

## **Session 3: Astronomy Education Research**



## Introduction

The first article in this session is about an invited talk by Markus Pössel, Carolin Liefke, Niall Deacon, Natalie Fischer, Juan Carlos Muñoz, Markus Nielbock, Saeed Salimpour, and Gwen Sanderson that is titled The IAU Office of Astronomy for Education. In it the authors describe the new IAU Office of Astronomy Education (OAE). The OAE was first approved at the 2018 GA in Vienna and came into being in December 2019. Its organization, goals, and activities are described and the value it provides for astronomy education is emphasized.

Following the talk questioning was active and Mirjana Povic asked:

*I can see that many African countries still do not have established NAEC team. Can from the African astronomical society we help you with that?*

The response was:

*While three of the officers of the African Astronomical Society have been involved in the NAEC selection process in different roles, I believe we have not formally asked the AfAS for support in this matter. Thanks for the suggestion, we will follow up on that!*

Noorali Jiwaji asked:

*In the world map can you explain what the yellow means*

Markus Pössel replied:

*The yellow areas in the NAEC world map are those countries where we have a nomination, but will still need to confirm the NAEC candidates. There is a distinction here between countries who have an official IAU National Committee for Astronomy as their official national IAU body, and countries who have not; since we want the NAECs to be anchored in their national communities, for countries with an NCA, the NCA confirms the NAEC Teams. Where there is no NCA, the OAE itself makes the confirmation, based on the candidates' qualifications and recommendations from the community.*

After the talk Amelia Bayo asked:

*Hi Sally, such a great project!!! In Chile (within NPF) we are producing astronomy mirrors / segments out of carbon fiber, therefore much lighter, would that be something of interest for the new telescope?*

Salma Sylla asked:

*In how many languages, the resources are available?*

Markus answered:

*All of our translation projects are currently in the future; based on a first analysis of the prevalence of languages spoken by school-age children/young adults, we are looking at about 30 to 40 languages, though – which will be considerable work, as we are well aware!*

Lara Rodrigues asked:

*In there a link for the astronomy education survey worldwide you mentioned?*

Markus answered:

You can find the NAEC summaries of their country's educational systems, and the role of astronomy within those systems, here: <https://www.haus-der-astronomie.de/oea/worldwide>

Mayra Lebron asked:

*How do the OAE Nodes and Centers relates with the NAECs?*

Markus answered:

*Those are separate structures, although of course we expect there to be overlap. The main role of the OAE Nodes and OAE Centers is to be part of the OAE overall – they are \*not\* regional offices (such as the ROADS of the OADs), but all of them have an international perspective and reach – they support the overall mission of the OAE, not the activities of the OAE regarding a specific country (although there might be some overlap, e.g. when it comes to supporting certain translations, or helping organise regional events). The NAECs, in contrast, are country-specific.*

Finally, within State of the Art in Astronomy Education Hakim Malasan and co-authors Rosa M. Ros, Chatief Ku Next Susana Duestua writes about IAU Strategic Plan 2020-2030 and Division C Education, Outreach and Heritage. She discusses how Division C fits into and supports the goals of the Strategic Plan. She outlines how the division stays dynamic and finishes with plans for great work in the future.

Following this is an article called “Research, Innovation, Scientific Literacy and Inclusion in Astronomy” written by Nicoletta Lanciano, Amelia Ortiz-Gil, and Néstor Camino. This was written about a roundtable session that addressed issues of research, innovation, scientific literacy, and inclusion. Details were introduced about each and contributions of the participants in these areas were recognized.

Students' Preconceptions in Astrophysics – How to break them down? was written by Corina Toma. In it she talks about the most common preconceptions of students entering into the study of astrophysics and how to break them down. She emphasizes the use of active teaching methods that include experiments and models.

After the talk Kelly Lepo asked:

*Thanks for the great talk Corina. Are there any resources that NASA or other organizations could make that would help help you in the classroom to overcome your student's preconceptions?*

And Corina answered:

*Of course. I use many times NASA, ESA, ESO resources*

The final paper of this section called “Meet the skies of world : First Intecontinental-experimental course of teacher training in Astronomy, of a cooperative and participatory type, in a time of physical distancing” was written by Nicoletta Lanciano and Nestor Camino. The authors describe virtual course development necessitated by the global pandemic. Meet the Skies of the World is the first with a second to follow. Key items are outlined and they finish with what will be accomplished by the next course.

Following the talk Lara Rodrigues asked:

*Nicoletta and Néstor, congratulation on your work. It is very inspiring! Have you evaluated it with some method? And also, do you plan to follow-up with the participant teachers' and see how they apply what they learn with their students? Thank you!*

And Néstor replied:

*Hola Lara. Thank you for your greetings. We had an evaluation by the comments of the more than 100 participants, but we don't have any “tracing” of the way each teacher worked with their students. We will develop another course, level II, next year, with the same teachers, that will be another way of evaluation. thank you. yours. Néstor.*

# The IAU Office of Astronomy for Education

Markus Pössel<sup>1</sup> , Carolin Liefke<sup>1</sup>, Niall Deacon<sup>1</sup>, Natalie Fischer<sup>1,2</sup>,  
Juan Carlos Muñoz<sup>1</sup>, Markus Nielbock<sup>1</sup>, Saeed Salimpour<sup>1</sup>  
and Gwen Sanderson<sup>1</sup>

<sup>1</sup>IAU Office of Astronomy for Education and Haus der Astronomie,  
Königstuhl 17, 69117 Heidelberg, Germany  
Contact email: [oea@astro4edu.org](mailto:oea@astro4edu.org)

<sup>2</sup>Forscherstation – Klaus-Tschira-Kompetenzzentrum  
für frühe naturwissenschaftliche Bildung gGmbH,  
Speyerer Straße 6, 69115 Heidelberg, Germany

**Abstract.** Since January 2020, the International Astronomical Union has an Office of Astronomy for Education (OAE). The OAE, which joins the previously existing IAU Offices for Astronomy for Development (OAD), Astronomy Outreach (OAO) and Young Astronomers (OYA) is hosted at Haus der Astronomie, a center for astronomy education and outreach operated by the Max Planck Society in Heidelberg, Germany. This contribution outlines the mission of the OAE, the current state of the office, its background, mission and collaborative structure, as well as the activities that have already started or are planned for the future.

**Keywords.** astronomy education, IAU Strategic Plan 2020–2030, International Astronomical Union

---

The IAU Office of Astronomy for Education is the newest office of the International Astronomical Union, and a key element of the Union's Strategic Plan 2020–2030. As such, we are grateful to the organisers for allowing us to present both our plans for and the current state of the IAU OAE at this symposium.

## 1. The Office of Astronomy for Education's role within the IAU

The IAU is the worldwide umbrella organisation of and for professional astronomers. Traditionally, its role has been two-fold: Since its foundation in 1919, the Union has organised scientific meetings, including General Assemblies every three years and IAU Symposia such as IAUS 367. Also, the IAU has been instrumental for the establishment, via its resolutions, of formal community consensus on issues where such consensus is deemed useful — such as the definition of specific coordinate systems, of the astronomical unit, or, famously, of what a planet is. The IAU has also traditionally been responsible for naming celestial objects, or features on the surfaces of such objects (such as craters of the Moon).

But over the past decade, the IAU has also become much more active beyond those traditional areas of activity. Notably, at the 2009 General Assembly, the IAU adapted its Strategic Plan 2010–2020, “Astronomy for Development — Building from the IYA 2009” (Miley 2009), which grew out of activities in the framework of the International Year of Astronomy 2009 (Russo & Christensen 2009). In the plan's successor, the extended Strategic Plan 2020–2030 (van Dishoeck & Elmegreen 2019), the perspective has broadened: In that plan, education and outreach come into their own, on par with the continuing goal of leveraging astronomy for development.



**Figure 1.** The OAE logo, designed by Juan Carlos Muñoz and Gwen Sanderson, combines representations of classic and modern tools of education.

The organisational structure of the IAU has two main strands. On the one hand, the IAU provides a framework for astronomers to self-organise, bringing together those who are experts on, and interested in engaging with, specific astronomical topics. For that purpose, there are within the IAU nine Divisions, most of them defined along astronomical sub-disciplines (such as Planetary Systems and Astrobiology in Division F, or Sun and Heliosphere in Division E), with an additional layer of organisation in the shape of 35 Commissions, each associated with one or more divisions. For our purposes, the relevant division is Division C, “Education, Outreach and Heritage,” whose president, Susana E. Deustua, is also on the steering committee of the IAU Office of Astronomy for Education. Specifically, Commission C1 (President 2018–2021: Paulo S. Bretones) is concerned with “Astronomy Education and Development.”

In order to accomplish specific tasks, divisions or commissions can institute Working Groups. Such Working Groups are by default term-limited, namely instituted at an IAU General Assembly for the period of time until the next such assembly three years later. There are exceptions in the shape of so-called Functional Working Groups that fulfill more long-term tasks (such as the naming of minor bodies), and thus are exempt from the three-year limit.

It is at this point, namely when considering alternatives to getting things done via temporary Working Groups, that the idea of IAU Offices comes into play. Prior to 2019, the three offices were the Office of Astronomy for Development (OAD; [McBride & Venugopal 2020](#)) in Cape Town, South Africa; the IAU Office for Astronomy Outreach in Tokyo, Japan (OAO; [van Dishoeck & Elmegreen 2019](#)) and the (virtual) Office for Young Astronomers (OYA; [Gerbaldi \*et al.\* 2011](#)) tasked with organising the annual International School for Young Astronomers (ISYA).

This, then, was the context for the establishment of the IAU Office of Astronomy for Education — completing the quartet of IAU offices with a mission that is centered around the leveraging of astronomy for the benefit of education in primary and secondary schools (Fig. 1). Both the overall aim and five specific goals were specified within the IAU’s Strategic Plan 2020–2030, which was approved in August 2018 at the XXXth IAU General Assembly, in Vienna, Austria. The plan lists the overall mission of the IAU as “The mission of the International Astronomical Union is to promote and safeguard astronomy in all its aspects (including research, communication, education and development) through international cooperation.” Based on this mission, the plan spells out five specific goals, including the following as Goal 5: “The IAU stimulates the use of astronomy for teaching and education at school level.”

After the Strategic Plan had been approved, newly-elected IAU General Secretary Teresa Lago swung into action: On October 31, 2018, the IAU launched an international

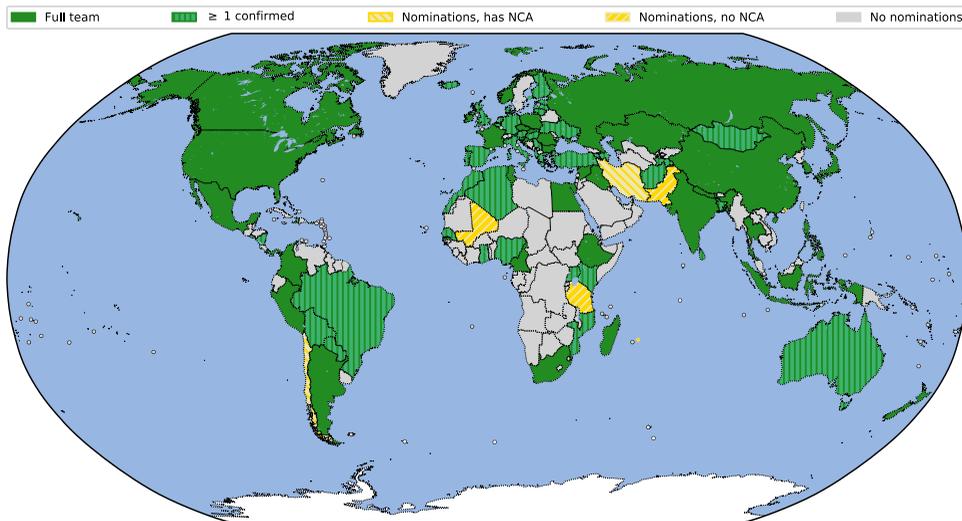


**Figure 2.** Establishment of the IAU Office of Astronomy for Education at the 1st Shaw-IAU Workshop on Astronomy for Education at IAU headquarters in Paris on 17 December 2019. Center group left to right: OAE Deputy Director Carolin Liefke, OAE Director Markus Pössel, IAU General Secretary Teresa Lago signing the Memorandum of Understanding, IAU Division C President Susana Deustua and IAU President-Elect Debra Elmegreen. Image: IAU/A. Gustin.

call for Letters of Intent to institutions willing to host the new IAU Office of Astronomy for Education, to be submitted by December 31, 2018. From the 23 Letters of Intent received in response, an ad-hoc selection committee made a short-list. On 28 February, 2019, the nine short-listed applicants, namely institutions from Australia, China, France, Germany, India, Italy, Netherlands, and the USA, were asked to submit a full application. By the 30 June, 2019 deadline, six proposals had been received. Haus der Astronomie, Heidelberg (Pössel 2011), emerged as the clear winner once the proposals had been evaluated and ranked, and also received the unanimous approval of the IAU Executive Committee. The decision was communicated to Haus der Astronomie on 13 September, and a Memorandum of Understanding establishing the OAE came into force on 17 December, 2019, signed by Hans-Walter Rix as managing director of the Max Planck Institute for Astronomy representing the host institution, and IAU General Secretary Teresa Lago for the IAU (Fig. 2).

## 2. OAE: Planned and current activities

From the IAU mission, and the goals formulated in the IAU Strategic Plan 2020–2030, it is clear that setting up the OAE's activities must begin with the question: Which actions aimed at fostering the leveraging of astronomy to benefit primary and secondary education are appropriate and effective for an IAU office to take, at an international level? There are several aspects to this. First of all, what actions are appropriate at an international level? After all, the most important interactions in education happen locally, between teachers and learners, and between the learners themselves. Also, even within the IAU community and the wider astronomy community, there are numerous actors supporting astronomy education with individual actions, but also within the framework of large-scale projects, such as Universe Awareness (UNAWA; Miley, Ödman & Russo 2020), EU Space Awareness (Russo 2015), the Galileo Teacher Training Program (GTTP; Doran 2012) or the Network for Astronomy School Education (NASE; Ros 2012). It is clear that any additional IAU effort needs to make sure not to re-invent any wheels.



**Figure 3.** Overview of the current reach of the network of National Astronomy Education Coordinator Teams (NAEC Teams). Figure: N. Deacon and G. Sanderson.

The strategy that we formulated as part of the Haus der Astronomie application to host the OAE takes into account those boundary conditions. Our conclusion from those boundary conditions is that it is the task of the OAE to foster professionalisation in astronomy education both for educators and for professional astronomers involved in education, to create, curate, translate and help disseminate fundamental resources, to foster the creation of community-wide standards both for astronomical resources and for teacher training events, and to foster and support suitable infrastructure for astronomy education. Involvement of the various national and regional astronomy education communities requires active networking.

### 2.1. Networking

Liaising between the OAE and the various national astronomy education communities are the National Astronomy Education Coordinator Teams (NAEC Teams). The worldwide NAEC network comprises astronomers and educators with expertise in primary and secondary education. NAECs interface between the OAE and the educational community in their respective countries; they are tasked with identifying local needs in astronomy education, promoting astronomy in national curricula, and developing teaching resources and training events.

Each NAEC team is composed of up to 5 members, covering their country's diversity in terms of gender, geographical distribution, ethnicities and, where applicable, languages. In countries that have a National Committee for Astronomy, the NCA can directly nominate their NAEC team. Individuals can also submit self-nominations; if their country does not have an NCA, the OAE team evaluates their application. As of the time of this writing in January 2021, the tally of NAECs is the following:

- 318 Nominations / Self-Nominations from 87 countries
- 300 confirmed NAECs from 82 countries
- 230 NCA- Nominations from 60 countries
- 86 Self-Nominations from 34 countries (of which 9 are awaiting approval)

19 countries have not sent any nominations. The current reach of the NAEC network is shown in Fig. 3.

In addition to the NAECs, there are plans for more specific extensions of the OAE, in the shape of what we call OAE Centers and OAE nodes — hosted by institutions who are willing to commit specific funds and FTE resources to the OAE, with the goal of solidifying the long-term international reach of the office. Nodes and Centers differ both in scope and amount of resources provided by the host institution, but all of them are active internationally: their scope is not primarily regional; instead, all of them are meant to have international reach. Centers are expected to have similar dedicated staffing and funds as the OAE itself, whereas Nodes are more limited in scope and resources.

Of course, our networking activities do not end with the NAECs, the OAE Centers and OAE Nodes. In addition, the OAE will aim to keep in touch with astronomy education stakeholders within and without the IAU. One eventual aim is to create a data base of professional astronomers who are interested in astronomy education, and in furthering the mission of the OAE. Last but not least, given that the goals of the various IAU offices have some overlap, the OAE participates in regular coordination meetings with the other offices.

## 2.2. *OAE Reviews*

OAE Reviews are meant to be a key tool for the office's professionalisation of astronomy education. They are meant to provide professional astronomers and astronomy education practitioners with a ready means of getting up to speed in areas pertinent to astronomy education — from teaching methods to background information in astronomy education to astronomy-specific topics, for example daylight observations, or indigenous astronomy. By default, each OAE Review is written by an OAE Review Panel consisting of educators and researchers, and the creation process always includes the solicitation of community feedback.

Currently under way are three OAE Reviews: The OAE Review on Equity, Diversity and Inclusion has constituted its OAE Review Panel, which has met several times remotely in order to organise work on the review. The OAE Review on Digital Teaching and Learning, intended to summarize best practices on how to efficiently use digital technology for educational purposes, including (but not limited to) interactive simulations, e-assessment tools, and online teaching, is currently recruiting its Panel.

The OAE Review on Astronomy Education around the World, which is led by OAE staff (Saeed Salimpour and Niall Deacon), will be based on, and analyze in a larger context, descriptions of various countries' educational systems by the respective NAEC teams. The descriptions are meant to cover the role that astronomy plays in primary and secondary education in each country. To date, first versions of 64 of these country-specific documents have been published on the OAE website.

The establishment of additional OAE Review panels is planned for 2021. Once we are joined by OAE Centers and OAE Nodes, the supporting roles ("OAE support scientist" for an OAE Review) will be filed by OAE Center and OAE Nodes personnel. The OAE Astronomy Education Seminar Series (see below) is also meant to aid us in finding prospective OAE Panel members, as well as resources useful for inclusion in OAE Reviews.

## 3. **Astronomy Education Infrastructure**

An important part of the OAE's mission of fostering astronomy education is the creation and operation of suitable infrastructure.

### 3.1. *astroEDU*

astroEDU (<https://astroedu.iau.org>) is an open-access online resource of peer-reviewed astronomy education activities (Russo *et al.* 2015) which has since its inception been a collaborative effort between various institutions. It is a project of the International Astronomical Union under the framework of the IAU Office of Astronomy for Development. The project is supported by the IAU OAD, Universe Awareness, Leiden University, LCO, Space Awareness, Europlanet and European Union. IAU astroEDU is part of Europlanet 2020 RI and EU Space Awareness projects and it has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreements No 654208.

astroEDU has now been transferred to the stewardship of IAU OAE as part of the core astronomy education resources. OAE will provide/fund the framework both for the public-facing astroEDU website and for the underlying journal management system, as well as organisational support. The scientific responsibility will remain with the scientific community, and notably with astroEDU editor-in-chief Michael Fitzgerald of Edith Cowan University, Perth.

### 3.2. *Astronomy education resources data base*

A key part of OAE planning is the maxim not to re-invent wheels. The number one go-to resource for research astronomers in search of specific bits of literature is the NASA Astrophysics Data Service (ADS; Accomazzi *et al.* 2015). OAE is currently in negotiations with the NASA ADS team to expand the ADS data base to include astronomy education resources, in English as well as in other languages, with the OAE acting as curator for the pertinent ADS collection.

### 3.3. *Big Ideas in Astronomy*

Big Ideas in Astronomy (Retrê *et al.* 2019) is a project by the Leiden Observatory, Leiden University (the Netherlands) and Institute of Astrophysics and Space Sciences (Portugal) in the framework of the IAU Commission C1: Working Group on Research and Methods. The aim of this project was to create a document that constitutes a proposal for a definition of astronomy literacy: a list of “big ideas,” complete with descriptions in terms of sub-ideas, that any astronomy-literate person should be familiar with. The Big Ideas project having reached a state where the main initial work is completed, extensive feedback from the community has been obtained, and a new version that incorporates that feedback created, its focus has now moved to creating faithful translations of the Big Ideas document, as well as occasional revisions at regular intervals.

With a memorandum of understanding signed in October 2020, OAE has taken over stewardship for the Big Ideas in Astronomy project, with the previous IAU Commission C1 working group becoming Big Ideas Advisory Panel. The rollout of version 2 is currently underway. The website is already online although not yet ready for public distribution. Work is ongoing to put the existing translations into the Big Ideas booklet design. The full rollout of version 2 is envisioned by the end of the first quarter of 2021.

## 4. Astronomy Education Resources

Part of our mission is to provide astronomy educators worldwide with a basic collection of open, high-quality educational resources, either curated or newly created, translated wherever possible into the learners' native languages, and available under licenses that allow for free use (namely suitable Creative Commons licenses). Full strategic planning will only become possible once the OAE Centers and Nodes are in place, and we have

a more reliable idea about the personnel and funds we can bring to bear on the various projects; the following is an indication of where we are starting:

#### 4.1. *Multilingual Glossary*

We expect translation of various resources into dozens of languages to be an important part of OAE activity over the years to come. As a solid basis for such translations, we have begun creating a multilingual glossary, as a joint project with OAO (Lina Canas, Hidehiko Agata). On the OAE side, the project lead is Niall Deacon. The project aims to produce a glossary of a few hundred astronomical terms that will commonly come up in primary or secondary school lessons, with translations both of the terms itself and brief definitions (providing context) into as many languages as we can manage. The initial batch of terms will be the result of an iteration projects: Starting out with a list drawn from the Japanese glossary (Agata) as well as the Big Ideas document, we have asked the NAECs for additions, and are currently in a stage where expert panels are meant to select the most pertinent terms from the current pool, separately for primary and secondary school teaching. To ensure the quality of the translations, we will institute a review process where, ideally, each translation will have been checked by a professional astronomer who is also a native speaker.

#### 4.2. *Astrophotography Contest*

Suitable images are an important teaching tool. In a number of areas of astronomy, numerous excellent images are available, thanks to the image publications notably from the NASA/ESA Hubble Space Telescope and the ESO telescopes. In other areas, notably in situations where high-end and/or space telescopes are unsuitable, there are some gaps when it comes to images accessible freely under open licenses. The aim of our Educational Astrophotography Contest, our astrophotography competition launched in early 2021, is to fill some of the gaps. Winning images will receive cash prizes, and will be released as Open Educational Resources under a suitable Creative Commons license. Depending on the success of the initial contest, we expect to follow up with more targeted contests over the following years.

#### 4.3. *Visualisation resources*

In order to kick-start the OAE resource pool for images and animations, we are currently working on diagrams/animations/visualisations specifically related to the topics of the “Big Ideas in Astronomy,” both with HdA’s Thomas Müller and with the visualisation specialist Stefan Payne-Wardenaar.

#### 4.4. *Standards for astronomy education resources*

Part of the mission of the OAE is to establish community-consensus standards for what makes for high-quality education resources. To start the process, we will solicit ideas about such standards from astronomy educators as well as external experts in early 2021.

## 5. Events

#### 5.1. *Shaw-IAU Workshops*

The Shaw Prize Foundation has generously provided funding to the IAU for an annual Shaw-IAU Workshop on Astronomy for education. The First Shaw-IAU Workshop was

held in Paris in December 2019, and served to provide the nascent OAE with feedback from the astronomy education community regarding plans and strategy.

The Second Shaw-IAU Workshop on Astronomy for Education was a fully online event held on Oct 6-9 2020. It brought together the NAECs and other key actors in the field of astronomy education. The Opening Session also served as the official launch event of the OAE, featuring Ewine van Dishoeck as President of the International Astronomical Union (IAU); Theresia Bauer, MdL, Chair of the Zeiss Foundation Administration as well as Minister for Science, Research and Art of the German State of Baden-Württemberg; Beate Spiegel, Managing Director of the Klaus Tschira Stiftung; Kenneth Young, Chairman of the Shaw Prize Council and Vice Chair of its Board of Adjudicators, representing the Shaw Prize Foundation; Teresa Lago as General Secretary of the IAU; with a keynote address by Svein Sjøberg, University of Oslo, on the ROSE study (Relevance Of Science Education).

Over the following days, 347 participants from 82 countries were able to attend 31 talks in sessions dedicated to Making astronomy education equitable, diverse and inclusive; Astronomy education within the IAU; Astronomy education in low-tech environments; Astronomy education resources; and Astronomy education around the world. Participants were also able to visit poster displays and “NAEC booths,” in which a total of 51 NAEC Teams presented themselves and their countries.

### 5.2. *OAE Seminar Series*

We are currently making plans for an OAE Online Seminar Series. In the series, we want to provide information about the same topics that are also covered in the OAE Reviews — with the series effectively acting as a “trial run” for the different reviews. We also want to introduce astronomers and astronomy education practitioners to the basics of astronomy education research. The overall aim is to bring together experts and members of the astronomy, astronomy education and general education research communities to instigate fruitful discussions about how to engage in astronomy education. Our target group consists of anyone interested in understanding the fundamentals of astronomy education and astronomy education research, whether a beginner or a seasoned expert.

### 5.3. *Schools for Astronomy Education (SAE) and standards for teacher training events*

As per the Strategic Plan 2020–2030, the OAE will eventually organise an Annual International School for Astronomy Education (ISAE) for teachers, as well as Regional Schools for Astronomy Education. While the current pandemic makes such endeavours impossible at this time, for us, it in fact makes sense for the ISAEs, and Regional SAEs to commence at a later stage: Another of our goals, after all, is to establish community-consensus standards for teacher training events, and the proper order is for our own activities in that field to commence after at least a preliminary version of the standards has been established. As in the case of astronomy education research standards, we will start the process by soliciting ideas about, and views on, such standards from astronomy educators as well as external experts in early 2021.

## 6. Who does the work?

So who are the actors — who does the work? The IAU OAE is operated by Haus der Astronomie (HdA), a center for astronomy education and outreach in Heidelberg, Germany, which is administered by the Max Planck Institute for Astronomy (MPIA) in Heidelberg, which in its turn is part of the Max Planck Society for the Advancement of Science, Germany’s largest society for fundamental research. As such, OAE is based, in



**Figure 4.** Aerial view of the MPIA Campus, showing the main building of the Max Planck Institute for Astronomy (right), MPIA's Elsässer laboratory (top), and Haus der Astronomie as seat of the IAU Office of Astronomy for Education (left). Image: Dominik Elsässer.

style, in a spiral-galaxy-shaped building on Königstuhl mountain (cf. Fig. 4) — although for its first year, OAE staff operated almost exclusively from home, meeting up virtually at regular intervals.

Funding for OAE operations is provided by the Klaus Tschira Foundation, the Carl Zeiss Foundation, and the Shaw Prize Foundation, in addition to regular funding that comes from the budget of the IAU itself.

The management of the OAE consists of Markus Pössel as OAE Director, who is also the Managing Scientist of Haus der Astronomie, and Carolin Liefke as Deputy Director, who is a Haus der Astronomie staff member with a dual appointment at Heidelberg University. Staff funded by the OAE budget includes Markus Nielbock, Juan Carlos Muñoz and Niall Deacon as OAE Coordinators, Saeed Salimpour as OAE Astronomy Education Research Coordinator, and Gwen Sanderson as Organizational Assistant. In the area of primary education, we are supported by Natalie Fischer (HdA) as a consultant. OAE work profits greatly from collaboration with additional Haus der Astronomie staff.

At the point of this writing, namely in January 2021, we are about to sign Memoranda of Understanding that will enlarge the OAE beyond the central Heidelberg office: Following our 2020 call for OAE Centers and Nodes, we are now looking forward to establishing OAE Centers Italy, India, China, Cyprus, and Egypt, as well as OAE Nodes in France, South Korea, and Nepal.

OAE strategic planning and operations are supported by the OAE Steering Committee, which consists of Susana Deustua (Space Telescope Science Institute; chair), Coryn Bailer-Jones (Max Planck Institute for Astronomy), Matthias Bartelmann (Heidelberg University), and Teresa Lago (IAU General Secretary). In 2020, the Steering Committee met five times, namely in January, April, July, September and December.

Up-to-date information about OAE activities is available on the office's website at [<http://www.astro4edu.org>].

## 7. Conclusion

With the IAU Office of Astronomy for Education, the IAU has taken a decisive step towards the goal of leveraging astronomy for education, in particular for education in the STEM subjects (science, technology, engineering and mathematics). Over the coming

years, the OAE aims at fostering astronomy education world-wide, following the strategy outlined in this contribution, while remaining flexible when it comes to reacting to specific community issues. Both in the framework of the IAU and beyond, there have been numerous powerful initiatives, on different scales, to support astronomy education, and the OAE is happy to be able to take its place in the existing vibrant astronomy education international community.

## References

- Accomazzi, A., Kurtz, M. J., Henneken, E. A., Chyla, R., Luker, J., Grant, C. S., Thompson, D. M., Holachek, A., Dave, R. & Murray, S. S. 2015 in A. Holl, S. Lesteven, D. Dietrich & A. Gasperini (Eds.), *Library and Information Services in Astronomy VII, ASP Conference Series* 492, pp. 189–197. [arXiv:1503.04194](https://arxiv.org/abs/1503.04194)
- van Dishoeck, E. & Elmegreen, D.M. 2018, *IAU Strategic Plan 2020–2030*, [www.iau.or/tati/ducatio/tragicplan-2020-2030.pdf](http://www.iau.or/tati/ducatio/trategicplan-2020-2030.pdf)
- van Dishoeck, E. & Elmegreen, D.M. 2020, *Proceedings of the International Astronomical Union* 14(A30), pp. 546–548. DOI: [10.1017/S1743921319005337](https://doi.org/10.1017/S1743921319005337)
- Doran, R. 2012, *Proceedings of the International Astronomical Union* 10(H16), p. 547. DOI: [10.1017/S1743921314012046](https://doi.org/10.1017/S1743921314012046)
- Gerbaldi, M., DeGreve, J. P. & Guinan, E. 2011, *Proceedings of the International Astronomical Union* 5(S260), pp. 642–649. DOI: [10.1017/S174392131100295X](https://doi.org/10.1017/S174392131100295X)
- McBride, V. & Venugopal, R. 2020, *Proceedings of the International Astronomical Union* 14(A30), pp. 553–554. DOI: [10.1017/S1743921319005350](https://doi.org/10.1017/S1743921319005350)
- Miley, G. 2009, *Astronomy for Development: Strategic Plan 2010–2020*, [www.iau.or/tati/ducatio/tragicplan-2020-2030.pdf](http://www.iau.or/tati/ducatio/tragicplan-2020-2030.pdf)
- Miley, G., Ödman, C. & Russo, P. 2020, in Visser, J., & Visser, M. (Eds.), *Seeking Understanding* (Brill — Sense), pp. 119–135, DOI: [10.1163/9789004416802](https://doi.org/10.1163/9789004416802), [arXiv:2001.00456](https://arxiv.org/abs/2001.00456)
- Pössel, M. 2011, *Astronomie und Raumfahrt im Unterricht* 48(3–4), pp. 31–34.
- Retrê, J., Russo, P., Lee, H., Penteadó, E., Salimpour, S., Fitzgerald, M., Ramchandani, J., Pössel, M., Scorza, C., Christensen, L. L., Arends, E., Pompea, S. & Schrier, W. 2019, *Big Ideas in Astronomy: A Proposed Definition of Astronomical Literacy*. [www.iau.org/static/archives/announcements/pdf/ann19029a.pdf](http://www.iau.org/static/archives/announcements/pdf/ann19029a.pdf)
- Ros, R. 2012, *Physics Education* 47(1), pp. 112–119. DOI: [10.1088/0031-9120/47/1/112](https://doi.org/10.1088/0031-9120/47/1/112)
- Russo, P. 2015, *Proceedings of the International Astronomical Union* 11(A29A), p. 398. DOI: [10.1017/S1743921316003409](https://doi.org/10.1017/S1743921316003409)
- Russo, P., Gomez, E., Heenatigala, T. & Strubbe, L. 2015, [arXiv:1501.07116](https://arxiv.org/abs/1501.07116)
- Russo, P. & Christensen, L. L. 2009, *International Year of Astronomy 2009: Final Report*, [www.astronomy2009.org/static/archives/documents/pdf/iya2009\\_final\\_report.pdf](http://www.astronomy2009.org/static/archives/documents/pdf/iya2009_final_report.pdf)