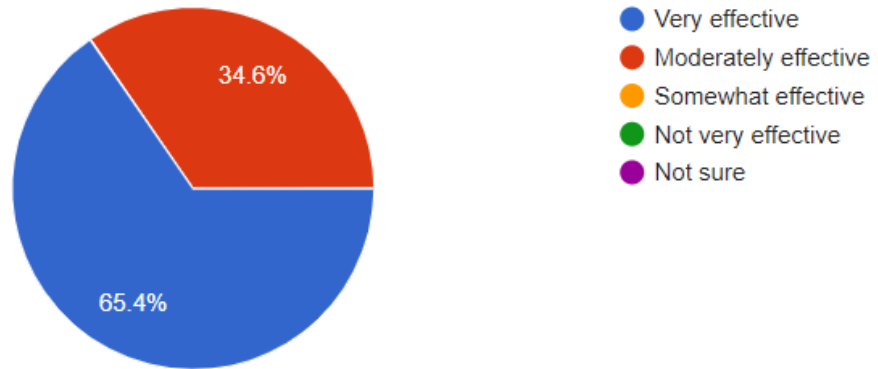
## *Appendix I: Disciplines/Subjects Taught by the Participants*

Big Data; Biomedical Instrumentation, Biomaterials and Artificial Organs, Biomedical Signal Processing, Mechanics of Biological Systems, Human Anatomy and Physiology, Medical Physics, Clinical Engineering; Building Materials and Construction; Chemistry; Computer Applications; Computer Organization; Computers; Data Analytics, Data Science, Deep Learning, Machine Learning; Data Mining; Design and Drawing of Reinforced Concrete Structures (DDRCS), Surveying, Concrete Technology, Pre-stressed Concrete; Digital Signal Processing; Economics; Electrical and Electronics Engineering; Engineering Chemistry; Engineering Mechanics, Heat Transfer, Manufacturing Technology, Thermal Engineering; Engineering Physics; English; Environmental Engineering, Environmental Impact Assessment and Mitigation; Environmental Science; Geology; Ground Water Quality; Hydraulics and Hydraulic Machinery (HHM), Water Resources Engineering; Human Resource Management; Management; Managerial Economics, Accountancy, and Finance; Mathematics; Mechanical Engineering; Neural Engineering; Signals and Systems; Software Engineering; Strength of Materials; Transportation Engineering; Water Resources Engineering

Appendix II: *Review of Lesson Plans by Participants*

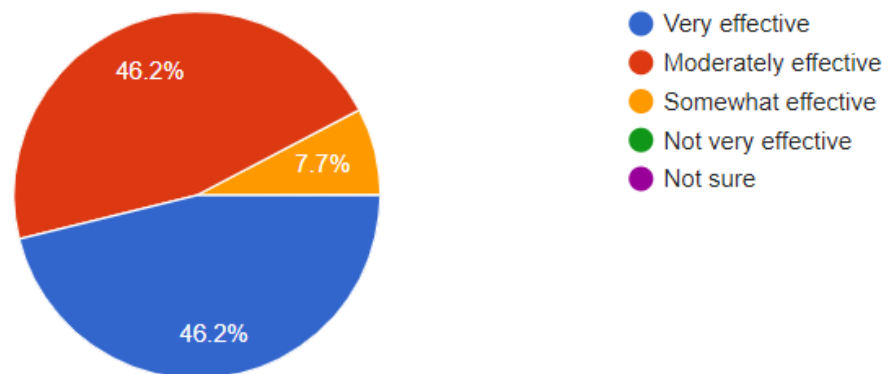
2. In your opinion, how effective is this lesson plan in explaining the topic(s) in the discipline?

26 responses



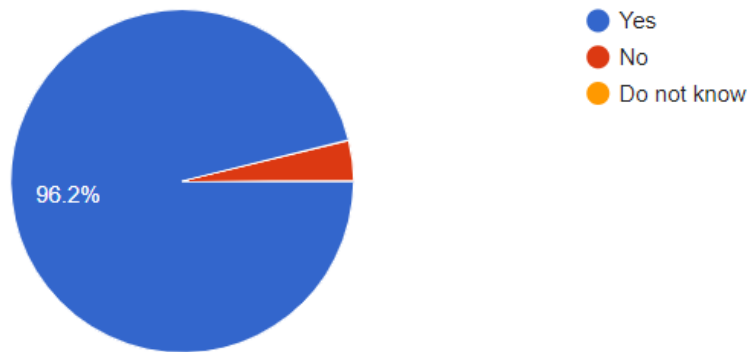
3. In your opinion, how effective is this lesson plan in integrating the discipline topic(s) with climate science?

26 responses



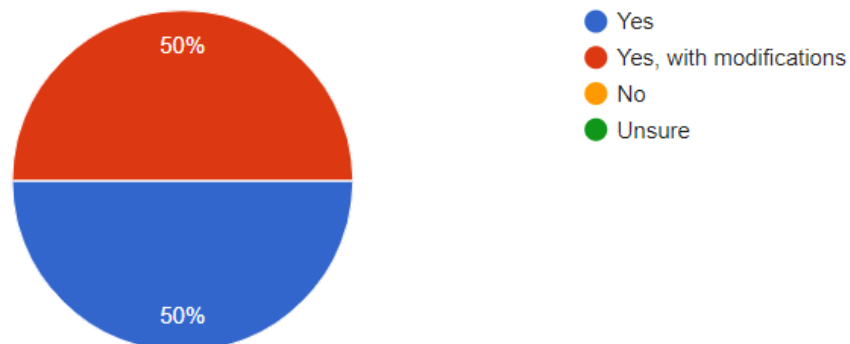
7. Do you think that your students will become more aware of climate change if you use this lesson plan in your classroom?

26 responses



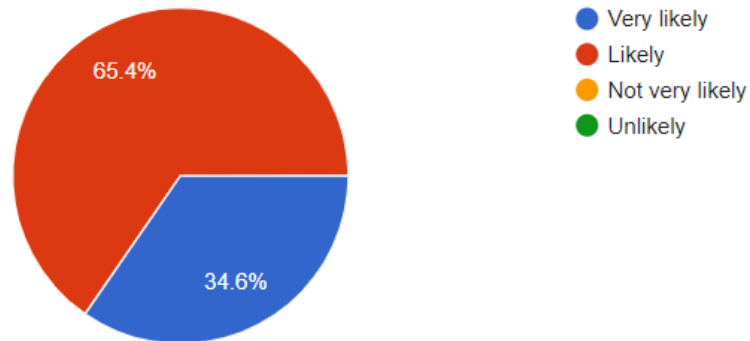
8. Would you use this lesson plan in your classroom for your students?

26 responses



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?

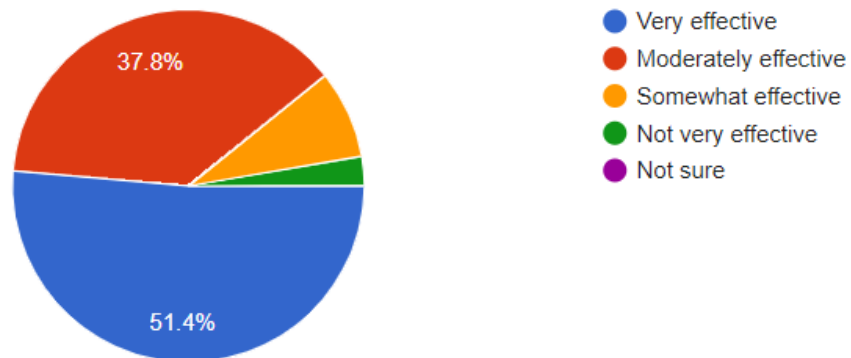
26 responses



Appendix III: *Review of Teaching Tools by Participants*

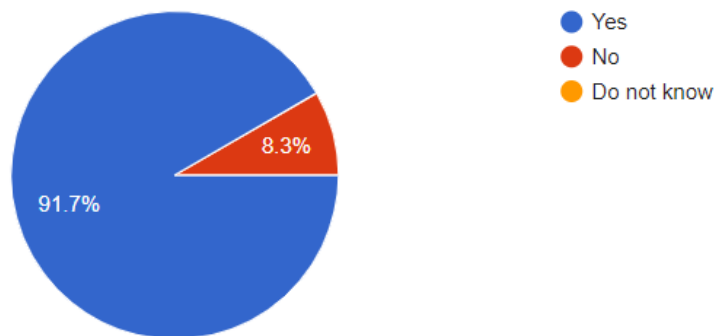
2. In your opinion, how effective is this teaching tool in explaining the topic(s) in the discipline?

37 responses



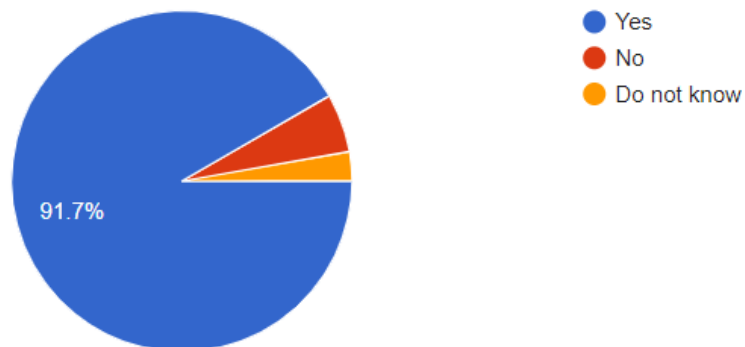
4. Does the tool description adequately show how the discipline topic can be taught using a climate-related example, activity, or case study?

36 responses



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

36 responses



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

36 responses

