



***Scientists and Science teachers working together:
the Research Experiences for Teachers as
professional development***

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Research Experiences for Teachers (RET)

- Research Experiences for Teachers (RET) are considered one effective way to enhance students' STEM careers and achievements in science.



<https://iodp.tamu.edu>

- During a RET, individuals build their own knowledge and are active in their own learning.

Research Experiences for Teachers (RET)

- Variations in RET structures also apply to the duration of the experience that can range **from one week to months**. The literature shows better outcomes for longer RETs than short ones.



Exciting Summer Research...

on Sustainable Electronics for High School Science Teachers Through the *Research Experiences for Teachers (RET) Site Program*

Purdue University and Tuskegee University seek high school teachers (chemistry, physics, biology, engineering) to participate in summer research on sustainable electronics. Teachers will work on projects to make cell phones, laptops, and other electronic devices greener.



Research projects include:

- Finding environmentally friendly replacements for toxic materials often used in electronics
- Cost-effectively recovering and reusing electronics instead of sending them to landfills
- Life cycle assessment of the environmental impacts of electronics


Summer RET activities include an orientation, introduction to basic engineering principles and terms, initial interviews to understand teachers' interests and instructional needs, and matching teachers with unique research projects related to science or engineering standards. Also:

- Fields trips to local electronics recycling centers and other industries related to electronics
- Teachers participate at either **Purdue University-West Lafayette** (8 teachers) or **Tuskegee University** (3 teachers) for 6 weeks during summer (June 5 – July 14, 2017)
- Assistance with designing lesson plans related to green electronics, and follow-up by faculty and graduate students during the school year to support implementation of new classroom activities and curricula




The RET Site program will be offered for second time in 2017. Teachers typically participate for one year but may do so for two consecutive years, if they choose. Each teacher will be paid an \$3000 stipend, plus \$2000 for high school instructional materials. Additional funds will be provided to conduct the research at Purdue or Tuskegee. This program is funded by the National Science Foundation, awards #1542418 and #1542422.

For details, contact: **Dr. Inez Hua, Purdue University** **Dr. Michael Curry, Tuskegee University**
hua@purdue.edu curym@mytu.tuskegee.edu
 (765) 494-2409 (334) 724-4489

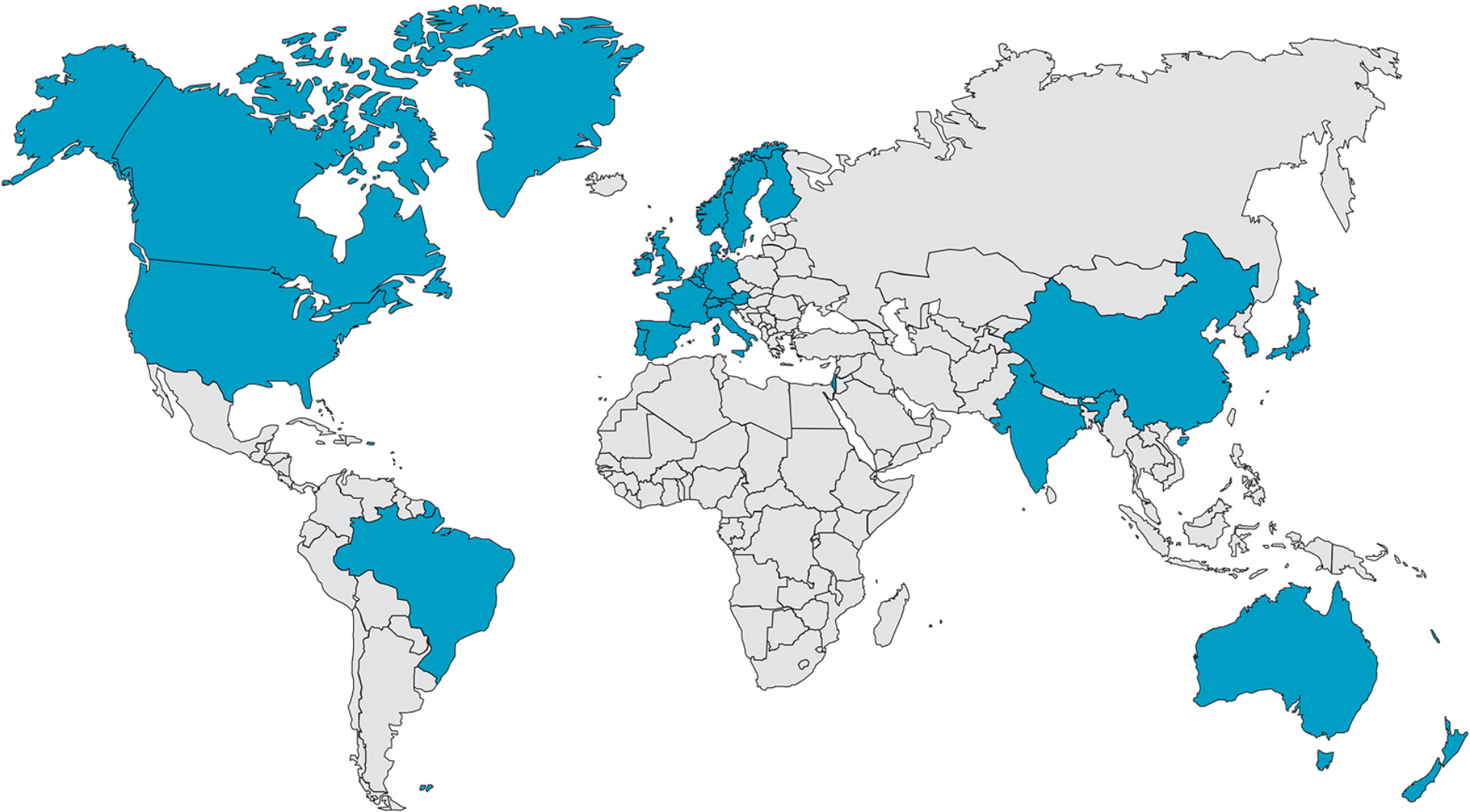
"Practice What You Teach"



Columbia's *Summer Research Program for Science Teachers* was established in 1990 for the purpose of contributing to the improvement of science achievement of students by providing science teachers with experience in the practice of science. Teachers become members of research teams.

International Ocean Discovery Program



RET in the International Ocean Discovery Program (IODP)

The International Ocean Discovery Program (IODP) and the European Consortium for Ocean Research Drilling (ECORD) offer two kinds of professional development for educators:

- 1) School of Rock, a training course for teachers based on data from drilling expeditions;
- 2) the opportunity to sail on an IODP expedition as Education and Outreach Officer, working alongside scientists on board the research vessel *JOIDES Resolution* and sharing the science story with students and the public.

RET in the International Ocean Discovery Program (IODP)

The role of *Education and Outreach Officer* on board could be considered a RET because:

- Expeditions are 8 weeks long.
- The duties:
 - a) facilitating interviews between mass media and scientists;
 - b) developing educational resources;
 - c) managing social media (www.joidesresolution.org);
 - d) *working with researchers as a researcher*;
 - e) broadcasting from the ship.

Our goal:

We analyse the effectiveness of the activity on board in order to understand:

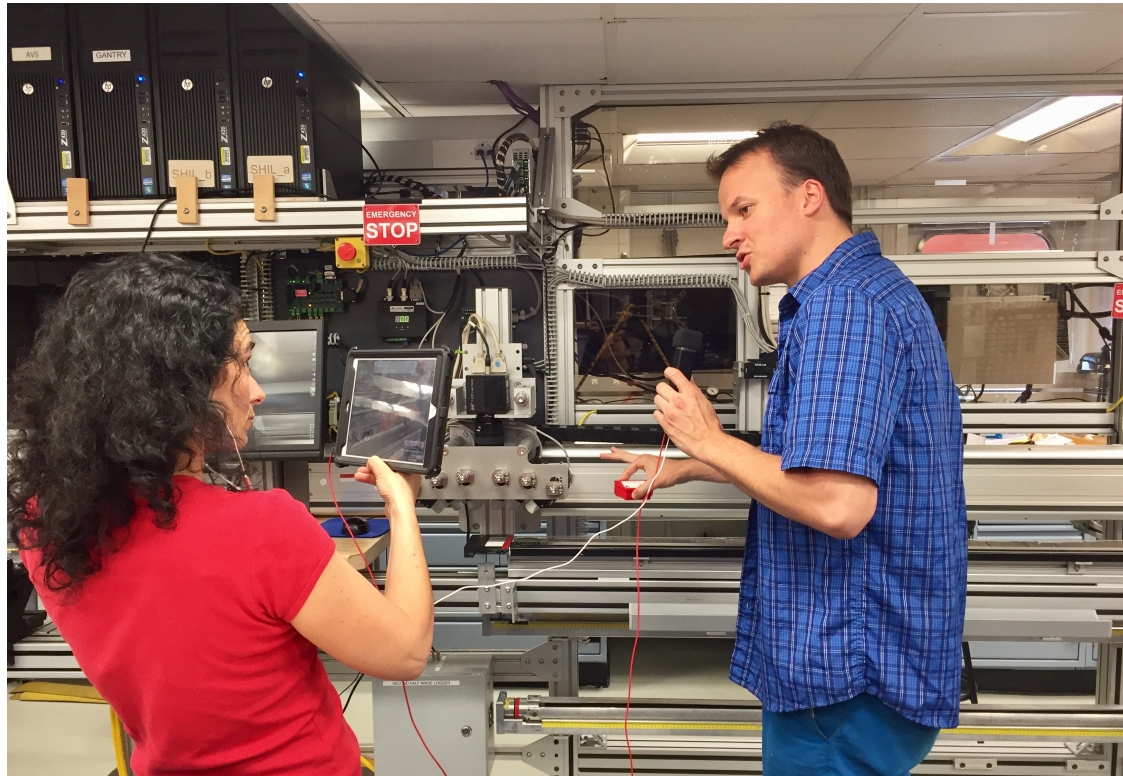
if the sailing experience could be considered a valid RET.



Methods:

We evaluate the quality of the RET activities through:

The Broadcasting from the Ship and the connected survey.



Methods:

- Every video connection from the ship had the same characteristics:
 - one hour long;
 - guided by the Education officer with a scientist speaking the same language as the students.



Methods:

We evaluate the quality of the activity through:

A very simple survey to science teachers involved from land:

“What do you like most?”

Which is the topic that you learned?

Are the students interested?....”

The experience:

IODP Exp 367 - Southern China Sea



The experience: IODP Exp 367 - Southern China Sea



Claudia Lupi, Scientist

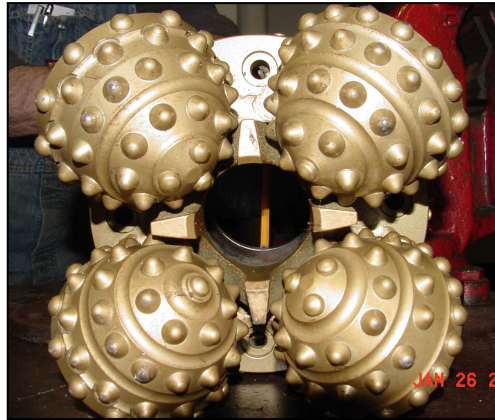
Alessia Cicconi, Education Officer

The experience: life on board of *Education and Outreach Officer* with scientists



The experience:

life on board of *Education and Outreach Officer* with scientists



The experience: life on board of *Education and Outreach Officer* with scientists



The experience: life on board of *Education and Outreach Officer* with scientists



Results: the broadcasts from JR



Results: video connections

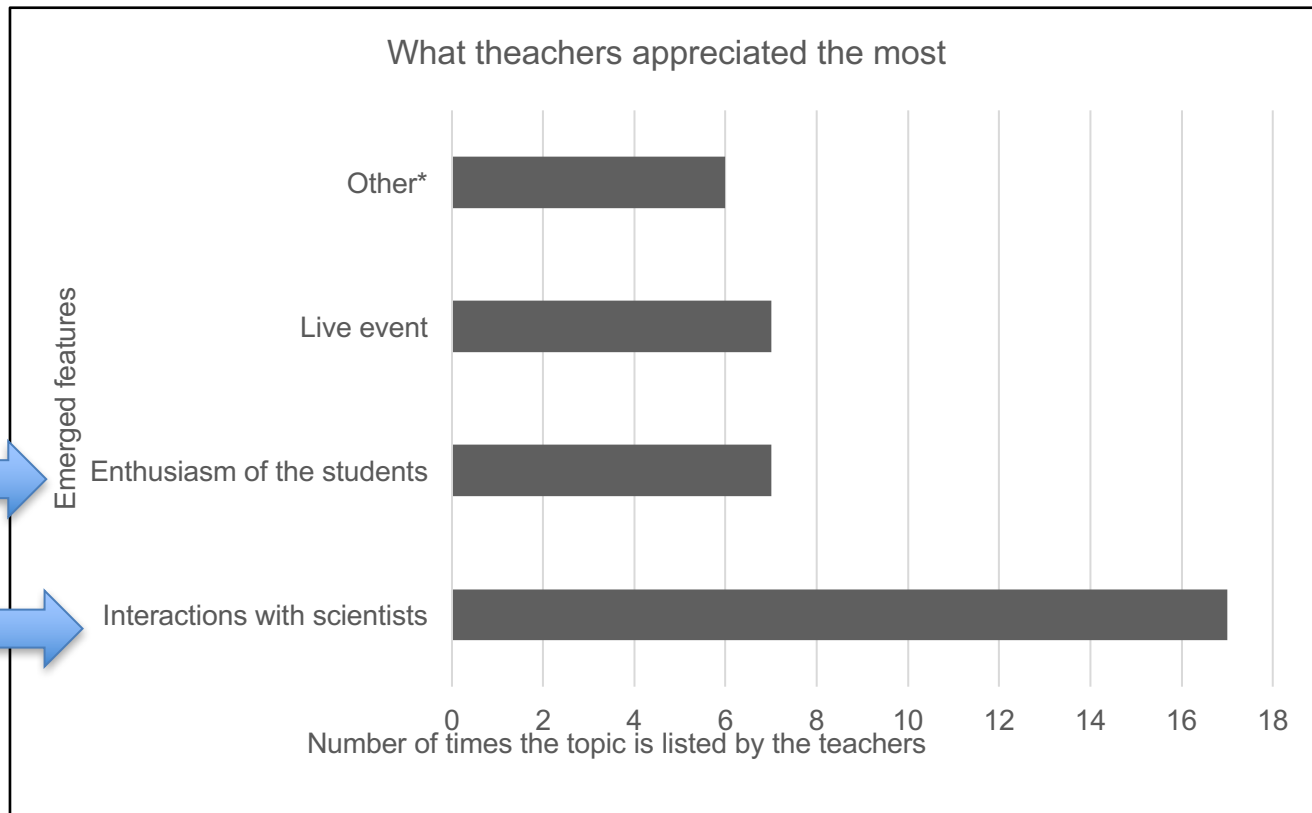
Country	Number of broadcasts	Number of students participants
Italy	40	≈1500
China	30	≈3400
USA	24	≈700
France	3	≈70
Germany	2	≈800
Spain	1	≈120
Argentina	1	≈300

Results: survey

We send the post-event survey to all teacher participants (99 connections). The Chinese teachers were surveyed by a Chinese-speaking Education and Outreach Officer.

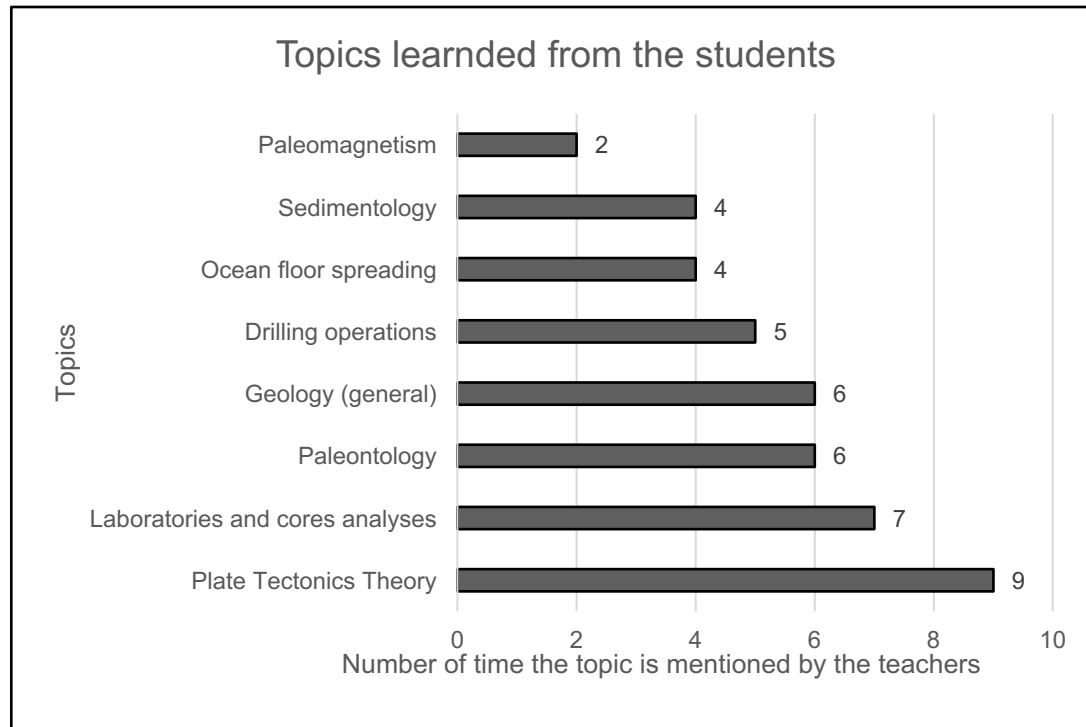
Therefore, **43 surveys in English are available and analyzed here.**

Results: survey



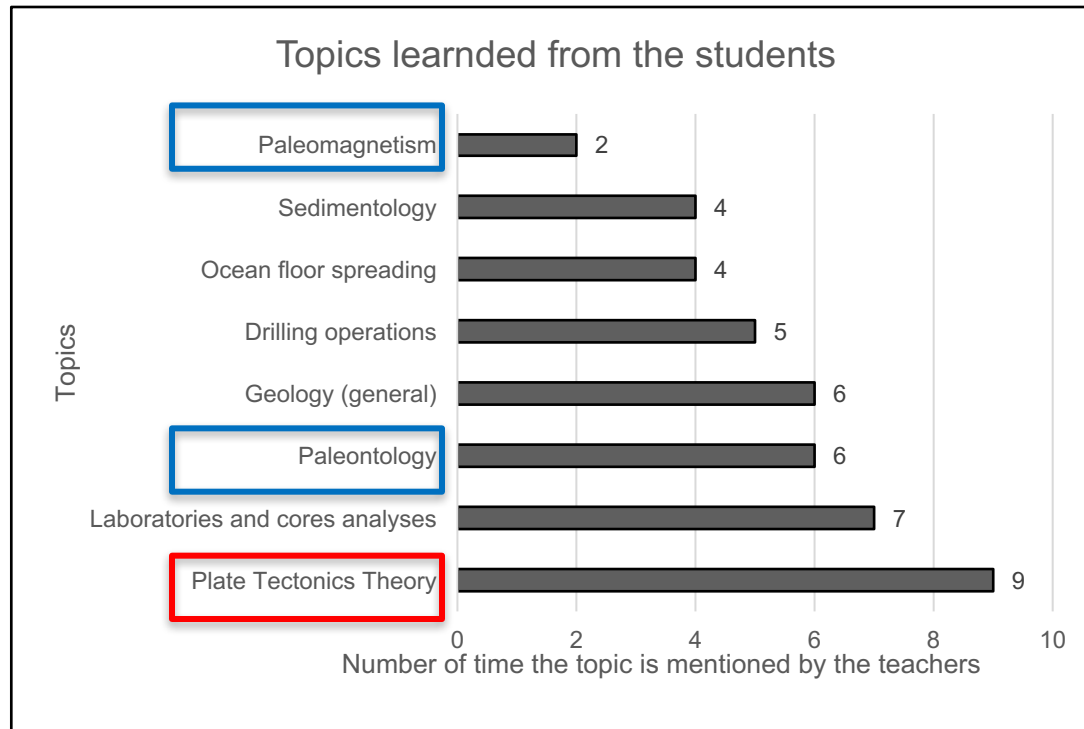
Data show that the strengths of the video-connections are undoubtedly the interactions with the researchers and the opportunity to see the scientists working live.

Results: survey



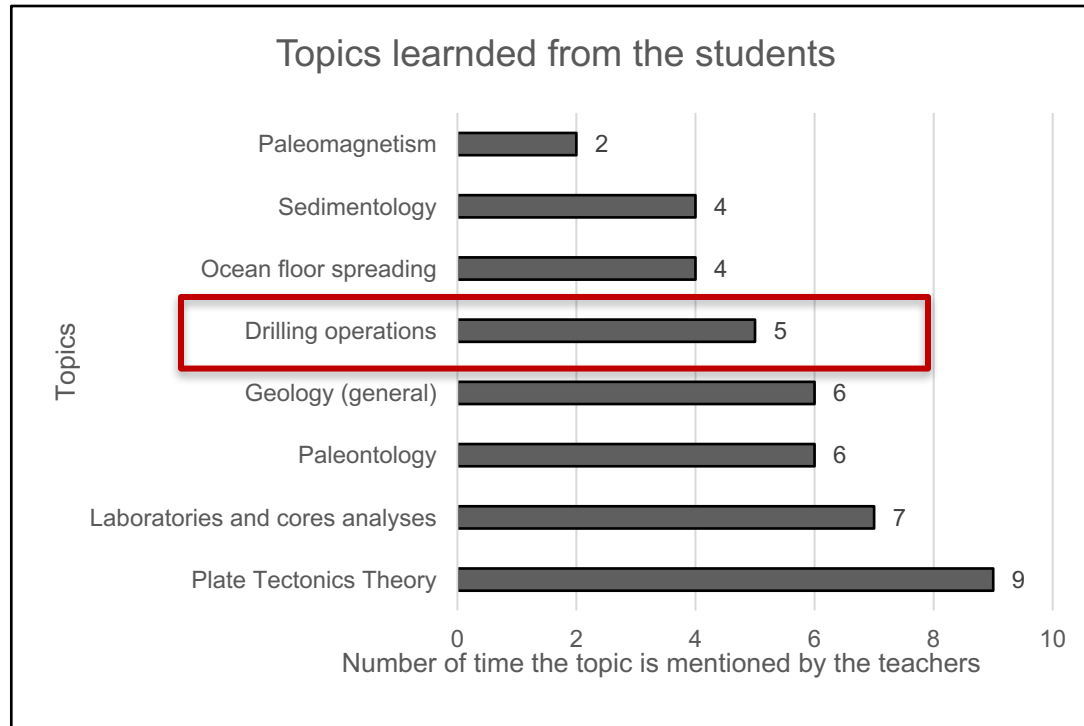
Moreover, 32 out of 42 teachers replied to the questions about the topics that, in their perception, students learned in the video connection.

Results: survey



It emerges that students learned topics related to the expedition, including **plate tectonics theory**, and topics poorly covered at school such as **paleontology** and **paleomagnetism**.

Results: survey #1



Students learned something about the **drilling operations**, a topic related to **technology** and **engineering** among the STEM disciplines.

Conclusions

The RET program investigated in this study seems to be effective in terms of:

- 1) enhancement of students' knowledge and interest in science.
- 2) interactions with the scientists are really appreciated by teachers and students and enhanced by enthusiasm in the classroom.

Conclusions:

- 3) The activity of a teacher on board a drilling ship has permitted to integrate common knowledge of students with more professional information.
- 4) A teacher on board a living with scientists and experimenting with all the technical operations could make it easier to understand topics poorly covered at school.
- 5) This integrated approach permits students to participate virtually in a real example of research in Earth sciences and to follow all the phases of the scientific method.

Conclusions

LA STAMPA VERCELLI

“Il riscaldamento globale svelato dai fossili cinesi”

La micropaleontologa vercellese Claudia Lupi in missione nei mari asiatici



LA STAMPA CC

ABBONATI

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R

Joides Resolution: nel Mar Cinese Meridionale per studiare la storia del pianeta

oggi.scienza.it/2017/03/08/joides-perforazione-oceanica-geologia/

Eleonora Degano



La massima qualità come magnetometro, spettrometro di massa, diffrattometro delle polveri, strumentazioni per studiare le proprietà meccaniche delle rocce, microscopi ottici ed elettronici. Ma anche una potente imbarcazione, in grado di effettuare la perforazione del fondo oceanico al di sotto di migliaia di metri di colonna d'acqua, con un potenziale di più di otto chilometri di tubi per la trivellazione scientifica.

Radio3scienza

IL PROGRAMMA | AUDIO | PODCAST | VIDEO | FOTO | EDIZIONI PRECEDENTI

In fondo in fondo
31/03/2017 | Visualizzazioni: 836

commenti | commenti | correlati | mail to

6) On their own initiative many teachers and students sent enthusiastic comments and decided to announce the experience in the local newspapers.

In Italy, the activity benefited of more than twenty articles in the newspapers and two interviews in national WebTV and radio programs. In some occasions, students declared to seriously consider to study geology after the broadcast.

La Provincia PAVESA

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Conferenza dal mare della Cina

la Repubblica LUNEDÌ 20 MARZO 2017

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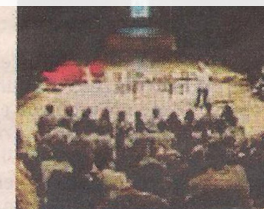
IN STREAMING

“A bordo” di una nave nelle Filippine

Nei giorni scorsi il Gioia si è collegato in streaming con la nave oceanografica “Joyce Revolution” che si trova nel ma-

Tre ricercatori italiani da un mese al largo della Cina con un team internazionale
Una trivella buca i fondali e dà la caccia alla linea che separa oceani e continenti

Cinquemila metri sotto i mari
“Qui cerchiamo



Serata al teatro Gioia

La serata, che ha avuto come filo conduttore “le emozioni”, è iniziata con la lettura dall’articolo scritto da Margherita Gazzola su un numero dell’Acuto, “Il profondo blu”, dal quale sono emerse le emozioni date dall’esplorazione sottomarina: affascinante, spaventoso, misterioso, magico. Un universo dove tutto è silenzio eppure sembra parlare.

Nei giorni scorsi il Gioia si è collegato in streaming con la nave oceanografica “Joyce Revolution” che si trova nel ma-

Was the sailing experience a valid RET?

<https://www.youtube.com/watch?v=ky87iKfLUOs>