

**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 Orsay, France

organized in collaboration with

**Paris-Sud University (Université Paris-Sud)
(28 June 2019)**

Workshop Title:	ENSEIGNEMENT ET CHANGEMENT CLIMATIQUE
Date:	June 28, 2019
Venue:	Paris-Sud University (Université Paris-Sud)
Facilitators from the TROP ICSU Team:	Ms. Anita Nagarajan, Dr. Nathalie Fomproix (IUBS)
Facilitator from the YESS community:	Dr. Mohamadou Diallo
Organizing Team from Paris-Sud University:	Dr. Catherine Even-Beaudouin, Dr. Jean-Michel Lourtioz, Ms. Anaïs Vergnolle
Number of Participants:	21
Disciplines/Subjects Taught by Participants:	Biology, Chemistry, Computer Science, Earth and Life Sciences, English, Mathematics, Physics 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 **1-day workshop for high school and undergraduate-level teachers** was conducted in collaboration with Paris-Sud University (Université Paris-Sud) in Orsay, France, on June 28, 2019. The workshop was conducted in French and was attended by 21 participants teaching various disciplines. A representative from the Young Earth System Scientists (YESS) community also participated in the workshop.

TROP ICSU is grateful for the valuable support from Paris-Sud University (Université Paris-Sud) 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*.

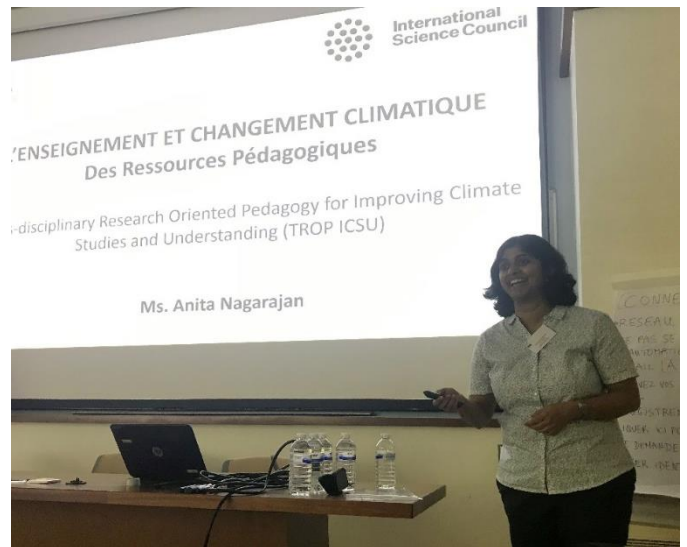
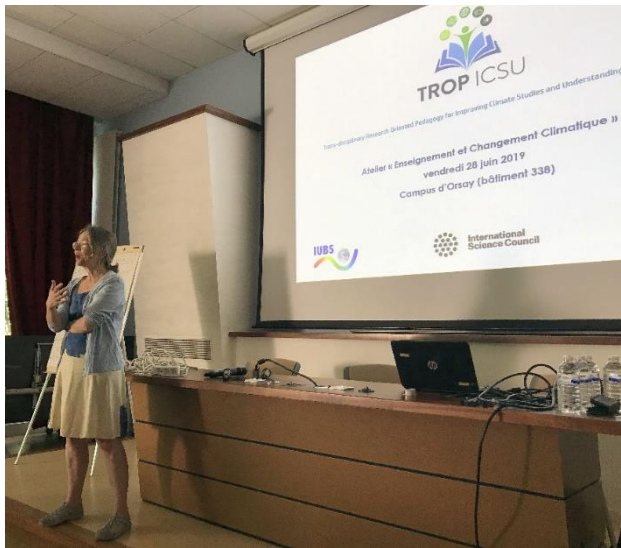


Group Photo: Workshop for Teachers, Orsay, France

The workshop commenced with welcome remarks by Dr. Christine Paulin (Paris-Sud University (Université Paris-Sud)). Then, Dr. Nathalie Fomproix provided an introduction to the International Union of Biological Sciences (IUBS), the International Science Council (ISC), and the TROP ICSU project. The audience comprised high school-level and undergraduate-level teachers of various subjects/disciplines. Next, the TROP ICSU team provided an [overview of the TROP ICSU project](#) and its educational resources, including teaching tools and lesson plans. The YESS representative from the climate science field provided an overview of climate-related topics and useful 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. In these activities, participants engaged in peer-to-peer discussions and exchanged ideas for effective teaching using relevant examples.



Plenary Sessions at the Workshop for Teachers, Orsay, France

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 and discipline perspective.



Group Activity at the Workshop for Teachers, Orsay, France

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

Explaining the topic(s) in the discipline: 50% of the responses from the university lecturers stated that the reviewed lesson plan was **very effective or effective**, and 100% of the responses from the high school teachers stated that the reviewed lesson plan was **somewhat effective** in explaining the topic in the discipline.

Integrating the discipline topic(s) with climate science: 50% of the responses from the university lecturers and 100% of the responses from the high school teachers indicated that the reviewed lesson plan was **very effective or effective** in integrating the discipline topic(s) with climate science.

Using the lesson plan in the classroom: 100% of the responses from the university lecturers and 100% of the responses from the high school teachers 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 A: Review of Lesson Plans by Participants \(University Lecturers\)](#) and [Appendix II B: Review of Lesson Plans by Participants \(High School Teachers\)](#).

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

Explaining the topic(s) in the discipline: Approximately 33% of the respondents among the university lecturers and approximately 50% of the respondents among the high school teachers thought that the reviewed tool was **very effective or effective** in explaining the topic(s) in the discipline.

Describing the tool: Approximately 58% of the responses from the university lecturers and 50% of the responses from the high school teachers 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: 50% of the respondents among the university lecturers and **100%** of the respondents among the high school teachers 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 A: Review of Teaching Tools by Participants \(University Lecturers\)](#) and [Appendix III B: Review of Teaching Tools by Participants \(High School Teachers\)](#).

Details of the Workshop

Agenda and Overall Organization

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

Welcome remarks from Paris-Sud University (Université Paris-Sud): Welcome remarks; objectives of the workshop

Welcome remarks and introduction from IUBS: Welcome remarks; introduction to IUBS, ISC, and TROP ICSU

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

Presentation by climate expert from the YESS community

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

Discussions 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, Orsay, France



Group Activity at the Workshop for Teachers, Orsay, France

Participant Feedback and Suggestions on Existing Teaching Resources

- Include datasets and activities that are relevant to Europe
- Include more interactive activities for students
- Add model United Nations conference-style simulations on climate change; these would require students to do personal research and represent their chosen country's needs
- Specify a problem statement at the beginning of each lesson plan
- Game on Fossil Fuel Usage (Teaching Tool):
Several participants reported that one of the teaching resources listed on the TROP ICSU website—a game on future energy requirements and the energy sources to meet these requirements—appeared to be biased toward the usage of fossil fuels.

Comments and feedback on the teaching tool: Teachers expressed concern that the game appeared to force players to choose traditional energy sources to meet future energy demands, thus creating a bias toward the usage of fossil fuels. They also stated that, in the game, cleaner energy sources seemed to be expensive always, thereby posing a possible deterrent to the choice of these cleaner sources.

Action taken by the TROP ICSU team:

The concerns raised by the participants were recorded by the TROP ICSU team. Subsequently, an in-depth review and analysis of the teaching tool was carried out by the TROP ICSU team and climate experts.

Response from the TROP ICSU team:

Following the review and analysis, a detailed response was sent to the participants. A summary of the response is provided below:

An analysis of the game does not show a bias toward any type of fuel usage. The main objective of the game is to produce required energy to meet the world's energy demands with available money at hand while keeping carbon emissions low enough to minimize impacts on climate. It involves exploring various scenarios so that the player will understand the implications of our actions and choices. It increases the awareness of current limitations and helps the player to think about possible ideas for sustainable solutions in the future. While the simulation was made in 2010, the underlying science is found to be robust, no bias is observed, and the game is an informative and an interesting teaching tool that shows the reality of the economics of energy sources and links to climate change.

The team expressed gratitude to the participants for their detailed feedback and indicated a willingness and openness to address any further queries and concerns.

Key Takeaways and Learnings from the Workshop

- From observations during the workshop, the key learning for many teachers was: the idea of using and creating teaching resources that integrate topics in climate science or climate change with topics in their discipline.
- The Physics teachers stated that several available teaching tools in Physics are very useful for in-class teaching and as material for learning at home. They provided a few specific suggestions for further refinement of these tools.
- Some participants indicated that one of the teaching tools did not seem to be sufficiently objective, and therefore, they recommended a detailed analysis of all the tools to ensure their objectivity.

- Participants sought contextually relevant examples (France, Europe) for their teaching; they suggested the inclusion of more simulations and examples relevant to or customized for France and Europe.

- Some feedback from participants:

"Pour adapter ces outils et plans de cours à l'enseignement français, il faudrait rajouter les problématiques puis donner les objectifs pédagogiques au début."

"... il faut vraiment tester les divers outils proposés afin d'être assurés de pouvoir les réinvestir en classe en toute objectivité."

"... j'ai apprécié les échanges avec les collègues de différentes disciplines et ai pu recueillir auprès d'eux des pistes et des idées exploitables dans mes cours."

"Globally the applets are very useful tools both for inclass teaching and material for home training."

Next Steps

- Modification of existing teaching resources (content and layout) based on analysis of feedback from participants
- Addition of new resources or enhancement of existing resources to include Europe-specific examples, cases studies, and activities

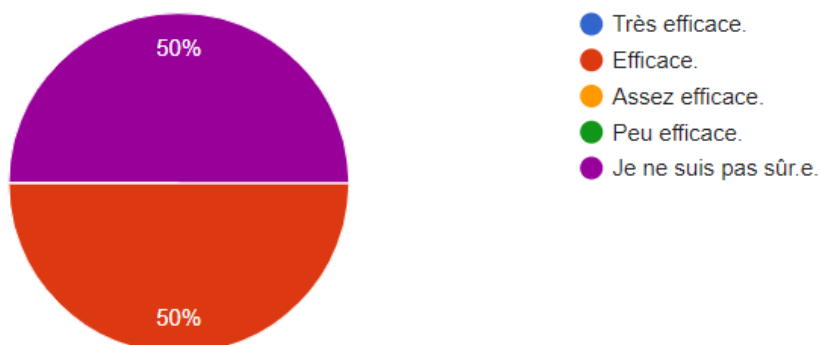
Appendix I: Disciplines/Subjects Taught by the Participants

Biology, Chemistry, Computer Science, Earth and Life Sciences, Earth Sciences, English, English for Scientists, Languages, Mathematics, Physics

Appendix II A: Review of Lesson Plans by Participants (University Lecturers) (in French)

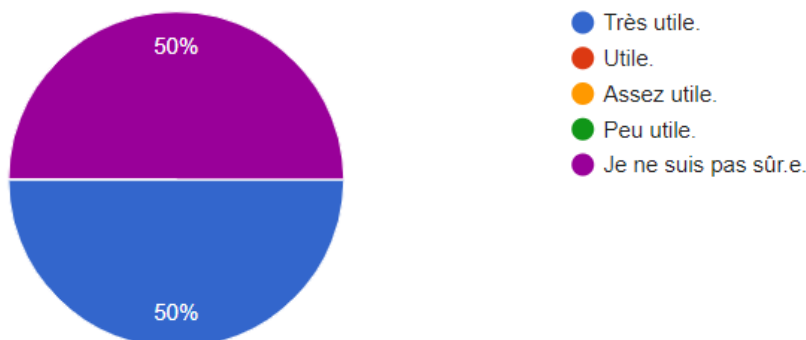
2. Comment jugeriez-vous l'efficacité de ce plan de cours pour expliquer le(s) sujet(s) dans votre discipline?

2 responses



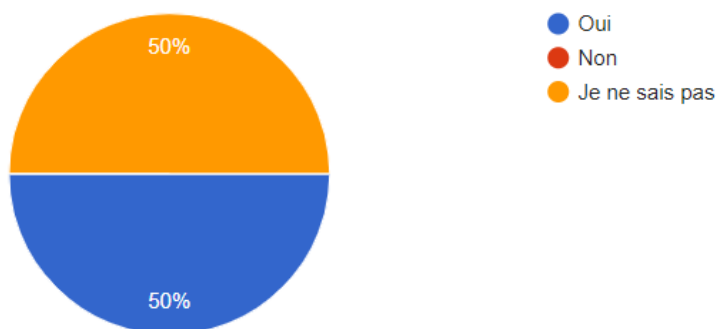
3. Comment jugeriez-vous l'utilité de ce plan de cours pour intégrer l'enseignement du changement climatique avec un/des sujet(s) dans votre discipline?

2 responses



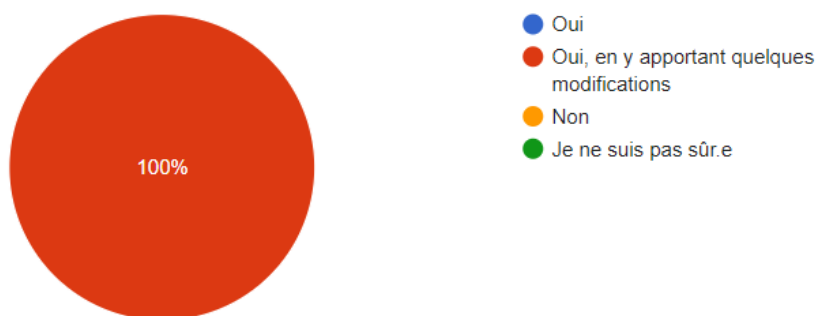
7. À votre avis, l'utilisation de ce plan de cours dans votre classe améliorerait-elle la compréhension des élèves sur le changement climatique?

2 responses



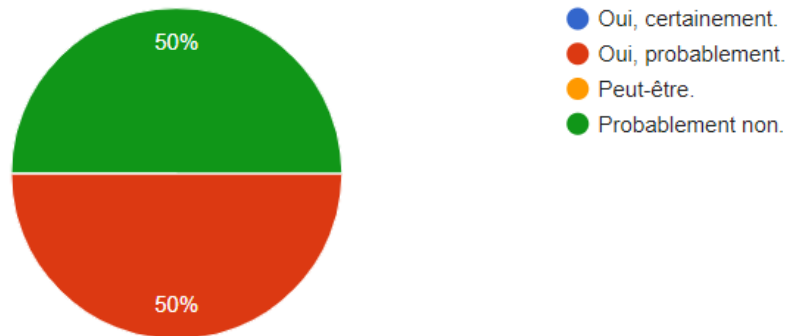
8. Utiliseriez-vous ce plan de cours dans votre classe ?

2 responses



10. Auriez-vous envie de créer votre propre plan de cours personnalisé pour enseigner des matières fondamentales dans votre discipline en utilisant un exemple, activité ou étude de cas liés au climat ?

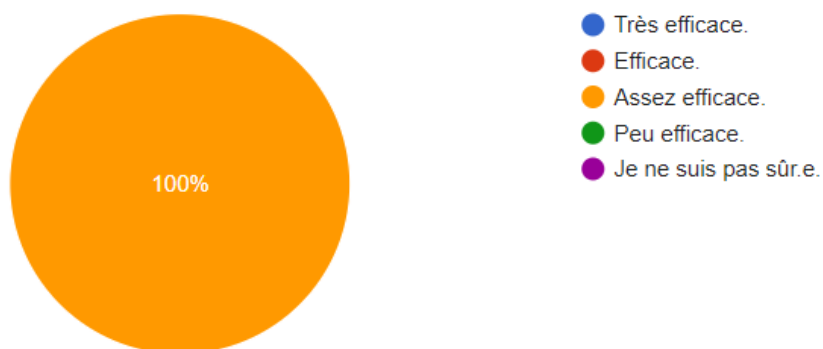
2 responses



Appendix II B: *Review of Lesson Plans by Participants (High School Teachers) (in French)*

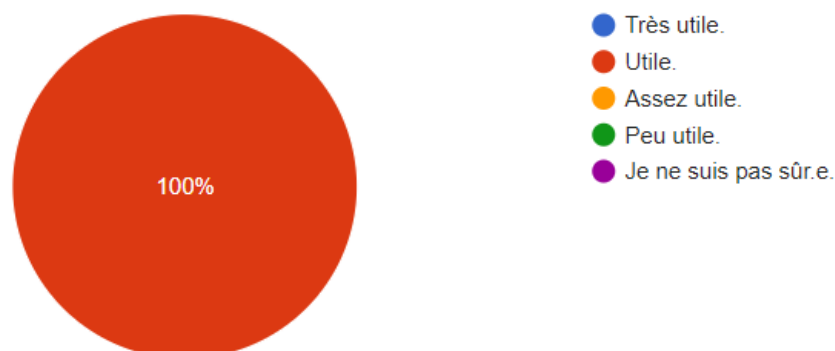
2. Comment jugeriez-vous l'efficacité de ce plan de cours pour expliquer le(s) sujet(s) dans votre discipline?

1 response



3. Comment jugeriez-vous l'utilité de ce plan de cours pour intégrer l'enseignement du changement climatique avec un/des sujet(s) dans votre discipline?

1 response



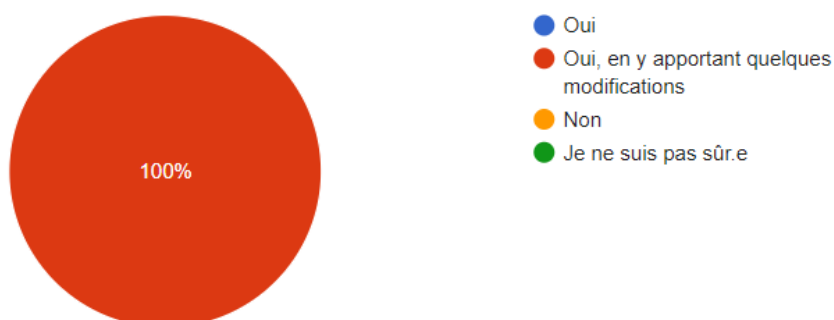
7. À votre avis, l'utilisation de ce plan de cours dans votre classe améliorerait-elle la compréhension des élèves sur le changement climatique?

1 response



8. Utiliseriez-vous ce plan de cours dans votre classe ?

1 response



10. Auriez-vous envie de créer votre propre plan de cours personnalisé pour enseigner des matières fondamentales dans votre discipline en utilisant un exemple, activité ou étude de cas liés au climat ?

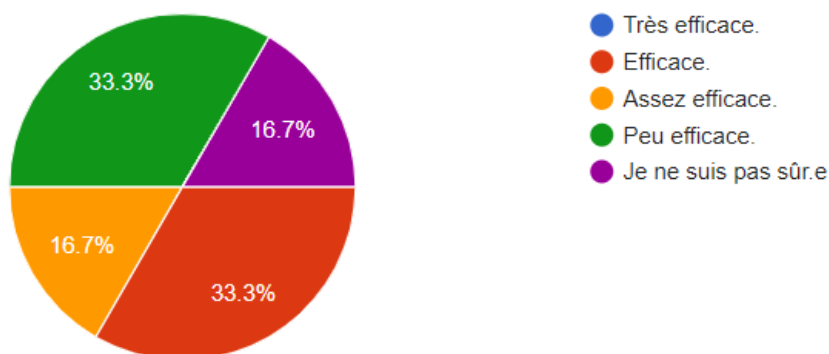
1 response



Appendix III A: *Review of Teaching Tools by Participants (University Lecturers) (in French)*

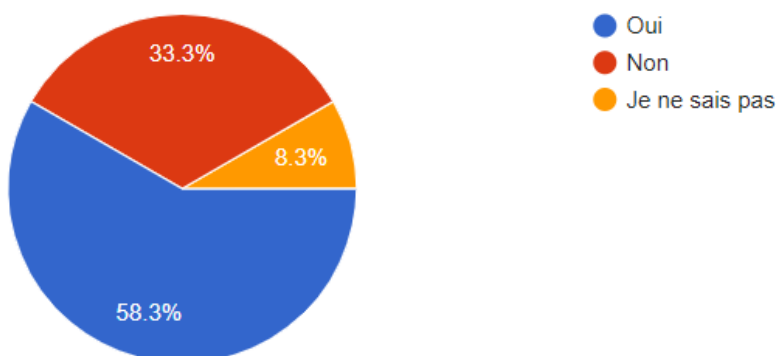
2. Comment jugeriez-vous l'efficacité de cet outil pour expliquer le(s) sujet(s) dans votre discipline?

12 responses



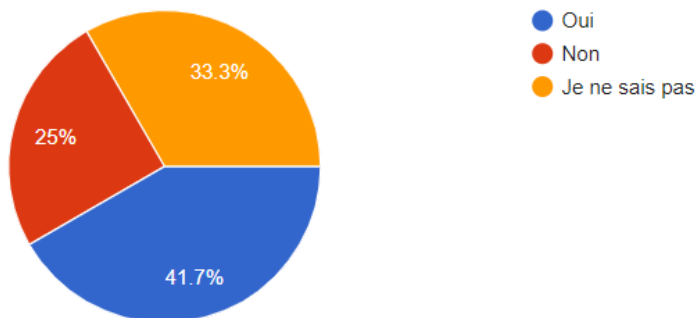
4. La description de l'outil explique-t-elle de manière adéquate l'utilisation d'un exemple, activité ou étude de cas liés au changement climatique pour enseigner un sujet dans votre discipline?

12 responses



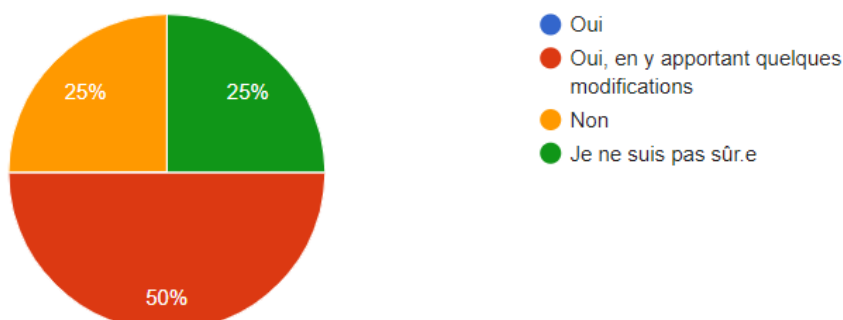
5. À votre avis, l'utilisation de cet outil d'apprentissage dans votre classe améliorerait-elle la compréhension des élèves sur le changement climatique?

12 responses



6. Utiliseriez-vous cet outil comme ressource pédagogique dans un cours?

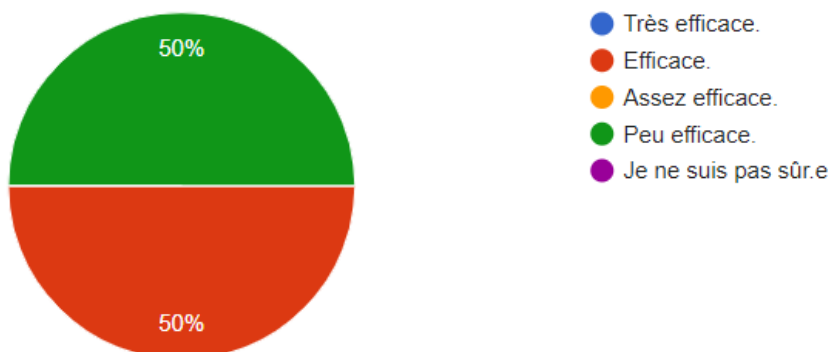
12 responses



Appendix III B: *Review of Teaching Tools by Participants (High School Teachers) (in French)*

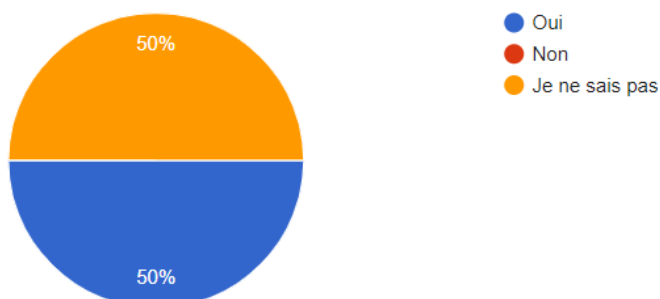
2. Comment jugeriez-vous l'efficacité de cet outil pour expliquer le(s) sujet(s) dans votre discipline?

2 responses



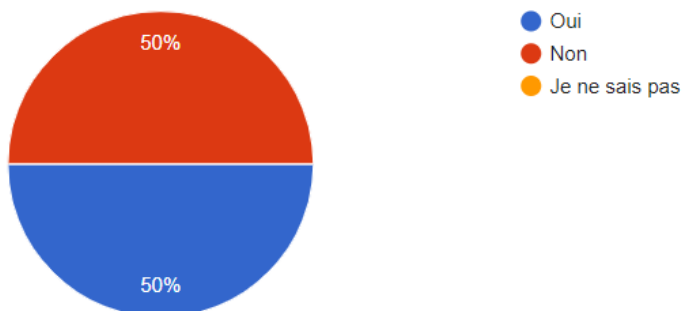
4. La description de l'outil explique-t-elle de manière adéquate l'utilisation d'un exemple, activité ou étude de cas liés au changement climatique pour enseigner un sujet dans votre discipline?

2 responses



5. À votre avis, l'utilisation de cet outil d'apprentissage dans votre classe améliorerait-elle la compréhension des élèves sur le changement climatique?

2 responses



6. Utiliseriez-vous cet outil comme ressource pédagogique dans un cours?

2 responses

