

## Projects on Astronomy Education Research and C46

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Survey studies of the academic production on Astronomy Education Research can be done in PhD and MSc Dissertations, Proceedings of Meetings and Published Papers.

This is a Proposal of a project for the encouragement of studies, programs and research projects for Astronomy Education Research (AER) in Com 46.

It is increasing the number of researches, doctors, researchers, meetings and publications in the area.

Com 46 could have an important role to recognize, encourage and promote such efforts.

Actions/Activities in international level for development, teaching, outreach and communication programs are important and necessary.

But C46 and IAU could promote further studies and educational research, as has been done by other areas of knowledge and science in particular.

Some Proceedings of IAU Meetings on Astronomy Education have been published.

We analysed six proceedings and presented an oral contribution on IAU GA in 2009 held in Rio:

| Proceedings of IAU                 | Total of papers | Papers on education |
|------------------------------------|-----------------|---------------------|
| The Teaching of Astronomy          | 92              | 91                  |
| New Trends in Astronomy Teaching   | 69              | 67                  |
| Astronomy for Developing Countries | 39              | 19                  |
| Teaching and Learning Astronomy    | 21              | 21                  |
| Astronomy for the Developing World | 56              | 40                  |
| Innovations in Astronomy Education | 45              | 45                  |
| Total                              | 322             | 283                 |

About this study, a complete article published in Astronomy Education Review analyses this production:

BRETONES, P. S.; MEGID NETO, J. An Analysis of Papers on Astronomy Education in Proceedings of IAU Meetings from 1988 to 2006. Astronomy Education Review, v. 10, n. 1, 2011. <[http://aer.aas.org/resource/1/aerscz/v10/i1/p010102\\_s1](http://aer.aas.org/resource/1/aerscz/v10/i1/p010102_s1)>

We have selected the following categories to classify the papers: the country of origin of the work, the school level or public outreach, the topics of astronomy, the focus of the study, the type of academic research, and the theoretical framework. Each work was classified according to these aspects. The data were organized into frequency tables and cross-checked to identify publication trends as:

| Level                | n   | %    |
|----------------------|-----|------|
| Elementary School    | 22  | 7.8  |
| Middle School        | 30  | 10.6 |
| High School          | 34  | 12.0 |
| University Education | 107 | 37.8 |
| Unspecified          | 96  | 33.9 |
| Public Outreach      | 78  | 27.6 |

| Focus  | n  | %    |
|--|----|------|
| Non-School Programs                                      | 80 | 28.3 |
| Curricular Discussions and Programs                      | 75 | 26.3 |
| Teaching Materials                                       | 52 | 18.4 |
| Learning & Teaching                                      | 44 | 15.5 |
| Teacher Education  | 20 | 7.1  |
| History of Astronomy /<br>History of Astronomy Education | 14 | 4.9  |
| Student and Teacher Understanding                        | 9  | 3.2  |

| Type of Academic Research   | n   | %    |
|---|-----|------|
| Reports of Education Experience<br>(R&D, Reports of Practices etc.) | 191 | 67.5 |
| Essay   | 58  | 20.5 |
| Survey  | 25  | 8.8  |
| Empirical Research  | 6   | 2.1  |
| Content Analysis  | 4   | 1.4  |
| Review  | 3   | 1.1  |
| Action Research   | –   | –    |
| Case Study  | –   | –    |

| Country         | n  | %    |
|-----------------|----|------|
| USA             | 90 | 35.6 |
| UK              | 28 | 9.9  |
| India           | 14 | 4.9  |
| France          | 13 | 4.6  |
| Canada          | 12 | 4.2  |
| Germany         | 10 | 3.5  |
| Japan           | 10 | 3.5  |
| Mexico          | 9  | 3.2  |
| Australia       | 9  | 3.2  |
| South Africa    | 5  | 1.8  |
| Spain           | 5  | 1.8  |
| Other Countries | 78 | 27.6 |

The papers presented in Rio (42 Abstracts) were after published and could be studied too:  
Highlights of Astronomy, Volume 15; XXVIIth IAU General Assembly, August 2009;  
Ian F. Corbett, ed., with.

As a conclusion of this study, we had:

- \* IAU meetings have been characterized more by reports about practical education matters and exchange of experiences, and not by scientific research in the field of education itself.
- \* The efforts to elevate Astronomy for public outreach and classrooms are always suitable for the exchange of experiences as a great academic and educational forum
- \* However, from the point of view of educational research, deeper treatments that deal with epistemological questions, teaching and learning processes proper of the area of Astronomy at different school levels and theoretical framework are necessary.
- \* A deeper look could stimulate the development of scientific investigations in Astronomy education, analogously to other areas of knowledge.

This demand has been noted by many committee members. Even Prof. George Miley, the author of the *Strategic Plan 2010-2020*, agrees with me.

As we know there are some Journals of Science Education that publish papers on Astronomy Education (AE) as: International Journal of Science Education, Journal of Research in Science Teaching, Science & Education and Enseñanza de las Ciencias.

And there are two Journals of Astronomy Education: Astronomy Education Review (AER) and Latin-American Journal of Astronomy Education (RELEA)

There are other publications on Astronomy Education as: The Universe in the classroom, The Classroom Astronomer, IAU Com 46 Newsletter and Gnomon – Newsletter of the Association of Astronomy Education. These are not publications of research papers.

A lot of suggestions/experiences/material by hard-sciences practitioners is NOT enough. We should see whether they work, and how an educational theory/framework guides us to improve teaching.

As a suggestion of this proposal, we have possible strategies:

- Section in the Com. 46 Newsletter to promote efforts on AER;
  - Ask for cooperation of the National Liaisons and IAU OAD;
  - Publish notes about meetings;
  - Publish surveys of published papers about AER in journals;
  - Support for meetings on AER;
- Others ???

Before I go to Beijing, I had agreements from Tim and Stephanie Slater to do this with me and to build a team!

Some ideas of them for how IAU Commission could better support AER:

- Symposium before or after IAU GA on How AER Results Can Impact Teaching;
- “How To” Workshop for people wanting to start doing AER research;
- Roadmap Meeting to Prioritize AER Efforts for the Next 10 Years;
- Joint Observation Plan for International Survey and Comparison of Citizen’s Astronomy Knowledge;
- Support the Publishing of Proceedings for State of the Art of Current AER Research Findings.

Other suggestions of Symposia are:

- Using Education Research to Improve Astronomy Teaching
- Astronomy Teaching in the 21st Century

So, this is my proposal and contribution and I am available to join forces and collaborate in this field.