

Report of the C.C1 Working Group Theory and Methods in Astronomy Education

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This Report corresponds to the activities of the period from Aug 2015 to Oct 2016.

Motivated by the IAU Commissions Reform, a proposal was submitted to the International Astronomical Union General Assembly (IAU) in Beijing (2012) to consider the importance of astronomy education research in the Commission 46 (Astronomy Education & Development) activities (Ros, De Greve and García, 2015). After that, a working group was established on Theory and Methods in Astronomy Education (De Greve, 2013). In brief, the WG needs and goals are as follows:

Needs:

1. Growing amount of emerging astronomy projects
2. Innovate and adapt teacher training, curricula, pedagogical methods.
3. Develop a promotional strategy for enhancing Astronomical Educational Research (AER).

Goals (to be promoted):

- 1) In different regions and continents, surveys and literature reviews of scholarly production that already exists on PhD and MSc theses, published papers in journals and works in proceedings of meetings on Astronomy, Physics and Science Education.
- 2) Meetings, courses, workshops, conferences and journals in regions and continents to enhance AER.
- 3) Structures and well succeeded practices such as GHOU, GTTP, NASE, UNawe etc.

During the last IAU GA, communication about “A new international agenda for astronomy education research” was presented, in which the WG projects and some existing results were shown (Bretones, 2015).

Since then, many contacts have been made in the GA and after. In a first moment, the surveys of theses, papers and works in different countries and languages have been increased and enhanced.

Within a network of contacts with colleagues, by e-mails and videoconference talks, the following actions were proposed towards that goal:

Steps for surveys:

- 1) Provide a list of references;
- 2) Get the pdf files of works;
- 3) Make them available online;
- 4) Analyze and classify the works by: year of publication, the authors' institutions, school level, study focus in education, content, kind of academic work, theoretical framework;
- 5) Write and publish papers about the results showing trends and gaps in the production.

Contacts with colleagues committed to these tasks include the following names and countries up to now:

Contacts and collaborations - countries:

2015

Rosa Doran, Lina Canas, Isabel Almeida Borges – Portugal; Néstor Camino - Argentina and Latin American Countries; Rosa Ros, Bernat Martínez Sebastià – Spain; Talat Saygaç – Turkey; Hidehiko Agata, Kodai Fukushima, Akihiko Tomita- Japan; Michel Faye, Suzanne Faye – France; Pedro Russo – Netherlands; Karen Masters e Derek McNally – England; Tim Slater, Andrew Fraknoi – USA; Hongfeng Guo – China; Youngng Lee - South Coreia; Jayashree Ramadas - India.

2016

Carlos Molina, Ángela Patricia Pérez Henao – Colombia; Valerie Frede, Frederic Pitout – France; Urban Eriksson – Sweden; Aniket Sule – India; Nicoletta Lanciano – Italia; Paulo Maurício – Portugal; Juan Amador Marín Martínez -Spain.

As a consequence of the e-mails and e-talks, many of them have sent a very relevant contribution in the form of lists of references and pdfs of publications that have never been collected and organized. The Table below shows this:

Received Surveys and Results

Contact/Country	Surveyed Country	Results
Néstor Camino/Argentina	Colombia	8 MSc theses; 28 undergraduate theses
Urban Eriksson/Sweden	European Countries	12 contacts of researchers and works
Paulo Maurício/Portugal	Portugal	51 MSc theses; 2 PhD theses
Frederic Pitout/France	France	7 PhD theses; 31 papers; 2 works
Nicoletta Lanciano/Italy	Italy	4 PhD theses; 17 <i>Laurea</i> theses; 63 papers; 53 works
Aniket Sule/India	India	11 contacts of researchers and works 11 papers; 8 works
Akihiko Tomita/Japan	Japan	1544 papers

As a part of the results obtained by the colleagues, some remarkable questions related to the field and the difficulties to find researchers and papers were made evident. Some of these questions are related to papers severely dispersed and published in many languages and countries. Some definite examples are:

In this paper, we discuss significances to organize our studies about astronomy educations and out-reach activities in (academic, peer-reviewed) papers. We research the trend of recent (peer-reviewed) papers about astronomy education, and we show that the papers are severely dispersed. For the establishment of astronomical education field as an important branch of academic discipline, broad sharing of knowledge in this field is highly required. (Agata, Karino and Matsumoto, 2015).

(...) I have used many different channels to identify European AER persons, and I continue to do so, and I send you the short(!) list I have so far (...). It seems to be very few, but I guess there is more AERs in different countries. I have learned that language difficulties is a large

barrier and AER persons often only publish in their own language and countries. This makes it increasingly difficult to find them. (Eriksson, 2016)

Even with these difficulties, it is appropriate for each language and country to go on making surveys, not only to establish the field, but also to give visibility to these productions and advertise to the teachers in the schools, students and interested people.

The next steps are related to perform analysis, make them widely available and give visibility to the references and publications.

Lectures in Colombia: April 2016

From 05 to 07 April, three lectures by P.S. Bretones were held in Colombia. The main subject was the need of astronomy education, the contribution to astronomy education research and the international projects of the IAU C.C1 WGs and others. More specifically, the WG-TMAE projects on surveys, publications and meetings were shown. The lectures were:

05th (Medellín, Parque Explora):

“El universo en el salón de clases: los astrónomos queremos otra cosa”.

(<https://www.youtube.com/watch?v=ECnwWkMRenQ>)

06th (Medellín, Universidad de Antioquia): “A New International Agenda for Astronomy Education Research”

07th (Bogota, Observatorio Astronómico, Universidad Nacional de Colombia):

“Nuevas Tendencias en la enseñanza de la Astronomía”

(<https://www.youtube.com/watch?v=jBSDYH2d1O0>)

In Colombia some meetings to start the collaboration with the colleagues were held, particularly to develop AER in surveys of works in the countries of the north of South America (Andean region).

WG webpage

The IAU maintains a website for the WG:

https://www.iau.org/science/scientific_bodies/working_groups/257/

At the same time, there was set up the WG webpage aiming to show the activities with more information: (www.iau-wgtm.ufscar.br)



Then, the issue of how to show the surveys and results will be discussed with the colleagues. One of the objectives is to advertise the productions in their each countries and languages. Studies like these are supposed to encourage new studies and to bind together the community of the area as well.

References

AGATA, H., KARINO, S. & MATSUMOTO, N. (2015). **Astronomy Educations as a Branch of Academic Discipline**. The Astronomical Herald (a monthly Japanese journal of the Astronomical Society of Japan), Vol.108, No.8 (August 2015 issue,521-528

BRETONES, P. S. A new international agenda for astronomy education research. 2015. In: IAU XXIX General Assembly, 29., 2015, Honolulu. **Guidebook...** Honolulu, USA, 2015. Disponível em: <https://guidebook.com/guide/39106/event/11384758/>

DE GREVE, J. P. Message from the president: C46-Div.C: From program groups to working groups. **IAU Commission 46 Newsletter 78**, p. 4-10, Oct. 2013.

ERIKSSON, U. (2016, E-mail). Personal Communication on September, 28, 2016. Kristianstad, Sweden to Paulo S. Bretones, São Carlos, Brazil.

ROS, R. M., DE GREVE, J. P. & GARCÍA, B. Report of the Business Meeting of Commission 46. In: MONTMERLE, T. (ed.) **Highlights of Astronomy**, Vol. 16, as presented at the XXVIIIth IAU General Assembly, August 2012 [Beijing, China, 20-31August 2012]. Cambridge, UK. Cambridge University Press, 2015, p. 1-2.

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